

CONTRIBUTORS

Knox County Hazard Mitigation Planning Committee

Jurisdictional Representatives

Name	Title	Department	Jurisdiction/Agency/Organiz
Evan Glasgow	Presiding Commissioner	County	Knox County
Roger Parton	Western District Commissioner	County	Knox County
Ronnie Leckbee	Eastern District Commissioner	County	Knox County
Alex Reel	Mayor	Administration	City of Edina
Margaret Gibson	City Clerk	Administration	City of Edina
Keli Luthenauer	Mayor	Administration	City of Baring
Tara Lowe	City Clerk	Administration	City of Baring
Tara Schrage	City Clerk	Administration	City of Hurdland
Kris McCarty	Mayor	Administration	City of Hurdland
Larry Edwards	Mayor	Administration	City of Knox City
Amanda Frost	City Clerk	Administration	City of Knox City
Meg Glover	Mayor	Administration	Village of Newark
Rita Lindsey	City Clerk	Administration	Village of Newark
Jason Violette	Mayor	Administration	Village of Novelty
Anna Applegate	City Clerk	Administration	Village of Novelty
Andy Turgeon	Superintendent	Administration	Knox County R-I School Dist.

Stakeholder Representatives

Name	Title	Department	Agency/Organization
Lisa Doster	County Engagement Specialist	Administration	MU Extension
Amy Crawford	Area Engineer	Transportation	Missouri Department of Transportation
Lori Moots-Clair	Administrator	Health Care	Knox County Health Dept.
Travis Mathes	General Manager	Utility	Lewis County REC

The Knox County stakeholders listed above were sent an invitation by email to attend the planning meeting and/or provide input. No comments were received from the stakeholders during the planning process and they did not choose to participate in the planning meeting.

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EXECUTIVE SUMMARY

The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Knox County and participating jurisdictions and school/special 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/special districts. The plan is an update of a plan that was approved in 2015. 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 County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that covers the following jurisdictions that participated in the planning process:

- Unincorporated Knox County
- City of Baring
- City of Edina
- City of Hurdland
- City of Knox City
- Village of Newark
- Village of Novelty
- Knox County R-I School District

Knox County and the entities listed above developed a Multi-Jurisdictional Hazard Mitigation Plan that was approved by FEMA in 2015 (hereafter referred to as the *2015 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 Knox County and participating jurisdictions. The MPC updated the risk assessment that identified and profiled hazards that pose a risk to Knox 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. Public Awareness- Using a variety of communications avenues to increase the citizens awareness of and promote education about the natural hazards that they may face, their vulnerability to these hazards, and how to lessen the effect of future natural hazards.
2. Strengthen communication and coordination between local governments, emergency personnel, public agencies, and citizens to mitigate the effect of future natural hazards.
3. Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties; on natural resources; on infrastructure; and on the local economy.

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
Knox County 2020.1	NFIP Participation	Knox County	High	3	Flooding	X		
Knox County 2020.2	Flood Mitigation	Knox County	High	3	Flooding	X	X	
Knox County 2020.3	Install/Upgrade Warning Sirens	Knox County	Medium	3	All	X		
Knox County 2020.4	Maintain Transportation Infrastructure	Knox County	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Knox County 2020.5	Response to Pandemic	Knox County	Medium	2	Pandemic	X		
Knox County 2020.6	Safe Rooms and Storm Shelters	Knox County	High	3	Tornado, Severe Thunderstorms	X		
Knox County 2020.7	Generator for Shelters	Knox County	High	3	Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado	X		
Baring 2020.1	Install/Upgrade Sirens	City of Baring	High	3	All	X		
Baring 2020.2	Maintain Transportation Infrastructure	City of Baring	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Baring 2020.3	Safe Rooms and Storm Shelters	City of Baring	High	3	Tornado, Severe Thunderstorms	X		

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Edina 2020.1	Generator for Shelter(s)	City of Edina	High	3	Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado	X		
Edina 2020.2	Maintain Transportation Infrastructure	City of Edina	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Edina 2020.3	Install/Upgrade Sirens	City of Edina	Medium	3	All	X		
Hurdland 2020.1	Install/Upgrade Sirens	City of Hurdland	High	3	All	X		
Hurdland 2020.2	Maintain Transportation Infrastructure	City of Hurdland	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Hurdland 2020.3	Safe Rooms and Storm Shelters	City of Hurdland	High	3	Tornado, Severe Thunderstorms	X		
Knox City 2020.1	Install/Upgrade Sirens	City of Knox City	High	3	All	X		
Knox City 2020.2	Maintain Transportation Infrastructure	City of Knox City	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Knox City 2020.3	Safe Rooms and Storm Shelters	City of Knox City	High	3	Tornado, Severe Thunderstorms	X		
Newark 2020.1	Install/Upgrade Sirens	Village of Newark	High	3	All	X		
Newark 2020.2	Maintain Transportation Infrastructure	Village of Newark	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Newark 2020.3	Safe Rooms and Storm Shelters	Village of Newark	High	3	Tornado, Severe Thunderstorms	X		

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Novelty 2020.1	Install/Upgrade Sirens	Village of Novelty	High	3	All	X		
Novelty 2020.2	Maintain Transportation Infrastructure	Village of Novelty	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Novelty 2020.3	Safe Rooms and Storm Shelters	Village of Novelty	High	3	Tornado, Severe Thunderstorms	X		
Knox County R-I 2020.1	Safe Rooms	Knox County R-I	High	3	Tornado, Severe Thunderstorms, Earthquake	X		
Knox County R-I 2020.2	Intercom System	Knox County R-I	Medium	3	Tornado, Severe Thunderstorms, Earthquake	X		
Knox County R-I 2020.3	Water Tower Installation	Knox County R-I	High	3	Fire	X		
Knox County R-I 2020.4	Generator(s)	Knox County R-I	Medium	3	Extreme Temperature, Severe Thunderstorms, Severe Winter Weather, Tornado	X		
Edina 2020.4	NFIP Participation	City of Edina	High	3	Flooding			X
Baring 2020.4	NFIP Participation	City of Baring	High	3	Flooding	X		
Hurdland 2020.4	NFIP Participation	City of Hurdland	High	3	Flooding	X		
Knox City 2020.4	NFIP Participation	City of Knox City	High	3	Flooding	X		
Newark 2020.4	NFIP Participation	Village of Newark	High	3	Flooding	X		
Novelty 2020.4	NFIP Participation	Village of Novelty	High	3	Flooding	X		

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.

- Unincorporated Knox County
- City of Baring
- City of Edina
- City of Hurdland
- City of Knox City
- Village of Newark
- Village of Novelty
- Knox County R-I School District

Model Resolution

(LOCAL GOVERNING BODY/SCHOOL DISTRICT), Missouri RESOLUTION NO. _____

A RESOLUTION OF THE (LOCAL GOVERNING BODY /SCHOOL DISTRICT) ADOPTING THE (PLAN NAME)

WHEREAS the (*local governing body/school district*) recognizes the threat that natural hazards pose to people and property within the (*local governing body/school district*); and

WHEREAS the (*local governing body/school district*) has participated in the preparation of a multi-jurisdictional local hazard mitigation plan, hereby known as the (*plan name*), hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the *Plan* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the (*local governing body/school district*) from the impacts of future hazards and disasters; and

WHEREAS the (*local governing body*) recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the (*local governing body/school district*) will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by the (*local governing body/school district*) demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

NOW THEREFORE, BE IT RESOLVED BY THE (LOCAL GOVERNMENT/SCHOOL DISTRICT), in the State of Missouri, THAT:

In accordance with (*local rule for adopting resolutions*), the (*local governing body/school district*) adopts the final *FEMA-approved Plan*.

ADOPTED by a vote of _____ in favor and __ against, and __ abstaining, this _____ day of _____, _____.

By (Sig): _____

Print name: _____

ATTEST:

By (Sig.): _____

Print name: _____

APPROVED AS TO FORM:

By (Sig.): _____

Print name: _____

1 INTRODUCTION AND PLANNING PROCESS

1	INTRODUCTION AND PLANNING PROCESS	1.1
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1.1 PURPOSE

Hazard mitigation is “any actions taken to reduce or eliminate the long-term risk to human life and property from natural hazards”. We understand that hazard events will continue to occur, and at their worst can result in death and destruction of property and infrastructure. The work done to minimize the impact of hazard events to life and property is called hazard mitigation. Audrain County and the participating jurisdictions and school districts developed this multijurisdictional local hazard mitigation plan update to reduce future losses from hazards.

- The County of Knox, City of Baring, City of Edina, City of Hurdland, City of Knox City, Village of Newark, Village of Novelty, and Knox County R-I School District adopted the plan as a Prerequisite for mitigation grant eligibility and cite the current legislation authorizing plan development.

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.
FEMA's Local Mitigation Planning Handbook, March 2013 and FEMA's Local Mitigation Plan Review Guide, October 1, 2011.

1.2 BACKGROUND AND SCOPE

This plan is a 5-year update of a plan that was approved in 2015. The plan and update were prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 to result in the eligibility for the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance Grant programs.

- Following is a list of the participants in both the previous plan, as well as the current plan: County of Knox, City of Baring, City of Edina, City of Hurdland, City of Knox City, Village of Newark, and Village of Novelty.

1.3 PLAN ORGANIZATION

The new format for the plan has 5 Chapters, while the previous plan had 6 Sections. The previous plan had a section dedicated to local jurisdiction capabilities, but that has been incorporated into the Planning Area Profile and Capabilities (Chapter 2) of this update.

Below is the outline of the plan.

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

Table 1.1 provides details on the changes made in the plan 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.
Chapter 2 - Planning Area Profile and Capabilities	Noted new GIS capabilities for participating jurisdictions.
Chapter 3 - Risk Assessment	Combined extreme heat and extreme cold into one hazard: extreme temperatures.
Chapter 4 - Mitigation Strategy	The mitigation category of each action was added to the action worksheets.
Chapter 5 - Plan Implementation and Maintenance	Updated MPC meetings for evaluating and updating the plan to quarterly.

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.

Knox County, Missouri contracted with the Northeast Regional Planning Commission (RPC) to facilitate the update of the multi-jurisdictional, local hazard mitigation plan. In fulfillment of this role, the RPC:

- Assisted in establishing a Mitigation Planning Committee (MPC) as defined by the Disaster Mitigation Act (DMA),
- Ensured the updated plan met the Disaster Mitigation Assistance requirements as established by federal regulations and followed the most current planning guidance of the Federal Emergency Management Agency (FEMA).
- Facilitated the entire plan development process,
- Identified the data that MPC participants could provide and conducted the research and documentation necessary to augment that data,
- Assisted in soliciting public input,
- Produced 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. Jurisdictional Representatives of Knox County Mitigation Planning Committee

Name	Title	Department	Jurisdiction/Agency /Organization
Evan Glasgow	Presiding Commissioner	County	Knox County
Roger Parton	Western District Commissioner	County	Knox County
Ronnie Leckbee	Eastern District Commissioner	County	Knox County
Alex Reel	Mayor	Administration	City of Edina
Margaret Gibson	City Clerk	Administration	City of Edina
Keli Luthenauer	Mayor	Administration	City of Baring
Tara Lowe	City Clerk	Administration	City of Baring
Tara Schrage	City Clerk	Administration	City of Hurdland
Kris McCarty	Mayor	Administration	City of Hurdland
Larry Edwards	Mayor	Administration	City of Knox City
Amanda Frost	City Clerk	Administration	City of Knox City
Meg Glover	Mayor	Administration	Village of Newark
Rita Lindsey	City Clerk	Administration	Village of Newark
Jason Violette	Mayor	Administration	Village of Novelty
Anna Applegate	City Clerk	Administration	Village of Novelty
Andy Turgeon	Superintendent	Administration	Knox County R-I School Dist.

Table 1.3 demonstrates each member's expertise in the six mitigation categories (Prevention, Property Protection, Natural Resource Protection, Emergency Services, Structural Flood Control Projects, and Public Information).

Table 1.3. MPC Capability with Six Mitigation Categories

Community Department/Office	Prevention	Structure and Infrastructure Projects		Natural Systems Protection	Education and Awareness Programs	Emergency Services
		Property Protection	Structural Flood Control Projects			
County Commission	X	X	X	X	X	
EMD	X	X	X	X	X	X
County Public Works	X	X	X	X	X	
Public Safety	X	X			X	X
City Clerk					X	
Civil Engineer		X	X	X		
Building Official	X	X	X		X	
City Administrator					X	
Mayor					X	
School Administrator	X	X			X	

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.

Hazard mitigation is defined as “sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards” and its purpose is to lessen the negative impact of a disaster on community’s economic, social, and environmental well-being.

Outreach programs that increase the publics’ awareness of hazard risks, projects to protect critical facilities and the removal of structures from flood hazard areas are all examples of mitigation actions. Local mitigation actions and concepts can also be incorporated into land use plans and building codes.

Local governments have the responsibility to protect the health, safety, and welfare of their citizens. Proactive mitigation policies and actions help reduce risk and create safer, more disaster-resilient communities. Mitigation is an investment in a community’s future safety and sustainability by facilitating:

- The protection of public safety and prevention of loss of life and injury
- The reduction of harm to existing and future development
- The prevention of damage to a community’s unique assets

The importance of active public participation in such an endeavor is obvious, but can be difficult to obtain in reality. Nowhere is difficulty more apparent than in small rural communities like those in Northeast Missouri. The County of Knox participated in all elements of the planning process.

Local government jurisdictions and the school district were invited to participate in the planning process via email, and in many cases, follow up phone calls and personal visits. (Appendix B- Public Documentation). Committee members were placed on a contact list featuring email and contact information. They were also directed to the Regional Planning Commission's webpage.

Jurisdictions that were presented with a multi-jurisdictional plan are required to participate in the planning process and formally adopt the plan. The County of Knox, City of Baring, City of Edina, City of Hurdland, City of Knox City, Village of Newark, Village of Novelty, and Knox County R-I School District participated in the plan update by meeting minimal requirement as described in the next paragraph. Each participating jurisdiction has formally adopted the mitigation plan.

Minimum participation requirements include:

- Designation of a representative to serve on the MPC;
- Provision of sufficient information to support plan development by completion and return of Data Collection Questionnaires and validating/correcting critical facility inventories;
- When applicable, provide progress reports on mitigation actions from the previously approved plan and identify additional mitigation actions for the plan;
- Eliminate from further consideration those actions from the previously approved plan that were not implemented because they were impractical, inappropriate, not cost-effective, or were otherwise not feasible;
- Review and comment on plan drafts;
- Provide documentation to show time donated to the planning effort (if a FEMA planning grant was awarded to the County); and
- Formally adopt the mitigation plan prior to submittal to SEMA and FEMA for final approval.

The County of Knox, City of Baring, City of Edina, City of Hurdland, City of Knox City, Village of Newark, Village of Novelty, and Knox County R-I School District met the participation requirements.

Table 1.4. Jurisdictional Participation in Planning Process

Jurisdiction	Meeting #1	Data Collection Questionnaire Response	Update/Develop Mitigation Actions
Unincorporated Knox County	X	X	X
City of Baring	X	X	X
City of Edina	X	X	X
City of Hurdland	X	X	X
City of Knox City	X	X	X
Village of Newark	X	X	X
Village of Novelty	X	X	X
Knox County R-I School District	X	X	X

1.4.2 The Planning Steps

Table 1.5. Knox County Mitigation Plan Update Process

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

In September 2020, NEMO RPC staff met with Knox County Commissioners to begin the planning process. In October 2020, staff from the RPC organized the all-in-one planning meeting that was held on November 11, 2020. Local jurisdictions were notified by email and letter of the meeting and personal phone calls were made to promote attendance. Agenda for the Kickoff meeting is included in Appendix B, as well as the minutes.

Step 1: Organize the Planning Team ***(Handbook Tasks 1, 2, and 4)***

Table 1.6. Schedule of MPC Meetings

Meeting	Topic	Date
Informational Meeting	Met directly with local jurisdictions and follow up phone calls to discuss the planning process and importance of participation.	September 2020

All-In-One Meeting	Purpose, process, planning area, building the team, participation, requirements, public outreach, data collection questionnaires, discussion of hazards, risks	November 11, 2020
	Purpose, discussion of hazards, risk assessment, determine/update	
	Review of the draft plan, discussion of plan update process, plan maintenance, discussion of adoption resolutions, submission to SEMA/FEMA	

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

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

The Planning Meeting's agenda is included in Appendix B which includes discussion, minutes, 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. As stated in the minutes, the participants felt a survey tool would not be effective and chose to solicit public involvement at the local level as they would be the key contacts for obtaining public comment. Public notice was posted on the NEMO RPC website, a notice was also posted at the County Courthouse.

No public comments were received which is characteristic for the area. The public in Knox County typically does not become active in planning activities such as plan development or updates.

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.

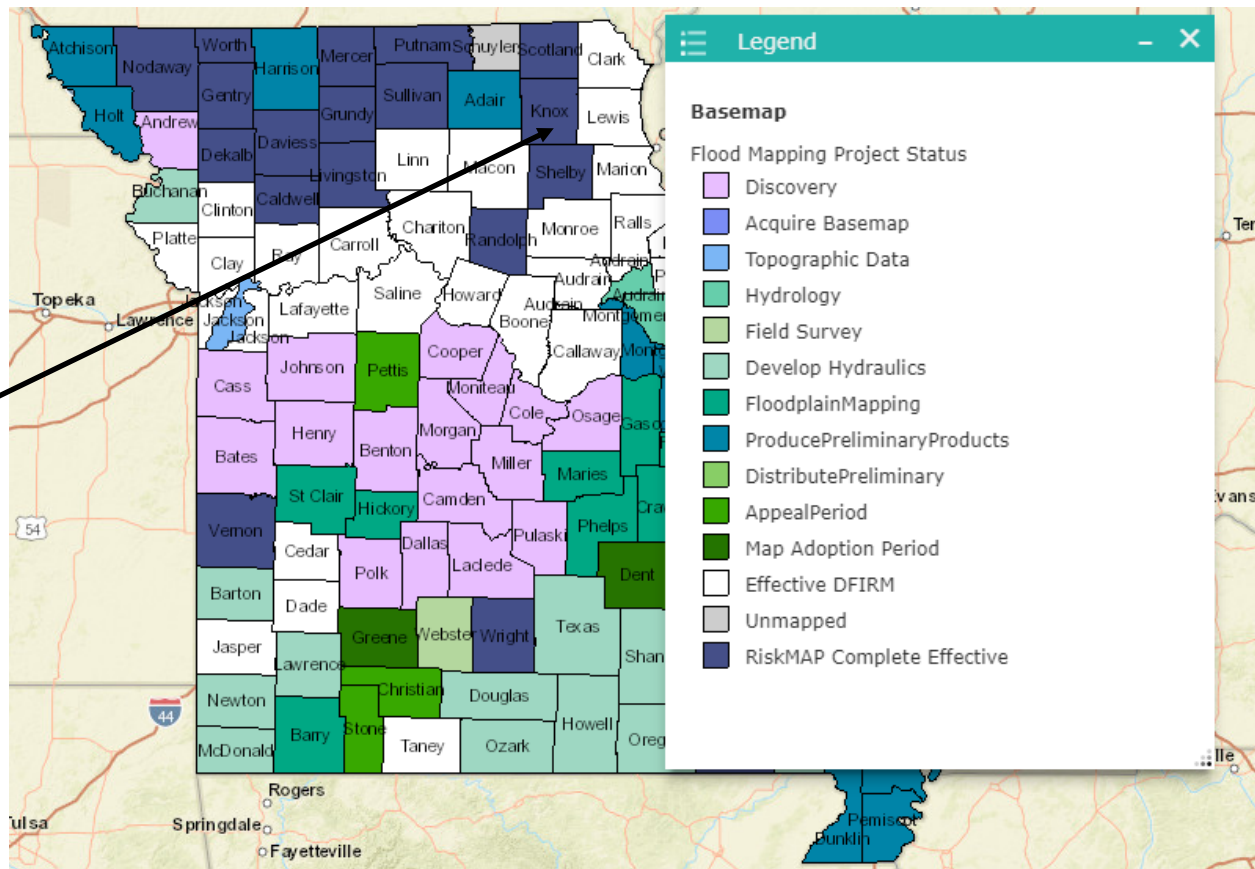
The Knox County stakeholders were sent an invitation by email to attend the planning meeting and/or provide input. Stakeholders invited to participate include: Lisa Doster, County Engagement Specialist with MU Extension, Amy Crawford, Area Engineer with MoDOT, Lori Moots-Clair, Administrator of Knox County Health Department, and Travis Mathes, General Manager of Lewis County REC. Neighboring communities were informed of the Knox County plan update and were invited to attend or offer input to the plan as they saw fit. No comments were received from the stakeholders during the planning process and they did not choose to participate in the meeting.

Coordination with FEMA Risk MAP Project

Knox County is currently in the Effective FIS/FIRM phase for Modernized FIRM Status. Risk MAP provides mitigation planning support in a variety of ways including helping in the assessment of risks and identifying action items to reduce vulnerability. In addition, this project will provide tools to improve the understanding of risk by local officials and the general public.

Figure 1.1 on the following page illustrates the current status of Missouri counties in regards to RiskMap projects.

Figure 1.1. RiskMAP Study Status Map



Source: <http://bit.ly/MOSEMAOutreach>

Integration of Other Data, Reports, Studies, and Plans

Other documents critical to the information of the plan include, mitigation plans of the state and adjacent counties, reports from university extensions, Flood Insurance Studies (FIS), Flood Insurance Rate Maps (FIRMs), State Department of Natural Resources (DNR) dam information, the National Inventory of Dams (NID), dam inspection reports, state fire reports, Wildland/Urban Interface and Intermix areas from the SILVIS Lab - Department of Forest Ecology and Management - University of Wisconsin, local comprehensive plans, economic development plans, capital improvement plans, US Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics, and local budgets.

Examples of relevant information that was incorporated into the plan include:

- FEMA FIRM maps
- DNR dam inspection reports
- County Master Plan: future growth trends
- SEMA's Arc GIS helped with mapping for hazards

- State Hazard Mitigation Plan- building counts and content exposure
- American Factfinder and 2019 American Community serve: demography

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

At the November 11, 2020 meeting, MPC profiled their hazards which was accomplished by reviewing:

- o previous disaster declarations in the county
- o hazards in the most recent State Hazard Mitigation Plan
- o hazards identified in the previously approved hazard mitigation plan.

The results of this process can be reviewed in Section 3 of this document. Data Collection Questionnaires from the previous plan update were disseminated to jurisdictions in attendance. Participants were requested to review and update the Questionnaires and submit to the Regional Planning Commission no later than December 7, 2020.

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

Assets were identified with demographic data from the US Census, Census of Agriculture, GIS Structure data, Data Collection Questionnaires and information from the RPC.

All loss estimates could not be provided due to lack of information provided by participating Jurisdictions. MPC members could not ascertain the value of buildings in the community, thus the information was not provided.

Step 6: Set Goals (Handbook Task 6)

The MPC reviewed the goals from the previously approved plan at the November 11, 2020 meeting and accepted the previous goals with no changes.

1. Public Awareness- Using a variety of communications avenues to increase the citizens awareness of and promote education about the natural hazards that they may face, their vulnerability to these hazards, and how to lessen the effect of future natural hazards.
2. Strengthen communication and coordination between local governments, emergency personnel, public agencies, and citizens to mitigate the effect of future natural hazards.
3. Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties; on natural resources; on infrastructure; and on the local economy.

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

As part of the November 11, 2020 meeting, members were asked to review the mitigation

strategy from the previously approved plan and note changes and update as it pertains to their individual jurisdictions. Committee members were requested to address progress (or lack thereof) on previously identified actions in the previously approved plan. MPC members were encouraged to continue forward only those actions that substantively address long-term mitigation solutions to the risks identified in the risk assessment. There were virtually no changes to any of the risk assessments in the plan. The MPC used the STAPLEE method to analyze and prioritize proposed actions. Members were provided a copy of the FEMA publication Mitigation Ideas- A Resource for Reducing Risk to Natural Hazards at the November 11, 2020 meeting.

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

The action worksheets, including the plan for implementation, was submitted by each jurisdiction for the updated Mitigation Strategy and are included in Chapter 4.

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

After the majority of the draft plan was composed, adoption resolution examples were given to the jurisdictional representatives and requested for adoption by whatever means their jurisdictions utilize for such activities.

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

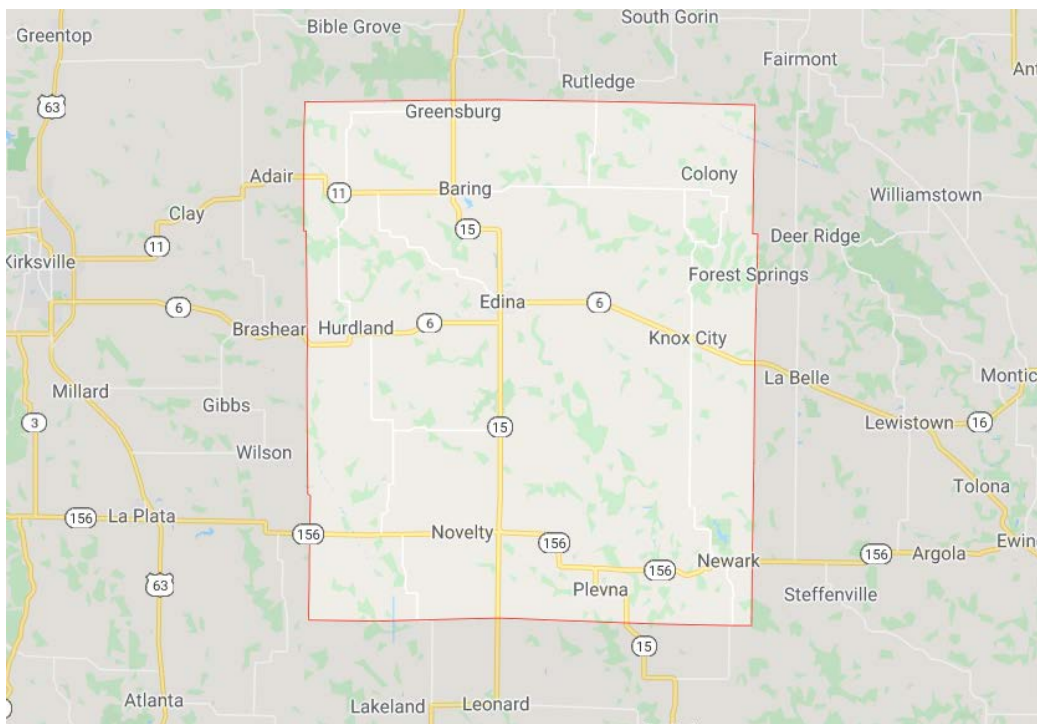
Part of the plan draft development included an outline of plan maintenance (Chapter 5) and was discussed and accepted by the MPC at the November 11, 2020 planning meeting. This process includes reviews annually and in the wake of any significant hazard event, as well as provisions for the five-year update process.

2 PLANNING AREA PROFILE AND CAPABILITIES

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2.1 KNOX COUNTY PLANNING AREA PROFILE

Figure 2.1. Map of Knox County



According to the US Census, the population estimate for Knox County as of the 2018 American Community Survey Estimates is 3,947 persons compared to the 2010 Census population of 4,131; a 4.5% decrease estimate in the eight-year period. This decrease in population falls far behind the growth estimate for the State of Missouri for the same time period 2.30% and the Nation at 5.7%.

The Knox County median household income from the 2010 US Census is \$33,029, as of the 2018 US Census estimate it is \$40,383, an approximate increase of 18%. The Median Household Income based on 2013-2017 American Community Survey 5-Year Estimates is \$51,542 for the State of Missouri and \$57,562 for the Nation.

2.1.1 Geography, Geology and Topography

Knox County has a total of 507 square miles of land and approximately 2.8 square miles is water. The County is a mix of residents living in unincorporated and incorporated areas. The City of Edina is the largest with a population of 1,118, City of Knox City population of 206, City of Hurdland 157 residents, Village of Novelty 132 residents, City of Baring 125 residents, and Village of Newark 90 residents according to the 2018 US Census estimates.

2.1.2 Climate

Knox County has an annual average of 39 inches of precipitation. Average of 18 inches of snow per year, average of 195 sunny days per year in Knox County. Annual high temperature of 87 degrees, annual low temperature of 17 degrees.

2.1.3 Population/Demographics

Table 2.1 provides the populations for each city, village, and the unincorporated county for 2010 and the latest population estimates (2018) on American Community Survey with the number and percentage change.

Table 2.1. Knox County Population 2010-2018 by Jurisdiction

Jurisdiction	2010 Population	2018 Annual Population Estimate or ACS Population	# Change (2010-2018)	% Change (2010-2018)
Knox County	4,131	3,947	-184	-4.5%
City of Baring	132	125	-7	-5.3%
City of Edina	1,176	1,118	-58	-4.9%
City of Hurdland	163	157	-6	-3.7%
City of Knox City	216	206	-10	-4.6%
Village of Newark	94	90	-4	-4.3%
Village of Novelty	139	132	-7	-5%

Source: U.S. Bureau of the Census, Decennial Census, annual population estimates/ 5-Year American Community Survey 2018;
*population includes the portions of these cities in adjacent counties

Table 2.2. Knox County Population Under Age 5 and Over Age 65, 2010 Census Data

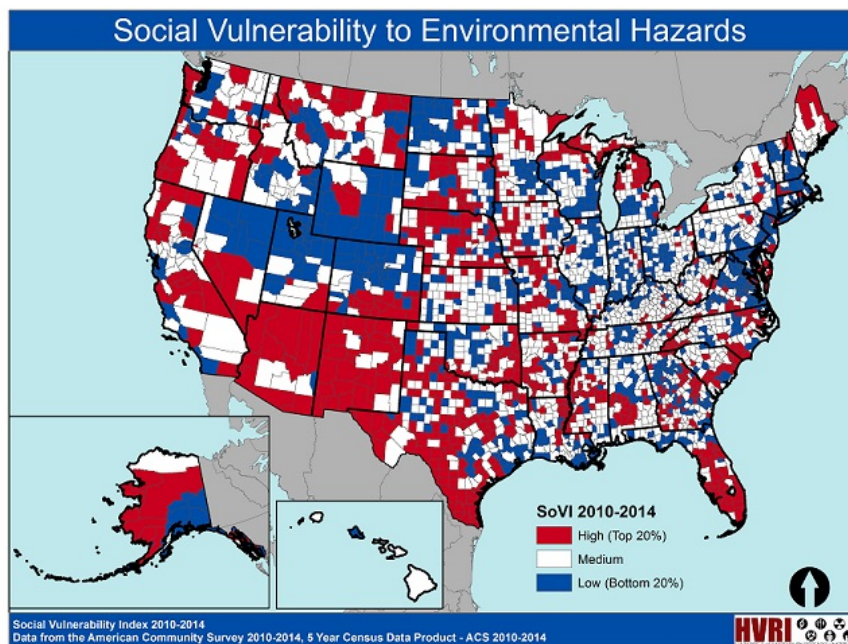
Jurisdiction	Population Under 5 Years	Population 65 Years and Over
Knox County	230	840
City of Baring	3	16
City of Edina	59	257
City of Hurdland	1	23
City of Knox City	33	41
Village of Newark	3	12
Village of Novelty	13	22

Source: U.S. Census Bureau

According to the American Community Survey 5-year estimates for 2018, 5.8% of the County's population was under the age of 5 (230). This is in line with the State of Missouri at 6.1% and 6.2% for the Nation. The American Community Survey 5-year estimates for 2018 shows 21.3% of Knox County's population was 65 years or older (840). The national percentage is 35.8%, while the State percentage is 7.4%.

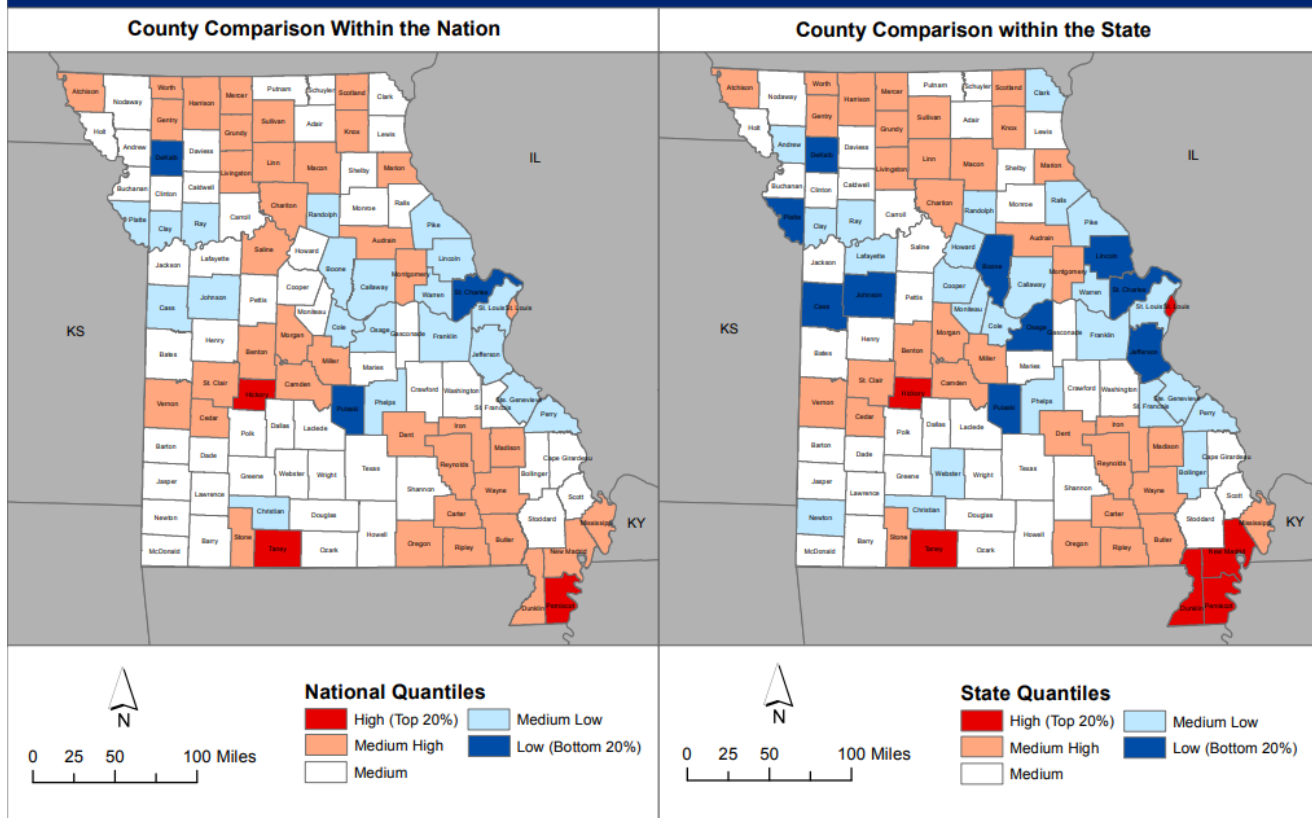
Knox County is a rural area with the primary land used for farming. There are 22 different waterways in Knox County: Black Creek, Bridge Creek, Coon Creek, Cottey Creek, Democrat Creek, Fabius River, Garnett Branch, Hawkins Branch, Lost Branch, Meadow Brook, Muddy Fork, North River, Owl Creek, Plum Branch, Rock Creek, Saling Branch, Seebers Branch, Spees Branch, Sweet Oak Branch, Troublesome Creek, Twomile Creek, and Wolf Branch.

The University of South Carolina developed an index to evaluate and rank the ability to respond to, cope with, recover from, and adapt to disasters. The index synthesizes 29 socioeconomic variables which research literature suggests contribute to reduction in a community's ability to prepare for, respond to, and recover from hazards. SoVI ® data sources include primarily those from the United States Census Bureau.



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

Social Vulnerability to Environmental Hazards State of Missouri



Social Vulnerability Index 2010-2014
Based on American Community Survey 2010-2014, 5 Year Census Data Product - ACS 2010-2014



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

A low number means that the county is more resilient to hazard events, and a high number means that the county is less resilient. Knox County has a Medium High rating.

Table 2.3. Unemployment, Poverty, Education, and Language Percentage Demographics, Knox 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
Knox County	1,688	3.6	12.9	88	15.8	4
City of Baring	75	4.1	6.3	94.3	4.5	0
City of Edina	463	3.1	23.3	93	20.6	1.9
City of Hurdland	76	0	18.5	86.2	9.6	3.4
City of Knox City	100	7.5	26.3	89.2	4.6	0
Village of Newark	41	12.9	27.3	83.6	6.6	7.6
Village of Novelty	85	3.5	11.4	97.5	10.2	0
State of Missouri	3,066,200	2.6	9.0	90.5	29.5	6.3
United States	165,907,527	3.1	9.3	88.3	32.6	21.9

Source: U.S. Census, 2018 American Community Survey, 5-year Estimates

2.1.4 History

Knox County is a county located in the northeast portion of the U.S. state of Missouri. Its county seat is Edina. The county was organized February 14, 1845 and named for U.S. Secretary of War General Henry Knox. A battle was fought during the American Civil War at Newark, involving Joseph C. Porter on August 1, 1862. According to the U.S. Census Bureau, the county has a total area of 507 square miles, of which 504 square miles is land and 2.8 square miles (0.6%) is water.

Today the incorporated cities of Baring, Edina, Hurdland, Knox City, Newark, and Novelty lie within the boundaries of Knox County. The location of these cities and villages are shown on the Knox County Base map.

Schools of Knox County:

Knox County R-I is the only Public or Private school district within county lines.

The first major attempt to change the administration organization of school districts within the county was made in 1949 when a county-unit plan was submitted to the voters. When this plan failed, a six-unit proposal was submitted to the voters in 1951. Four of the proposed districts were approved, but two failed to pass. Ten years passed with no major change in school districts within the county until the one-unit plan was again submitted to the voters on March 28, 1961. The overwhelming majority vote of fourteen to one indicated that the people of Knox County were ready to take a major step forward in providing better educational opportunities for their children. A centrally located high school for all pupils within the district was recognized by the board of education of the new district as one of the foremost possible advantages of the reorganization plan. Realization of this goal has been a prime objective of the board since the district's formation. This school, the result of the efforts of many people, is a great source of pride to the citizens of Knox County. School started on September 9th, 1963 for all students. Source: <https://www.knox.k12.mo.us/history--19>

2.1.5 Occupations

Table 2.4 provides occupation statistics for the incorporated cities and the county as a whole.

Table 2.4. Occupation Statistics, Knox 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
Knox County	25.7	17.2	23.4	16.3	17.4
City of Baring	23.3	4.7	30.2	23.3	18.6
City of Edina	25.3	17.4	27.9	22.9	6.5
City of Hurdland	9.1	35.1	2.6	15.6	37.7
City of Knox City	18.6	30.9	29.9	4.1	15.5
Village of Newark	35.4	27.3	0.0	15.2	21.2
Village of Novelty	14.9	17.6	9.5	20.3	37.8

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

2.1.6 Agriculture

Knox County has a total of 637 farms with the total acreage of 235,398. The average farm size is 370 acres which is higher than the State average of 291 acres. The top crop for Knox County is corn with 45,587 acres planted. The average sales per farm was \$153,614.

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

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

Disaster Declaration	Project Type	Sub-Grantee	Date Approved	Project Total
	None			
Total				\$0.00

Source: Federal Emergency Management Agency, 6/12/2020

There have been zero HMA grants received in Knox County from 1993 to 2019.

2.1.8 FEMA Public Assistance (PA) Grants in Planning Area

Table 2.6. FEMA PA Grants in Knox County from 1993-2019

Disaster Declaration	Project Type	Project Size	Applicant ID	Project Total
1403	DEBRIS REMOVAL	Small	103-51662-00	\$2,352.00
1412	TIMBER BRIDGE DAMAGES	Small	103-U352Z-00	\$1,169.98
1412	TIMBER BRIDGE DAMAGES	Small	103-U352Z-00	\$2,133.33
1412	ROAD WASHOUTS	Small	103-U352Z-00	\$1,786.45
1412	BRIDGE ABUTMENT/WINGWALL	Small	103-U352Z-00	\$3,243.55
1412	CULVERT WASHOUT	Small	103-U352Z-00	\$2,633.60
1412	HEADWALL WASHOUTS	Small	103-U352Z-00	\$9,573.02
1412	HEADWALL DAMAGES	Small	103-U352Z-00	\$2,797.63
1412	ROAD/CULVERT WASHOUTS	Small	103-U352Z-00	\$13,142.34
1412	TIMBER BRIDGE DECK DAMAGES	Small	103-U352Z-00	\$1,224.20
1412	BRIDGE DAMAGES	Small	103-U352Z-00	\$10,000.08
1412	CULVERT DAMAGES	Small	103-U352Z-00	\$2,357.45
1412	ROAD/CULVERT WASHOUTS	Small	103-U352Z-00	\$1,629.99
1412	TIMBER BRIDGE DAMAGES	Small	103-U352Z-00	\$6,238.80
1412	ABUTMENT & WINGWALL DAMAGES	Small	103-U352Z-00	\$6,384.80
1412	CMP, DITCH & APPROACH DAMAGES	Small	103-U352Z-00	\$1,019.20
1412	BOX CULVERT DAMAGES	Small	103-U352Z-00	\$4,437.00
1412	ROAD WASHOUT	Small	103-U352Z-00	\$2,549.60
1412	ROAD WASHOUT/WING WALL	Small	103-U352Z-00	\$5,062.11
1412	TIMBER BRIDGE DAMAGES	Small	103-U352Z-00	\$4,142.85
1412	ROAD/CULVERT WASHOUTS	Small	103-U352Z-00	\$1,918.75
1412	CULVERT WASHOUT	Small	103-U352Z-00	\$3,000.00
1412	DITCH EROSION & CULVERT	Small	103-U352Z-00	\$2,279.50
1412	TIMBER BRIDGE DAMAGES	Large	103-U352Z-00	\$151,522.50
1412	REPAIR OF FLOOD-DAMAGED	Small	103-U352Z-00	\$14,029.81
1773	ROAD WASHOUT	Small	103-99103-00	\$3,534.10
1773	ROAD WASHOUT	Small	103-99103-00	\$6,249.05
1773	ROAD WASHOUT	Small	103-99103-00	\$3,479.11
1773	ROAD WASHOUT	Small	103-99103-00	\$4,309.65
1773	ROAD WASHOUT	Small	103-99103-00	\$9,873.14
1773	ROAD WASHOUT	Small	103-99103-00	\$10,849.56

1773	ROAD WASHOUT	Small	103-99103-00	\$2,449.73
1773	ROAD WASHOUT	Small	103-99103-00	\$4,595.68
1773	LIFT STATION PUMP DAMAGE	Small	103-21322-00	\$1,982.80
1809	Debris-Pilot-Edina A	Small	103-21322-00	\$2,239.67
1809	Roads, Culvert & Bridges Washouts	Small	103-U352Z-00	\$25,830.94
1809	Building & Equipment Damage EPWE02	Small	103-21322-00	\$4,168.61
1809	EPM-EdinaB2	Small	103-21322-00	\$5,320.40
1809	Concession Building EPWE01	Small	103-21322-00	\$5,237.58
1809	Emergency Protective Measures	Small	103-21322-00	\$2,271.00
1809	City Ball Park-EPWG01	Small	103-21322-00	\$5,387.58
1809	Road Washout – Edina C	Small	103-21322-00	\$2,395.54
1934	KNTS01 - 1934 - KNOX (COUNTY)	Small	103-99103-00	\$49,493.48
1934	KNTS02 - 1934 - KNOX (COUNTY)	Small	103-99103-00	\$3,212.00
1934	Knox001 - 1934 - KNOX (COUNTY)	Small	103-99103-00	\$17,659.46
1934	Knox002 - 1934 - KNOX (COUNTY)	Small	103-99103-00	\$9,753.26
1961	KCC-01 - Aggregate Roadways	Small	103-99103-00	\$3,335.43
1961	KCRBB06 - Emergency Protective	Small	103-99103-00	\$11,334.87
4130	KCKC01C - Roads and Bridges	Small	103-99103-00	49270.01
4130	KCKC02C - Water Crossing	Small	103-99103-00	4033.48
4238	C - Roads & Bridges	Large	103-99103-00	394941.6
4238	C - Roads & Bridges	Small	103-99103-00	37014.59
4238	C - Roads & Bridges	Small	103-99103-00	7658.54
4238	C - Roads & Bridges	Small	103-99103-00	5603.4
4238	C - Roads & Bridges	Small	103-99103-00	3884.65
4238	C - Roads & Bridges	Small	103-99103-00	5172.68
4238	C - Roads & Bridges	Small	103-99103-00	8086.46
4238	C - Roads & Bridges	Small	103-99103-00	6938.39
4238	C - Roads & Bridges	Small	103-99103-00	4509.93
4238	C - Roads & Bridges	Small	103-99103-00	10983.22
4238	C - Roads & Bridges	Small	103-99103-00	49350.83
4238	C - Roads & Bridges	Small	103-99103-00	14192.17
4238	C - Roads & Bridges	Small	103-99103-00	11478.3
4238	C - Roads & Bridges	Small	103-99103-00	8916.55
4238	C - Roads & Bridges	Small	103-99103-00	51526.54
4200	C - Roads & Bridges	Small	103-99103-00	51564.48
4451	C - Roads & Bridges	Small	103-99103-00	31342.37
4451	Z - State Management	Small	103-99103-00	1556.79
Total				\$1,209,616.11

Source: Federal Emergency Management Agency, 6/12/2020

2.2 JURISDICTIONAL PROFILES AND MITIGATION CAPABILITIES

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

2.2.1 Unincorporated Knox County

By Missouri Statue (Section 48.020.1) Knox County is defined as a 3rd Class County, meaning it's assessed valuation is less than six hundred million dollars. The County seat is located in Edina. Knox County as six townships (City of Baring, City of Edina, City of Hurdland, City of Knox City, Village of Newark, and Village of Novelty) which serves today primarily as voting districts. The county government provides services such as law enforcement, judicial services, land records, tax collection, property assessment, administration of elections, construction and maintenance of road and bridge and zoning. The County is governed by an elected board of Commissioners composed of a Presiding Commissioner and two Associate Commissioners. Other positions within Knox County's government include:

- County Assessor
- Circuit Clerk
- County Clerk
- County Collector of Revenue
- County Coroner
- County Sheriff
- County Treasurer
- County Attorney
- Public Administrator
- County Recorder
- Emergency Management
- General Services
- Health Department
- Health Services
- Human Resources
- Public Works

Mitigation Initiatives/Capabilities

The County has an Emergency Management Director (EMD). The EMD plans and directs disasters responses or crisis management activities, provides disaster preparedness training and prepares emergency plans and procedures for natural disasters.

The County has a County Emergency Plan, County Mitigation Plan, and Mutual Aid Agreements. The Jurisdiction within Knox County are equipped with outdoor warning sirens, however, would benefit from updating.

Table 2.7. Unincorporated Knox County Mitigation Capabilities

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

Capabilities	Status Including Date of Document or Policy
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	No
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Director	Yes
NFIP Floodplain Administrator	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	Yes
Economic Development Department	No
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	Yes
Veterans Groups	Yes
Local Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes

Capabilities	Status Including Date of Document or Policy
Local Funding Availability	
Apply for Community Development Block	Yes
Fund projects through Capital	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	No
Impact fees for new development	No
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 11/2/2020

2.2.2 City of Baring

Baring is a city in Knox County, Missouri, United States. The population was 132 at the 2010 census.

Baring is located on the Burlington Northern and Santa Fe railroad's mainline between Chicago and Los Angeles, which carries heavy mixed freight and intermodal traffic, as well as Amtrak's Southwest Chief passenger train.

Baring was platted in 1888 when the Atchison, Topeka and Santa Fe Railway was extended to that point. The community was named for the Baring Brothers & Co., investors in the railroad. A post office has been in operation at Baring since 1888.

Baring is located at 40°14'38"N 92°12'24"W (40.243973, -92.206779).

According to the United States Census Bureau, the city has a total area of 0.13 square miles, all land.

Mitigation initiatives include:

- NFIP Participation
- Transportation Infrastructure
- Safe Rooms and Storm Shelters
- Warning Sirens

Table 28. City of Baring Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
Local Emergency Plan	No
County Emergency Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
Local Mitigation Plan	No
County Mitigation Plan	Yes
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	No
Economic Development Plan	No
Transportation Plan	No
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	No
Subdivision Ordinance	No
Tree Trimming Ordinance	No

Capability	Status Including Date of Document or Policy
Nuisance Ordinance	Yes
Storm Water Ordinance	No
Drainage Ordinance	No
Seismic Construction Ordinance	No
Capability	
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
Iowa Wetlands and Riparian Areas Conservation Plan	No
Debris Management Plan	No
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant	No
NFIP Community Rating System (CRS) Participating Community	No
Hazard Awareness Program	No
National Weather Service (NWS) Storm Ready	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	6
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	No
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Coordinator	No
NFIP Floodplain Administrator	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No

Capability	Status Including Date of Document or Policy
Salvation Army	No
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.	Yes
Local Funding Availability	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur debt through general obligation bonds	No
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 11/10/2020

2.2.3 City of Edina

Edina is a city in Knox County, Missouri, United States, between the North and South Forks of the South Fabius River. The population was 1,176 at the 2010 census. It is the county seat of Knox County.

Edina is located at 40°10'8"N 92°10'24"W (40.168881, -92.173275). According to the United States Census Bureau, the city has a total area of 1.32 square miles, of which 1.31 square miles is land and 0.01 square miles is water.

Edina was platted in 1839. The community was named after the Scottish city of Edinburgh, as referred to by Scots poets. A post office called Edina has been in operation since 1850.

The Edina Double Square Historic District is listed on the National Register of Historic Places.

Mitigation initiatives include:

- NFIP Participation
- Transportation Infrastructure
- Safe Rooms and Storm Shelters
- Warning Sirens

Table 2.9. City of Edina Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
Local Emergency Plan	Yes
County Emergency Plan	Yes, 4/2015
Local Recovery Plan	No
County Recovery Plan	No
Local Mitigation Plan	No
County Mitigation Plan	Yes, 4/2015
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	No
Economic Development Plan	No
Transportation Plan	No
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	Yes, 10/7/2019
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	No
Drainage Ordinance	No
Seismic Construction Ordinance	No

Capability	Status Including Date of Document or Policy
Capability	
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
Iowa Wetlands and Riparian Areas Conservation Plan	No
Debris Management Plan	No
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant	Yes
NFIP Community Rating System (CRS) Participating Community	No
Hazard Awareness Program	No
National Weather Service (NWS) Storm Ready	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	6
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	No
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	No
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	Yes
Emergency Management Coordinator	Yes
NFIP Floodplain Administrator	Yes
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	Yes
Sanitation Department	Yes
Transportation Department	No
Economic Development Department	No
Housing Department	No
Historic Preservation	Yes
Non-Governmental Organizations (NGOs)	
American Red Cross	Yes
Salvation Army	Yes
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No

Capability	Status Including Date of Document or Policy
Neighborhood Associations	No
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.	Yes
Local Funding Availability	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 11/2020

2.2.4 City of Hurdland

Hurdland is a city in Knox County, Missouri, United States. The population was 163 at the 2010 census.

Hurdland was platted in 1872 when the railroad was extended to that point. The community was named after John Hurd, the original owner of the town site. A post office has been in operation at Hurdland since 1872.

According to the United States Census Bureau, the city has a total area of 0.33 square miles, all land.

Mitigation initiatives include:

- NFIP Participation
- Transportation Infrastructure
- Safe Rooms and Storm Shelters
- Warning Sirens

Table 2.10. City of Hurdland Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
Local Emergency Plan	No
County Emergency Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
Local Mitigation Plan	No
County Mitigation Plan	No
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	Yes
Economic Development Plan	No
Transportation Plan	No
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	No
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	No
Drainage Ordinance	No
Seismic Construction Ordinance	No
Capability	
Site Plan Review Requirements	No

Capability	Status Including Date of Document or Policy
Historic Preservation Ordinance	No
Landscape Ordinance	No
Iowa Wetlands and Riparian Areas Conservation Plan	No
Debris Management Plan	No
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant	No
NFIP Community Rating System (CRS) Participating Community	No
Hazard Awareness Program	No
National Weather Service (NWS) Storm Ready	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	6
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	No
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Coordinator	No
NFIP Floodplain Administrator	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	No
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	No

Capability	Status Including Date of Document or Policy
Community Organizations (Lions, Kiwanis, etc.	Yes
Local Funding Availability	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur debt through general obligation bonds	No
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 12/10/2020

2.2.5 City of Knox City

Knox City is a city in Knox County, Missouri, United States. The population was 216 at the 2010 census.

Knox City was platted in 1872 when the railroad was extended to that point. A post office called Knox City has been in operation since 1873.

Knox City is located at 40°8'41"N 92°0'38"W (40.144674, -92.010466).

According to the United States Census Bureau, the city has a total area of 0.21 square miles, all land.

Mitigation initiatives include:

- NFIP Participation
- Transportation Infrastructure
- Safe Rooms and Storm Shelters
- Warning Sirens

Table 2.11. City of Knox City Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
Local Emergency Plan	No
County Emergency Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
Local Mitigation Plan	No
County Mitigation Plan	Yes
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	No
Economic Development Plan	No
Transportation Plan	No
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	No
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	No
Drainage Ordinance	No
Seismic Construction Ordinance	No
Capability	

Capability	Status Including Date of Document or Policy
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
Iowa Wetlands and Riparian Areas Conservation Plan	No
Debris Management Plan	No
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant	No
NFIP Community Rating System (CRS) Participating Community	No
Hazard Awareness Program	No
National Weather Service (NWS) Storm Ready	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	6
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	No
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Coordinator	No
NFIP Floodplain Administrator	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	No
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No

Capability	Status Including Date of Document or Policy
Chamber of Commerce	No
Community Organizations (Lions, Kiwanis, etc.	Yes
Local Funding Availability	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur debt through general obligation bonds	No
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 11/2/2020

2.2.6 Village of Newark

Newark is a village in Knox County, Missouri, United States, along the South Fabius River. The population was 94 at the 2010 census.

Newark was laid out in 1836 within old Fabius Township. The community was named after Newark, New Jersey.

Newark is located at 39°59'36"N 91°58'24"W (39.993376, -91.973265).

According to the United States Census Bureau, the village has a total area of 0.32 square miles, all land.

Mitigation initiatives include:

- NFIP Participation
- Transportation Infrastructure
- Safe Rooms and Storm Shelters
- Warning Sirens

Table 2.12. Village of Newark Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
Local Emergency Plan	No
County Emergency Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
Local Mitigation Plan	No
County Mitigation Plan	Yes
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	No
Economic Development Plan	No
Transportation Plan	No
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	No
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	No
Drainage Ordinance	No
Seismic Construction Ordinance	No
Capability	
Site Plan Review Requirements	No

Capability	Status Including Date of Document or Policy
Historic Preservation Ordinance	No
Landscape Ordinance	No
Iowa Wetlands and Riparian Areas Conservation Plan	No
Debris Management Plan	No
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant	No
NFIP Community Rating System (CRS) Participating Community	No
Hazard Awareness Program	No
National Weather Service (NWS) Storm Ready	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	6
Economic Development Program	Yes
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	No
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Coordinator	No
NFIP Floodplain Administrator	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	No
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	No

Capability	Status Including Date of Document or Policy
Community Organizations (Lions, Kiwanis, etc.	Yes
Local Funding Availability	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur debt through general obligation bonds	No
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 12/7/2020

2.2.7 Village of Novelty

Novelty is a village in Knox County, Missouri, United States. The population was 139 at the 2010 census.

Novelty was platted in 1857, and named for the novelty goods sold by a local merchant. A post office called Novelty has been in operation since 1854.

According to the United States Census Bureau, the village has a total area of 0.28 square miles, all land.

Mitigation initiatives include:

- NFIP Participation
- Transportation Infrastructure
- Safe Rooms and Storm Shelters
- Warning Sirens

Table 2.13. Village of Novelty Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
Local Emergency Plan	No
County Emergency Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
Local Mitigation Plan	No
County Mitigation Plan	Yes
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	No
Economic Development Plan	No
Transportation Plan	No
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	No
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	No
Drainage Ordinance	No
Seismic Construction Ordinance	No
Capability	
Site Plan Review Requirements	No
Historic Preservation Ordinance	No

Capability	Status Including Date of Document or Policy
Landscape Ordinance	No
Iowa Wetlands and Riparian Areas Conservation Plan	No
Debris Management Plan	No
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant	No
NFIP Community Rating System (CRS) Participating Community	No
Hazard Awareness Program	No
National Weather Service (NWS) Storm Ready	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	6
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	No
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Coordinator	No
NFIP Floodplain Administrator	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	No
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	No
Community Organizations (Lions, Kiwanis, etc.)	No

Capability	Status Including Date of Document or Policy
Local Funding Availability	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur debt through general obligation bonds	No
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 12/7/2020

2.2.8 Summary of Jurisdictional Capabilities

Table 2.14. Mitigation Capabilities Summary Table

CAPABILITIES	Uninc. Knox County	City of Baring	City of Edina	City of Hurdland	City of Knox City	Village of Newark	Village of Novelty
Planning Capabilities							
Comprehensive Plan	No	No	No	No	No	No	No
Builder's Plan	No	No	No	No	No	No	No
Capital Improvement Plan	No	No	No	No	No	No	No
Local Emergency Plan	No	No	Yes	No	No	No	No
County Emergency Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Recovery Plan	No	No	No	No	No	No	No
County Recovery Plan	No	No	No	No	No	No	No
Local Mitigation Plan	No	No	No	No	No	No	No
County Mitigation Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Mitigation Plan (PDM)	No	No	No	No	No	No	No
County Mitigation Plan (PDM)	No	No	No	No	No	No	No
Debris Management Plan	No	No	No	No	No	No	No
Economic Development Plan	No	No	No	No	No	No	No
Transportation Plan	No	No	No	No	No	No	No
Land-use Plan	No	No	No	No	No	No	No
Flood Mitigation Assistance (FMA) Plan	No	No	No	No	No	No	No
Watershed Plan	No	No	No	No	No	No	No
Firewise or other fire mitigation plan	No	No	No	No	No	No	No
School Mitigation Plan	No	No	No	No	No	No	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No	No	No	No	No	No	No
Policies/Ordinance							
Zoning Ordinance	No	No	No	No	No	No	No
Building Code	No	No	No	No	No	No	No
Floodplain Ordinance	No	No	Yes	No	No	No	No
Subdivision Ordinance	No	No	No	No	No	No	No
Tree Trimming Ordinance	No	No	No	No	No	No	No
Nuisance Ordinance	No	Yes	Yes	Yes	Yes	Yes	Yes
Storm Water Ordinance	No	No	No	No	No	No	No
Drainage Ordinance	No	No	No	No	No	No	No
Site Plan Review Requirements	No	No	No	No	No	No	No
Historic Preservation Ordinance	No	No	No	No	No	No	No

CAPABILITIES	Uninc. Knox County	City of Baring	City of Edina	City of Hurdland	City of Knox City	Village of Newark	Village of Novelty
Landscape Ordinance	No	No	No	No	No	No	No
Seismic Construction Ordinance	No	No	No	No	No	No	No
Program							
Zoning/Land Use Restrictions	No	No	No	No	No	No	No
Codes Building Site/Design	No	No	No	No	No	No	No
National Flood Insurance Program (NFIP) Participant	No	No	Yes	No	No	No	No
NFIP Community Rating System (CRS) Participating Community	No	No	No	No	No	No	No
Hazard Awareness Program	No	No	No	No	No	No	No
National Weather Service (NWS) Storm Ready	No	No	No	No	No	No	No
Building Code Effectiveness Grading (BCEGs)	No	No	No	No	No	No	No
ISO Fire Rating	N/A	6	6	6	6	6	6
Economic Development Program	No	No	No	No	No	No	No
Land Use Program	No	No	No	No	No	No	No
Public Education/Awareness	No	No	No	No	No	No	No
Property Acquisition	No	No	No	No	No	No	No
Planning/Zoning Boards	No	No	No	No	No	No	No
Stream Maintenance Program	No	No	No	No	No	No	No
Tree Trimming Program	No	No	No	No	No	No	No
Engineering Studies for Streams (Local/County/Regional)	No	No	No	No	No	No	No
Mutual Aid Agreements	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Studies/Reports/Maps							
Hazard Analysis/Risk Assessment (Local)	No	No	No	No	No	No	No
Hazard Analysis/Risk Assessment (County)	No	No	No	No	No	No	No
Flood Insurance Maps	No	No	No	No	No	No	No
FEMA Flood Insurance Study (Detailed)	No	No	No	No	No	No	No
Evacuation Route Map	No	No	No	No	No	No	No
Critical Facilities Inventory	No	No	No	No	No	No	No
Vulnerable Population Inventory	No	No	No	No	No	No	No
Land Use Map	No	No	No	No	No	No	No
Staff/Department							
Building Code Official	No	No	No	No	No	No	No

CAPABILITIES	Uninc. Knox County	City of Baring	City of Edina	City of Hurdland	City of Knox City	Village of Newark	Village of Novelty
Building Inspector	No	No	No	No	No	No	No
Mapping Specialist (GIS)	No	No	No	No	No	No	No
Engineer	No	No	No	No	No	No	No
Development Planner	No	No	No	No	No	No	No
Public Works Official	No	No	Yes	No	No	No	No
Emergency Management Coordinator	Yes	No	Yes	No	No	No	No
NFIP Floodplain Administrator	No	No	No	No	No	No	No
Emergency Response Team	No	No	No	No	No	No	No
Hazardous Materials Expert	No	No	No	No	No	No	No
Local Emergency Planning Committee	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County Emergency Management Commission	No	No	Yes	No	No	No	No
Sanitation Department	No	No	Yes	No	No	No	No
Transportation Department	Yes	No	No	No	No	No	No
Economic Development Department	No	No	No	No	No	No	No
Housing Department	No	No	No	No	No	No	No
Historic Preservation	No	No	Yes	No	No	No	No
Non-Governmental Organizations (NGOs)							
American Red Cross	No	No	Yes	No	No	No	No
Salvation Army	Yes	No	Yes	No	No	No	No
Veterans Groups	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Environmental Organization	No	No	No	No	No	No	No
Homeowner Associations	No	No	No	No	No	No	No
Neighborhood Associations	No	No	No	No	No	No	No
Chamber of Commerce	Yes	Yes	Yes	No	No	No	No
Community Organizations (Lions, Kiwanis, etc.	Yes	Yes	Yes	Yes	Yes	Yes	No
Financial Resources							
Apply for Community Development Block Grants	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund projects through Capital Improvements funding	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Authority to levy taxes for specific purposes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fees for water, sewer, gas, or electric services	No	Yes	Yes	Yes	Yes	Yes	Yes
Impact fees for new development	No	No	No	No	No	No	No

CAPABILITIES	Uninc. Knox County	City of Baring	City of Edina	City of Hurdland	City of Knox City	Village of Newark	Village of Novelty
Incur debt through general obligation bonds	Yes	No	No	No	No	No	No
Incur debt through special tax bonds	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Incur debt through private activities	No	No	No	No	No	No	No
Withhold spending in hazard prone areas	No	No	No	No	No	No	No

Source: Data Collection Questionnaire, 2/23/2021

2.2.9 Special District

No Special Districts participated in the plan update.

2.2.10 Public School District Profiles and Mitigation Capabilities

The Public Schools within the planning area:

- Knox County R-I School District – Edina
 - Knox County Elementary School (PK-05)
 - Knox County High School (06-12)



Missouri School Directory

[Missouri School Directory \(map\)](#) (Maps are provided purely for reference, please contact county authorities to obtain official school district boundary information.)

[Knox Co. R-I \(052-096\)](#)

Phone: 660-397-2228

Fax: 660-397-3998

E-mail: aturgeon@knoxr1.us

County-District Code: 052-096

County: Knox

Congressional District: 06

House District: 4 , 6

Senate District: 18

55701 State Highway 6

55701 State Highway 6

Edina, MO 63537-4131

Supervisory Area: I

MSIP: Accredited

Assessed Valuation: \$72,534,965

Tax Levy: \$3.8233

	Schools	Cert. Staff	Enrollment (Prior Year)		Total
			Residents	Non-Res.	
Elementary Schools	1	25	236	0	236
Middle Schools	0	0	0	0	0
Jr. High Schools	0	0	0	0	0
High Schools	1	31	245	0	245
Total	2	56	481	0	481

Name	Title	Yrs in District
Mr. Matt Reel	Pres. of Bd.	
Mrs. Shelly Bugh	Secy. of Bd.	
Mr. Andy Turgeon	Supt.	13
Mrs. Nancy Goodwin	Coord. Spec. Prgms.	15
Mrs. Laura Greenley	Pdc Co-Chair	11
Mrs. Tracy Hamlin	Pdc Co-Chair	21
Mrs. Laura Greenley	Prof. Dev. Chairperson	

Knox Co. High (1050)

55701 State Highway 6 55701 State Highway 6 Edina, MO 63537-4131

Phone: 660-397-2231 Fax: 660-397-3282

Grade Span: 06-12

Principal: Mr. Van Delft Alex (10 years in district)

E-mail: avandelft@knoxr1.us

Table 2.15. Knox County Buildings and Enrollment Data, 2019

District Name	Building Name	Building Enrolment
Knox County R-I	Knox County Elementary	143
Knox County R-I	Knox County High	172

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

Table 2.16. Summary of Mitigation Capabilities-Knox County R-1 School District

Capability	Knox County R-1
Planning Elements	
Master Plan/ Date	Yes, 2/16/2021
Capital Improvement Plan/Date	Yes
School Emergency Plan / Date	Yes
Weapons Policy/Date	Yes, 7/16/2013
Personnel Resources	
Full-Time Building Official (Principal)	Yes, 2
Emergency Manager	Yes
Grant Writer	Yes
Public Information Officer	Yes
Financial Resources	
Capital Improvements Project Funding	Yes
Local Funds	No
General Obligation Bonds	Yes
Special Tax Bonds	No
Private Activities/Donations	No
State and Federal Funds/Grants	No
Other	
Public Education Programs	Yes
Privately or Self- Insured?	Privately
Fire Evacuation Training	Yes
Tornado Sheltering Exercises	Yes
Public Address/Emergency Alert System	Yes
NOAA Weather Radios	Yes
Lock-Down Security Training	Yes
Mitigation Programs	Yes
Tornado Shelter/Saferoom	No
Campus Police	School Protection Officer

Source: Data Collection Questionnaire, 1/20/2021

3 RISK ASSESSMENT

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CRS Activity Points	Error! Bookmark not defined.

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.

The risk assessment for Knox County and its jurisdictions followed the methodology described in the Local Mitigation Planning Handbook (March 2013).

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.

The Knox County Emergency Management Director, along with members of the MPC and the Northeast Regional Planning Commission, reviewed existing mitigation plans, researched historical disaster declaration records, and surveyed various other sources, including anecdotal information, to fairly identify hazards to be included in this plan.

3.1.1 Review of Existing Mitigation Plans

The MPC reviewed the hazards identified in the previously approved plan from 2015, as well as the hazards identified in the most recent State Plan. There were no significant differences between the lists of hazards included in the previously approved plan and this plan update.

The MPC decided to include only natural hazards, as only natural hazards are required by federal regulation to be included. The human-caused and technological hazards were eliminated from further analysis due to these hazards are not necessary for plans to meet the requirements of the Disaster Mitigation Act of 2000.

Levee failure was excluded from the mitigation planning process as there are no mapped levees nor associated levee protected areas within or immediately upstream of Knox County.

3.1.2 Review Disaster Declaration History

Federal and 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. FEMA Disaster Declarations that included Knox County, Missouri, 1965-Present

Disaster Number	Description	Declaration Date Incident Period
372	HEAVY RAINS, TORNADOES & FLOODING	4/19/1973
407	SEVERE STORMS & FLOODING	11/1/1973
713	SEVERE STORMS & FLOODING	6/6/1984 – 6/16/1984
995	SEVERE STORMS & FLOODING	6/10/1993 – 10/25/1993
1403	SEVERE WINTER ICE STORM	1/29/2002 – 2/13/2002
1412	SEVERE STORMS, TORNADOES AND FLOODING	4/24/2002 – 6/10/2002

1463	SEVERE STORMS, TORNADOES, AND FLOODING	5/4/2003 – 5/30/2003
1524	SEVERE STORMS, TORNADOES, AND FLOODING	5/18/2004 – 5/31/2004
1773	SEVERE STORMS AND FLOODING	6/1/2008 – 8/13/2008
1809	SEVERE STORMS, FLOODING, AND A TORNADO	9/11/2008 – 9/24/2008
3017	DROUGHT	9/24/1976
3232	HURRICANE KATRINA EVACUATION	8/29/2005 – 10/1/2005
3281	SEVERE WINTER STORMS	12/8/2007 – 12/15/2007
3303	SEVERE WINTER STORM	1/26/2009 – 1/28/2009
3317	SEVERE WINTER STORM	1/31/2011 – 2/5/2011
1961	SEVERE WINTER STORM AND SNOWSTORM	1/31/2011 – 2/5/2011
1847	SEVERE STORMS, TORNADOES, AND FLOODING	5/8/2009 – 5/16/2009
1934	SEVERE STORMS, FLOODING, AND TORNADOES	6/12/2010 – 7/31/2010
4130	SEVERE STORMS, STRAIGHT-LINE WINDS, TORNADOES, AND FLOODING	5/29/2013 – 6/10/2013
4200	SEVERE STORMS, TORNADOES, STRAIGHT-LINE WINDS, AND FLOODING	9/9/2014 – 9/10/2014
4238	SEVERE STORMS, TORNADOES, STRAIGHT-LINE WINDS, AND FLOODING	5/15/2015 – 7/27/2005
4451	SEVERE STORMS, TORNADOES, AND FLOODING	4/29/2019 – 7/5/2019
4490	COVID-19 PANDEMIC	1/20/2020 – Present

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

3.1.3 Research Additional Sources

The following additional data sources were also consulted during the completion of this plan.

- Missouri Hazard Mitigation Plans (2010, 2013, and 2018)
- Previously approved planning area Hazard Mitigation Plan (2015)
- Federal Emergency Management Agency (FEMA)
- Missouri Department of Natural Resources
- National Drought Mitigation Center Drought Reporter
- US Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics
- National Agricultural Statistics Service (Agriculture production/losses)
- Data Collection Questionnaires completed by each jurisdiction
- State of Missouri GIS data
- Environmental Protection Agency
- Flood Insurance Administration
- Hazards US (Hazus)
- Missouri Department of Transportation
- Missouri Division of Fire Marshal Safety

- Missouri Public Service Commission
- National Fire Incident Reporting System (NFIRS)
- National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI);
- County and local Comprehensive Plans to the extent available
- County Emergency Management
- County Flood Insurance Rate Map, FEMA
- Flood Insurance Study, FEMA
- SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin
- U.S. Army Corps of Engineers
- U.S. Department of Transportation
- United States Geological Survey (USGS)
- Various articles and publications available on the internet

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

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

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

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

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 table below lists in alphabetical order the hazards that significantly impact Knox County that were chosen by the MPC for further analysis. Not all hazards impact every jurisdiction. An “X” in the table column indicates the jurisdiction is impacted by the hazard, and an empty cell 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	Severe Winter Weather	Thunderstorm/Lightning/Hail/ High Wind	Tornado	Wildfire	Pandemic
Knox County	x	x	x	x	x	x	x	x	x	x	x
City of Baring	X	x	x	x	x	x	x	x	x	x	x
City of Edina	x	x	x	x	x	x	x	x	x	x	x
City of Hurdland	x	x	x	x	x	x	x	x	x	x	x
City of Knox City	X	x	x	x	x	x	x	x	x	x	x
Village of Newark	x	x	x	x	x	x	x	x	x	x	x
Village of Novelty	x	x	x	x	x	x	x	x	x	x	x
Knox County R-I School District	X	x	x	x	x	x	x	x	x	x	x

3.1.5 Multi-Jurisdictional Risk Assessment

For this multi-jurisdictional plan, the risk assessment assesses each jurisdiction's risk where they deviate from risk's facing the entire county. Knox County is not geographically large at 507 square miles, and is fairly uniform in terms of climate and topography, as well as construction characteristics and development trends. Accordingly, overall hazards and vulnerability do not vary greatly across the planning area.

This is an update to the April 2015 plan. For this update, all hazards were assessed on a county-wide basis. Some hazards, like flooding, vary in risk across the planning area. Those variations were discussed by the MPC and included in the profile where appropriate. The hazards that vary across the planning area, in terms of risk, are dam failure, flash flood, levee failure, Land Subsidence/Sinkholes and floods.

The county is essentially rural with more densely populated areas in and around Edina. There is only one school throughout the County. Edina is situated along Highway 15. Row crops and silage across the county are susceptible to drought, floods, hail, and high winds. Livestock is not as big a concern but ranching is adversely affected by flooding, drought, and extremes of heat and cold. Where appropriate, these extremes will be explained in greater detail in the vulnerability sections of each hazard.

Each hazard identified in Section 3.1, Hazard Identification, is profiled individually in this section in alphabetical order for easier reference. The level of information presented in the profiles varies by hazard based on the information available. With each update of this plan, new information will be incorporated to provide for better evaluation and prioritization of the hazards that affect Knox County.

The sources used to collect information for these profiles include those mentioned in Section 3.1.3. and those cited individually in each hazard section. Detailed profiles for each of the identified hazards include information on the following characteristics of the hazard.

Hazard Description

This section consists of a general description of the hazard and the types of impacts it may have on a community. It also includes a ranking to indicate typical warning times and duration of hazard events.

Historical Statistics

This section describes the geographic extent or location of the hazard in the planning area and includes the information on historic incidents and their impacts based upon the sources described in Section 3.1.4, Hazard Identification and the information provided by the MPC. Where available, maps are utilized to indicate the areas of the planning region that are vulnerable to the subject hazard.

Probability of Future Occurrence

The frequency of past events is used to gauge the likelihood of future occurrences. Where possible, the probability and severity of occurrence was calculated based on historical data. Probability was

determined by dividing the number of events observed by the number of years and multiplying by 100. This gives the percent chance of the event happening in any given year. An example would be three droughts occurring over a 30-year period, which suggests 10 percent chance of drought in any given year.

Magnitude of Severity

The magnitude of the impact of a hazard event (past and perceived) is related directly to the vulnerability of the people, property, and the environment it affects. This is a function of when the event occurs, the location affected, the resilience of the community, and the effectiveness of the emergency response and disaster recovery efforts.

3.2 ASSETS AT RISK

In this section of the plan, the Knox County population, structures, critical facilities and infrastructure and other important assets that may be at risk to hazards are assessed. There were no changes to the planning area since the previously approved plan was adopted.

Missouri Mitigation Viewer

With the 2018 Hazard Mitigation Plan Update, SEMA now provides online access to risk assessment data and associated mapping for the 114 counties in the State, including the independent City of St. Louis. Through the web-based Missouri Hazard Mitigation Viewer, local planners or other interested parties can obtain all State Plan datasets.

The Missouri Hazard Mitigation Viewer includes a Map Viewer with a legend of clearly labeled features, a north arrow, a base map that is either aerial imagery or a street map, risk assessment data symbolized the same as in the 2018 State Plan for easy reference, search and query capabilities, ability to zoom to county level data and capability to download PDF format maps. The Missouri Hazard Mitigation Viewer can be found at this link:

- <http://bit.ly/MoHazardMitigationPlanViewer2018>
- <https://drive.google.com/file/d/1bPkc0jgF9ofwQLnTL9N0u-oPFWi9hkst/view> - User Guide

Assets at Risk available from the Mitigation Viewer include:

- State Owned Facilities
- State Leased Facilities
- Department of Higher Education Facilities
- State Owned Bridges

Flood Risk Datasets

Data sources include:

- FEMA Flood Insurance Rate Maps (FIRM)
<https://msc.fema.gov/portal/home>
- FEMA National Flood Hazard Layer
<https://hazards.fema.gov/femaportal/wps/portal/NFHLWMS>

- FEMA Hazus Program
<https://www.fema.gov/hazus>
- 2010 US Census Population and Housing Unit Counts
<https://www.census.gov/geo/maps-data/data/tiger-data.html>

3.2.1 Total Exposure of Population and Structures

For the 2018 State Plan, SEMA utilized a structure inventory dataset developed by the University of Missouri GIS Department (MSDIS) to determine the number of structures exposed to risks. MSDIS created a point and/or footprint dataset for every roof line in every county in the state of Missouri. This dataset is attributed with the type of structure such as Residential, Commercial, etc. This dataset was utilized throughout this section.

Unincorporated County and Incorporated Cities

In the following three tables, population data is based on 2010 Census Bureau data. Building counts and building exposure values are based on parcel data developed by the State of Missouri Geographic Information Systems (GIS) database. This data, organized by County, is available on Google Drive through the link provided on the previous page. Contents exposure values were calculated by factoring a multiplier to the building exposure values based on usage type. The multipliers were derived from the Hazus and are defined below in **Table 3.3**. Land values have been purposely excluded from consideration because land remains following disasters, and subsequent market devaluations are frequently short term and difficult to quantify. Another reason for excluding land values is that state and federal disaster assistance programs generally do not address loss of land (other than crop insurance). It should be noted that the total valuation of buildings is based on county assessors' data which may not be current. In addition, government-owned properties are usually taxed differently or not at all, and so may not be an accurate representation of true value. Note that public school district assets and special districts assets are included in the total exposure tables assets by community and county.

Table 3.3 shows the total population, building count, estimated value of buildings, estimated value of contents and estimated total exposure to parcels for the unincorporated 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 (Values are in Thousands of Dollars)

Jurisdiction	2018 Annual Population Estimate	Building Count	Building Exposure (\$)	Contents Exposure (\$)	Total Exposure (\$)
City of Baring	125	90	\$7,974	\$4,479	\$12,453
City of Edina	1,118	714	\$71,540	\$41,368	\$112,908
City of Hurdland	157	120	\$12,105	\$6,685	\$18,790
City of Knox City	206	143	\$15,330	\$8,650	\$23,980

Village of Newark	90	74	\$7,004	\$3,919	\$10,923
Village of Novelty	132	103	\$8,780	\$5,220	\$14,000
Knox County	3,947	7,317	\$150,864	\$73,999	\$224,863
Totals	5,775	8,561	\$273,597	\$144,320	\$417,917

Source: U.S. Bureau of the Census, Annual population estimates/ 5-Year American Community Survey 2018; 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 **All values are in thousands of dollars*

Jurisdiction	Residential	Commercial	Industrial	Agricultural	Total
City of Baring	\$6,903	\$1,028	\$0	\$43	\$7,974
City of Edina	\$60,120	\$11,308	\$0	\$112	\$71,540
City of Hurdland	\$10,799	\$1,285	\$0	\$21	\$12,105
City of Knox City	\$13,360	\$1,970	\$0	\$0	\$15,330
Village of Newark	\$6,123	\$857	\$0	\$24	\$7,004
Village of Novelty	\$7,014	\$1,713	\$0	\$53	\$8,780
Knox County	\$124,026	\$8,138	\$2,565	\$16,135	\$150,864
Totals	\$228,345	\$26,299	\$2,565	\$16,388	\$273,597

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
City of Baring	62	12	0	16	90
City of Edina	540	132	0	42	714
City of Hurdland	97	15	0	8	120
City of Knox City	120	23	0	0	143
Village of Newark	55	10	0	9	74
Village of Novelty	63	20	0	20	103
Knox County	1,114	95	46	6,062	7,317
Totals	2,051	307	46	6,157	8,561

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

School district assets are included in the tables above. However, more discrete school district data is provided below and was taken from the School District Data Collection Questionnaire, data provided by Missouri's Department of Elementary and Secondary Education (DESE) and district-maintained websites. The number of enrolled students at the participating public school districts is provided in **Table 3.6** below. Additional information includes the number of buildings, building values (building exposure) and contents value (contents exposure). These numbers will represent the total enrollment and building count for the public school districts regardless of the county in which they are located.

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

Public School District	Enrollment	Building Count	Building Exposure (\$)	Contents Exposure (\$)	Total Exposure (\$)
Knox County R-I School District	481	2	\$72,534,965		\$72,534,965

Source: <https://apps.dese.mo.gov/MCDS/Home.aspx>, 2019

3.2.2 Critical and Essential Facilities and Infrastructure

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

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

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

- Interviews with County Emergency Management Director
- Interviews with City Government Employees
- Hazus

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 Baring	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3
City of Edina	0	0	3	1	0	0	1	1	0	0	0	1	0	0	1	1	1	0	0	1	0	0	1	12
City of Hurdland	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
City of Knox City	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
Village of Newark	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Village of Novelty	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Knox County	0	0	0	0	1	0	0	1	0	0	5	1	0	0	1	0	0	1	0	1	0	0	0	11
Knox County R-I	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
Totals	0	1	3	1	1	0	5	7	0	0	5	2	0	0	2	1	1	2	0	3	0	0	3	37

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

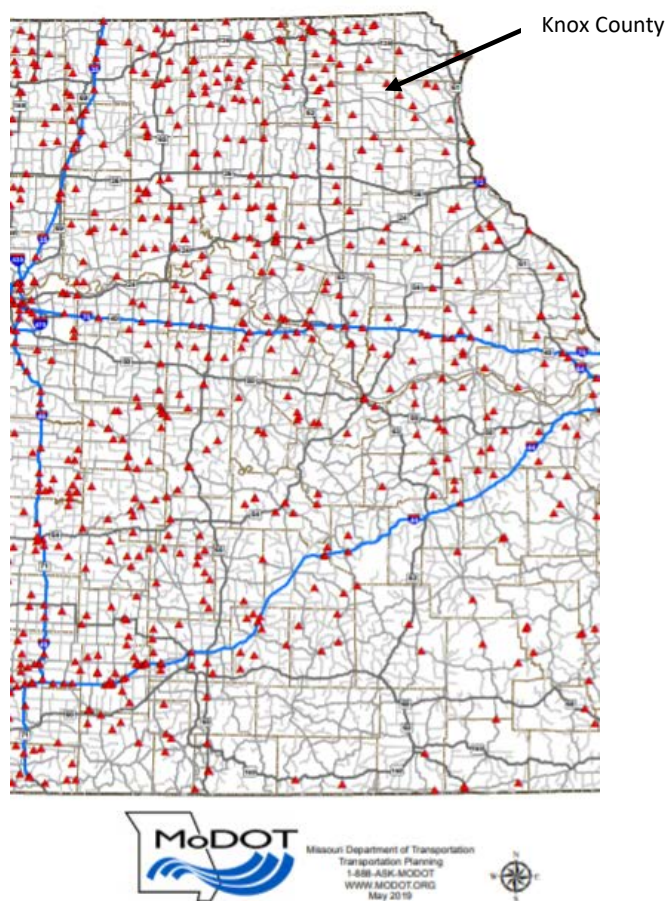
Missouri bridges are rated based on the National Bridge Inspection Standards developed by the Federal Highway Administration. **Figure 3.1** indicates there are 173 bridges in Knox County with 92 in good condition, 74 in fair condition, and 7 in poor condition. **Figure 3.2** indicates the bridges in Knox County with a poor rating.

Figure 3.1. Knox County Bridges

County	Bridge Counts				Bridge Area (Square Meters)			
	All	Good	Fair	Poor	All	Good	Fair	Poor
KNOX (103)	173	92	74	7	28,326	14,828	12,343	1,154

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

Figure 3.2. Knox County Structurally Deficient Bridges



Source: https://www.modot.org/sites/default/files/documents/Statewide_Poor_Bridges_2019_with_insets.pdf

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.

Knox County is home to several threatened and endangered species listed in **Table 3.8** below.

Table 3.8. Threatened and Endangered Species in Knox County

Common Name	Scientific Name	Status
Gray Bat	<i>Myotis grisescens</i>	Endangered
Indiana Bat	<i>Myotis sodalis</i>	Endangered
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Endangered
Mead's Milkweed	<i>Asclepias meadii</i>	Endangered

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

Natural Resources: The Missouri Department of Conservation (MDC) provides a database of lands it owns, leases, or manages for public use. These assets are listed in **Table 3.9** below for the Knox County planning area.

Table 3.9. Parks in Knox County

Park / Conservation Area	Address	City
Sever (Henry) Lake CA	Highway KK	Newark
White Oak Bend Access	County Road 387	Newark
Coon Creek Roadside Park	Highway 15	Edina

Source: <http://mdc7.mdc.mo.gov/applications/moatlas/AreaList.aspx?txtUserID=guest&txtAreaNm=s>
<https://missouri.hometownlocator.com/maps/feature-map.ftc.2.fid.716262.n.coon%20creek%20roadside%20park.cfm>

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

The table below lists the Knox County properties that are included in the National Register of Historic Places.

Table 3.10. Knox County Properties on the National Register of Historic Places

Property	Address	City	Date Listed
Edina Double Square Historic District	Main and E Lafayette Streets, 118-124 South Main Street	Edina	7/28/1999

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

Economic Resources: **Table 3.11** provides major Non-Government employers in the planning area.

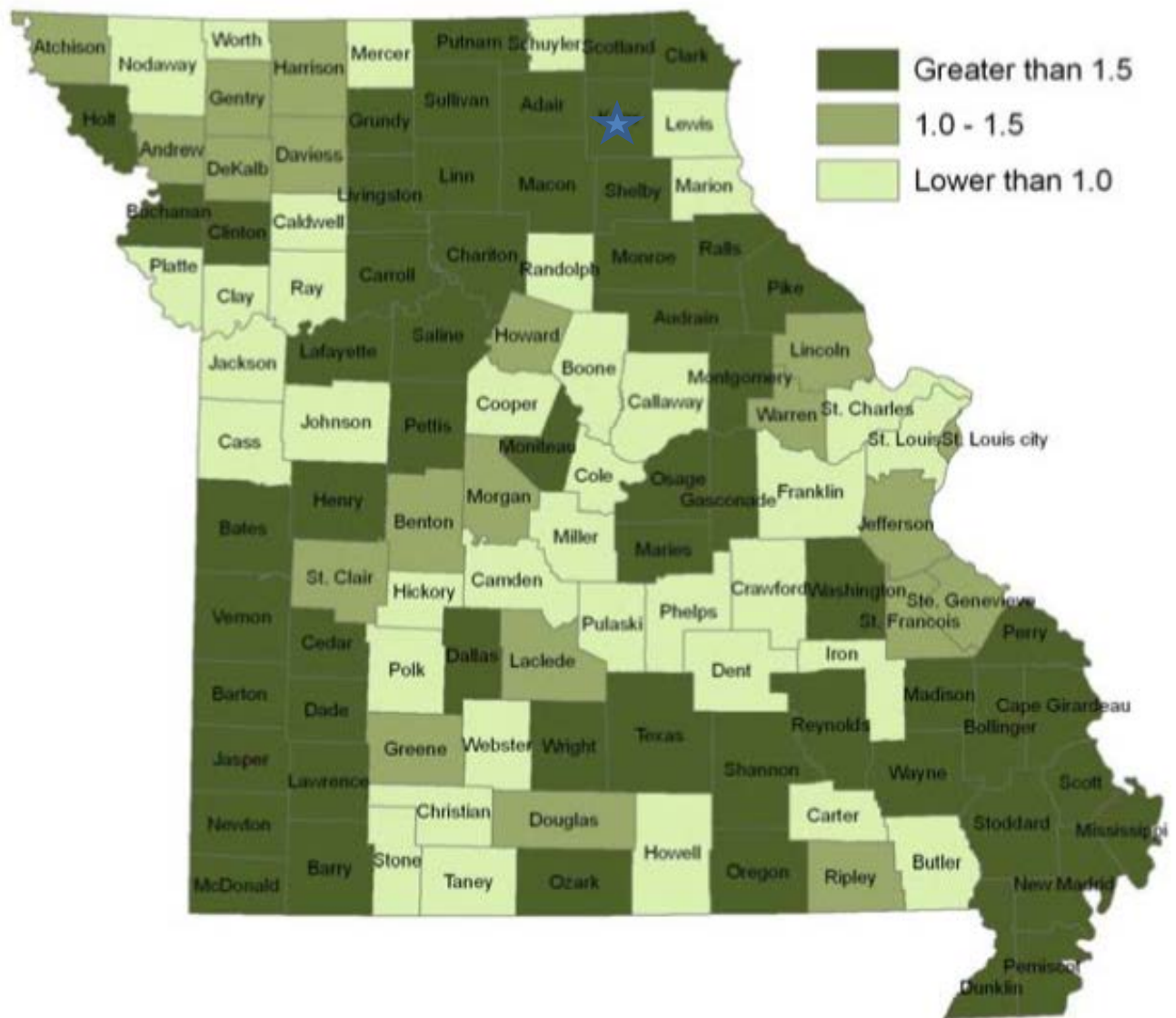
Table 3.11. Major Non-Government Employers in Knox County

Employer Name	Main Locations	Product or Service	Employees
Knox County R-I School	Edina	Public School District	N/A
Knox County Nursing Home	Edina		60
Cardwell Lumber		Building Sales	N/A
Blessing Center	Edina		16-20
C&R Market	Edina	Grocery Store	26
Hawkins Harrison Insurance	Edina	Insurance	17
Baring Farm Services	Baring	Agriculture	10
Baring Elevator	Baring		15

Source: Data Collection Questionnaires; local Economic Development Commissions

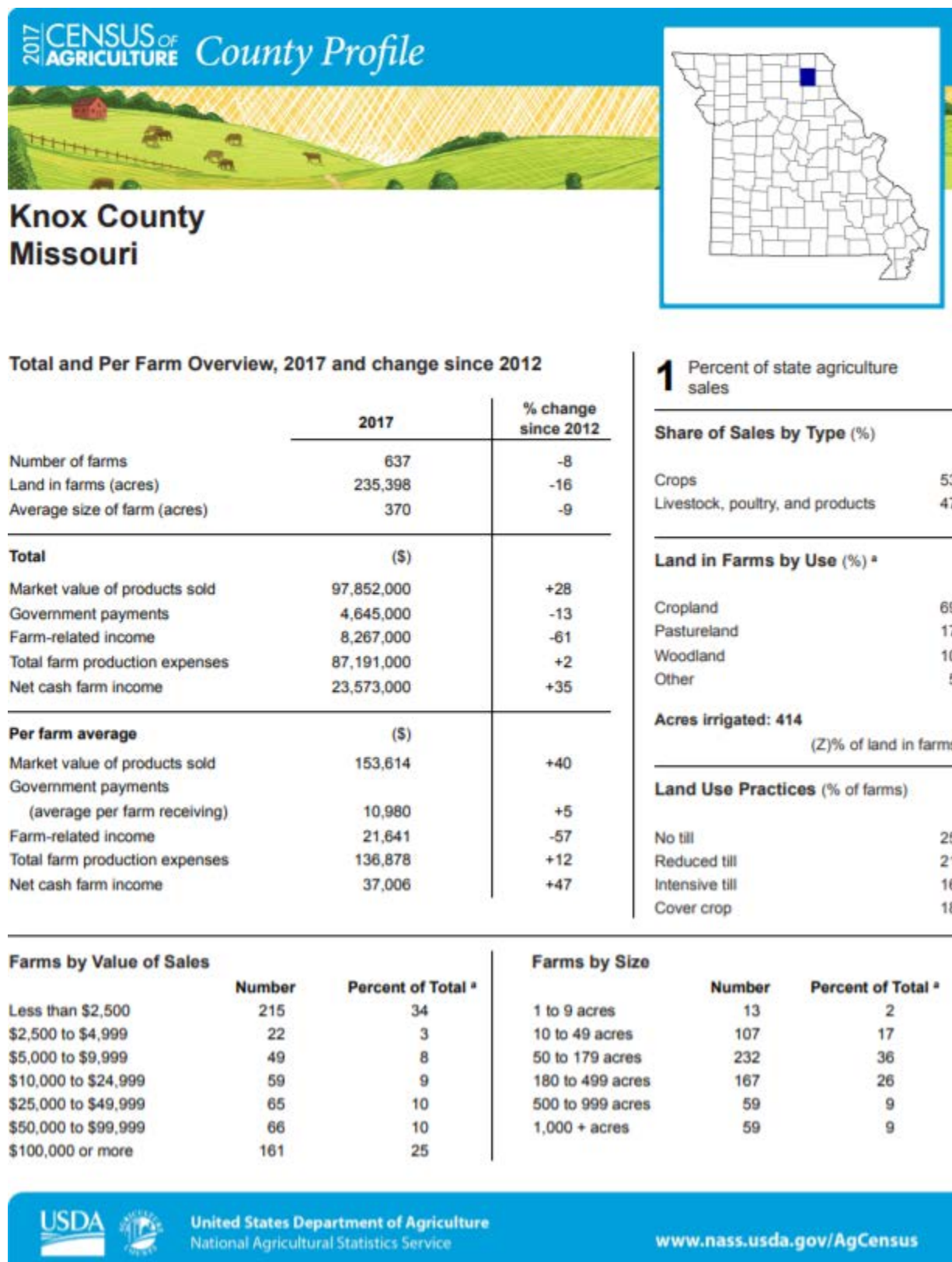
Agriculture plays an important role in the Knox County economy. As described in **Figure 3.3**, Knox County is greater than 1.5 in Agribusiness Employment.

Figure 3.3. Agribusiness Employment Location Quotient



Source: https://www.missourieconomy.org/pdfs/missouri_farms_and_agribusiness.pdf *Blue star indicates Knox County

Figure 3.4. 2017 Census of Agriculture



Market Value of Agricultural Products Sold

	Sales (\$1,000)	Rank in State ^b	Counties Producing Item	Rank in U.S. ^b	Counties Producing Item
Total	97,852	43	114	1,162	3,077
Crops	51,704	45	114	1,067	3,073
Grains, oilseeds, dry beans, dry peas	49,445	44	112	770	2,916
Tobacco	-	-	4	-	323
Cotton and cottonseed	-	-	5	-	647
Vegetables, melons, potatoes, sweet potatoes	(D)	104	113	(D)	2,821
Fruits, tree nuts, berries	(D)	100	111	1,886	2,748
Nursery, greenhouse, floriculture, sod	(D)	99	108	1,642	2,601
Cultivated Christmas trees, short rotation woody crops	-	-	37	-	1,384
Other crops and hay	(D)	38	114	1,103	3,040
Livestock, poultry, and products	46,149	36	114	1,005	3,073
Poultry and eggs	2,378	32	112	683	3,007
Cattle and calves	19,889	39	113	799	3,055
Milk from cows	4,532	17	97	631	1,892
Hogs and pigs	18,529	25	111	283	2,856
Sheep, goats, wool, mohair, milk	(D)	47	111	(D)	2,984
Horses, ponies, mules, burros, donkeys	29	86	113	2,039	2,970
Aquaculture	(D)	7	43	(D)	1,251
Other animals and animal products	6	76	111	1,582	2,878

Total Producers ^c	1,022	Percent of farms that:	Top Crops in Acres ^d	
Sex				
Male	658	Have internet access	61	
Female	364			
Age		Farm organically	(Z)	
<35	142			
35 – 64	514			
65 and older	366			
Race		Sell directly to consumers	3	
American Indian/Alaska Native	-			
Asian	1			
Black or African American	-			
Native Hawaiian/Pacific Islander	-	Hire farm labor	23	
White	1,017			
More than one race	4			
Other characteristics		Are family farms	95	
Hispanic, Latino, Spanish origin	13			
With military service	118			
New and beginning farmers	303			
			Livestock Inventory (Dec 31, 2017)	
			Broilers and other meat-type chickens	62
			Cattle and calves	34,436
			Goats	131
			Hogs and pigs	79,638
			Horses and ponies	234
			Layers	99,703
			Pullets	45
			Sheep and lambs	1,279
			Turkeys	(D)

See 2017 Census of Agriculture, U.S. Summary and State Data, for complete footnotes, explanations, definitions, commodity descriptions, and methodology.

^a May not add to 100% due to rounding. ^b Among counties whose rank can be displayed. ^c Data collected for a maximum of four producers per farm.

^d Crop commodity names may be shortened; see full names at www.nass.usda.gov/go/cropnames.pdf. * Position below the line does not indicate rank.

(D) Withheld to avoid disclosing data for individual operations. (NA) Not available. (Z) Less than half of the unit shown. (-) Represents zero.

USDA is an equal opportunity provider, employer, and lender.

Source: https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Missouri/cp29103.pdf

Table 3.12. Agriculture-Related Jobs in Knox County

		148
		270
		2,728
Hired farm labor	farms	
	workers	96
	\$1,000 payroll	96
Farms with-		23
1 worker	farms	46
	workers	
2 workers	farms	16
	workers	(D)
3 or 4 workers	farms	12
	workers	66
5 to 9 workers	farms	1
	workers	(D)
10 workers or more	farms	
	workers	70
Workers by days worked:		113
150 days or more	farms	
	workers	46
Farms with-		46
1 worker	farms	12
	workers	24
2 workers	farms	
	workers	9
		28
3 or 4 workers	farms	3
	workers	15
5 to 9 workers	farms	-
	workers	-
10 workers or more	farms	
	workers	91
Less than 150 days	farms	157
	workers	
Farms with-		58
1 worker	farms	58
	workers	16
2 workers	farms	32
	workers	
		12
3 or 4 workers	farms	36
	workers	5
5 to 9 workers	farms	31
	workers	-
10 workers or more	farms	-
	workers	
Reported only workers working		57
150 days or more	farms	80
	workers	1,210
	\$1,000 payroll	
Reported only workers working		78
less than 150 days	farms	128
	workers	394
	\$1,000 payroll	
Reported both - workers working		
150 days or more and workers		13
working less than 150 days	farms	33
	150 days or more, workers	
	less than 150 days, workers	29
	\$1,000 payroll	1,124
Total migrant workers	farms	-
	workers	-
Migrant farm labor on farms with hired labor	farms	-
	workers	-
Migrant farm labor on farms reporting only		
contract labor	farms	-
	workers	-
Unpaid workers	farms	271
	workers	591

https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Missouri/st29_2_0007_0007.pdf

3.3 LAND USE AND DEVELOPMENT

3.3.1 Development Since Previous Plan Update

The population data listed in **Table 3.13** below shows a significant and steady loss of population across all communities during the period between 2010 and the ACS 2018 Five-Year Estimate.

Table 3.13. Knox County Population Growth, 2010-2018

Jurisdiction	Total Population 2010	Total Population 2018	2010-2018 # Change	2000-2018 % Change
City of Baring	132	125	-7	-5.3%
City of Edina	1,176	1,118	-58	-4.9%
City of Hurdland	163	157	-6	-3.7%
City of Knox City	216	206	-10	-4.6%
Village of Newark	94	90	-4	-4.3%
Village of Novelty	139	132	-7	-5%
Knox County	4,131	3,947	-184	-4.5%

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

Population growth or decline is generally accompanied by increases or decreases in the number of housing units. All jurisdictions in Knox County have shown a decrease in population. Overall, there has been a .18% increase in housing in the Knox County area as reflected in **Table 3.14**.

Table 3.14. Change in Housing Units, 2010-2017

Jurisdiction	Housing Units 2010	Housing Units 2017	2010-2017 # Change	2000-2017 % Change
City of Baring	82	81	-1	-1.2%
City of Edina	667	666	-1	-0.2%
City of Hurdland	94	108	+14	+14.9%
City of Knox City	126	122	-4	-3.2%
Village of Newark	60	54	-6	-10%
Village of Novelty	68	76	+8	+11.8%
Knox County	2,289	2,282	-7	-0.3%

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

U.S. Census information is compiled every 10 years, with the last Census completed in 2010, estimates were used for the above data. According to the American Fact Finder, estimates show that in 2017 the number of housing units were expected to decrease in all jurisdictions within Knox County, with the exception of the City of Hurdland and Village of Novelty. Vulnerability to hazards will be affected based on population and where new housing units have been built. Due to city ordinances, vulnerability is not expected to increase as ordinances for new builds have been set to protect citizens.

3.3.2 Future Land Use and Development

Knox County and Participating Jurisdictions

Knox County and the participating jurisdictions are in a very rural area of Northeast Missouri and it is very difficult to attract new development due to the inability to attract new employers to the area. The county or participating jurisdictions did not indicate any future growth on the data questionnaires.

Knox County R-I School District

There are no plans in the next 5 years for any additions or renovations for K – 12 unless funding becomes available for construction of a safe room.

Special District's Future Development

The Special Road District does not have any plans for 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.

Each hazard identified in **Section 3.1.4** will be profiled individually in a hazard profile. 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. Tables are a good way to convey this data and when available, tables showing random events for the past 20 years are included.
- **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.

- **Changing Future Conditions Considerations:** In addition to the probability of future occurrence, changing future conditions should also be considered, including the effects of long-term changes in weather patterns and climate on the identified hazards.

Vulnerability Assessments

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

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

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

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

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

Following the hazard profile for each hazard will be the vulnerability assessment. The vulnerability assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to damages from natural hazards. The vulnerability assessments should be based on the best available data. The vulnerability assessments can also be based on data that was collected for the 2018 State Hazard Mitigation Plan Update. With the 2018 Hazard Mitigation Plan Update, SEMA is pleased to provide online access to the risk assessment data and associated mapping for the 114 counties in the State, including the independent City of St. Louis. Through the web-based Missouri Hazard Mitigation Viewer, local planners or other interested parties can obtain all State Plan datasets. This effort removes from local mitigation planners a barrier to performing all the needed local risk assessments by providing the data developed during the 2018 State Plan Update.

The Missouri Hazard Mitigation Viewer includes a Map Viewer with a legend of clearly labeled features, a north arrow, a base map that is either aerial imagery or a street map, risk assessment data symbolized the same as in the 2018 State Plan for easy reference, search and query capabilities, ability to zoom to county level data and capability to download PDF format maps. The Missouri Hazard Mitigation Viewer can be found at this link: <http://bit.ly/MoHazardMitigationPlanViewer2018>.

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

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

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

- **Vulnerability Overview:** The plan provides an overall summary of each jurisdiction's vulnerability to the identified hazards. The overall summary of vulnerability identifies structures, systems, populations or other community assets as defined by the community that are susceptible to damage and loss for hazard events.
- **Potential Losses to Existing Development:** For each participating jurisdiction, the plan describes the potential impacts of the hazard. Impact means the consequences of effect of the hazard on the jurisdiction and its assets. Assets are determined by the community and include, for example, people, structures, facilities, systems, capabilities, and/or activities that have value to the community. For example, impacts could be described by referencing historical disaster impacts and/or an estimate of potential future losses.
- **Previous and Future Development:** This section includes information on how changes in development have impacted the community's vulnerability to this hazard and describes how changes in development in known hazard prone areas since the previous plan have increased or decreased the community's vulnerability.
- **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. Jurisdiction-specific information is included in those cases where the risk varies across the planning area.

3.4.1 Flooding (Riverine and Flash)

Hazard Profile

Hazard Description

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

Flooding caused by dam failure is discussed elsewhere in this plan and 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.

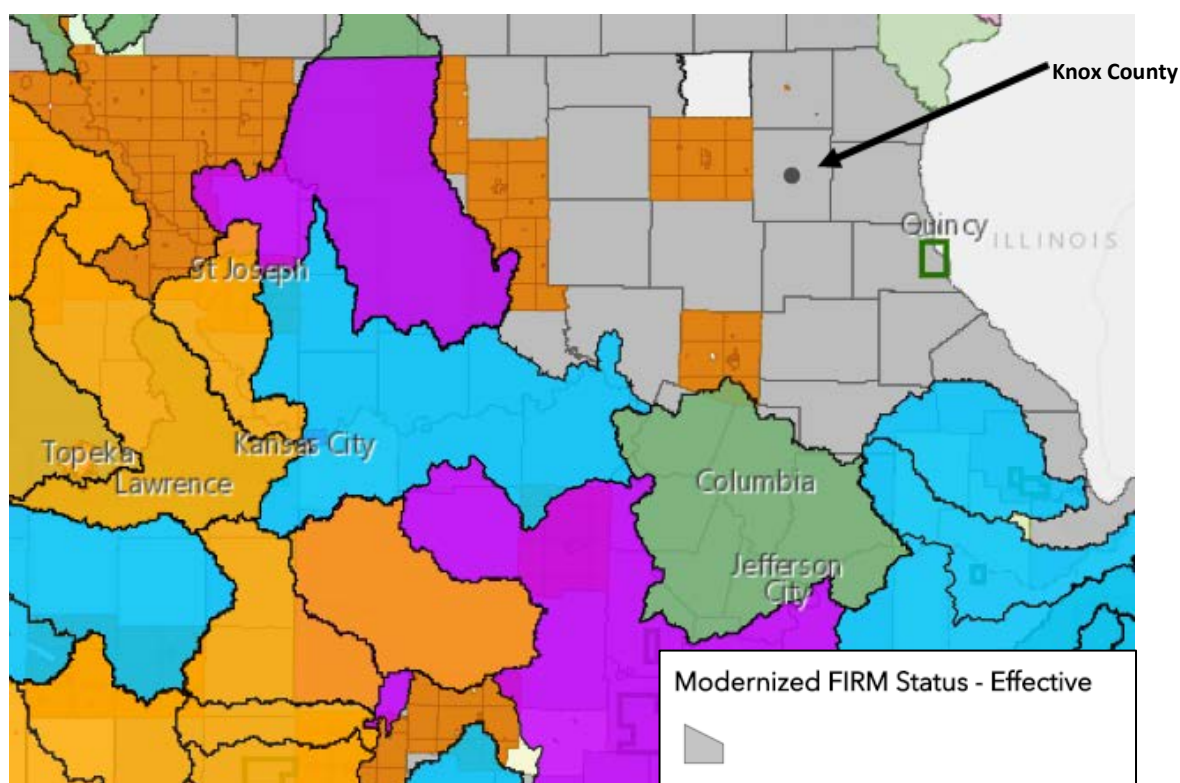
Although flash floods are somewhat unpredictable, there are factors that can point to the likelihood of flash floods occurring. Weather surveillance radar is being used to improve monitoring capabilities of intense rainfall. This, along with knowledge of the watershed characteristics, modeling

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) SFHAs. Below is a Risk MAP Study Status Map. Currently there are no unincorporated areas in the county at risk for river flooding.

Figure 3.5. Knox County Risk MAP Study Status Map

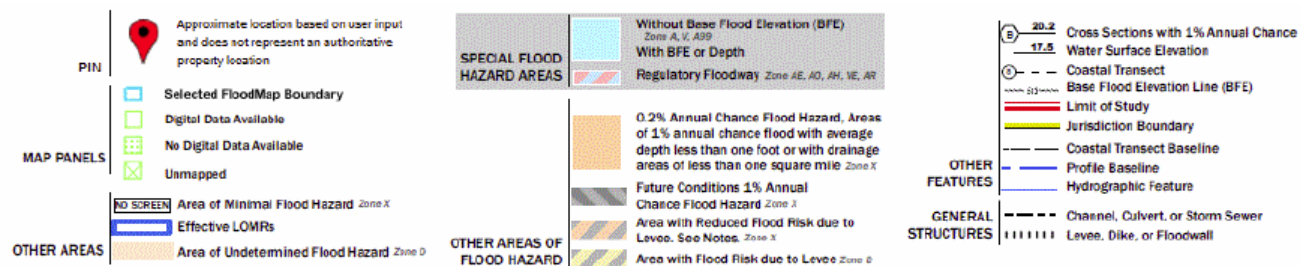


Effective: Knox County, MO FY16 (O-CW) REG PIR

MIP Case Number	17-07-0179S
Project Name	Knox County, MO FY16 (O-CW) REG PIR
Mapping Partner	Missouri State Emergency Management Agency (SEMA)
HUC 8	
Watershed Name	
Project Phase	Effective
Preliminary Date	2/23/2018
LFD Date	5/1/2019
Effective Date	

Source: <http://fema.maps.arcgis.com/apps/webappviewer/index.html?id=48cfac9a9ffb4003b565aaccf464d0ac>

Figure 3.6. Legend



Source: FEMA Map Service Center; <https://msc.fema.gov/portal/home>

The following are flood hazard maps for all jurisdictions to fully reflect the flooding hazard for Knox County.

Figure 3.7. City of Baring



Figure 3.8. City of Edina

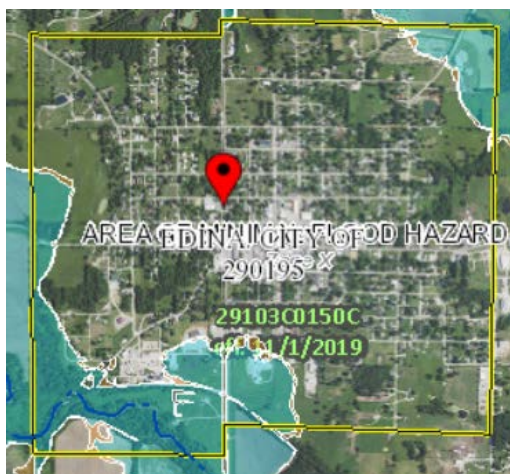


Figure 3.9. City of Hurdland

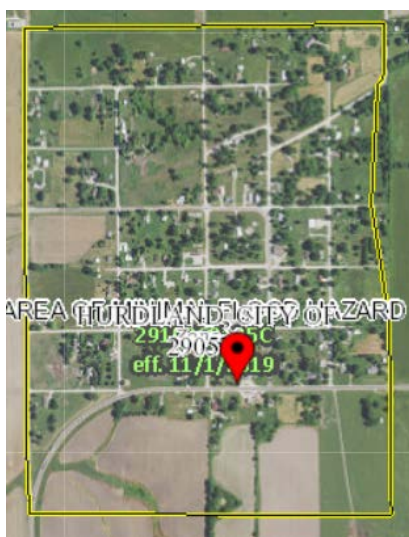


Figure 3.10. City of Knox City

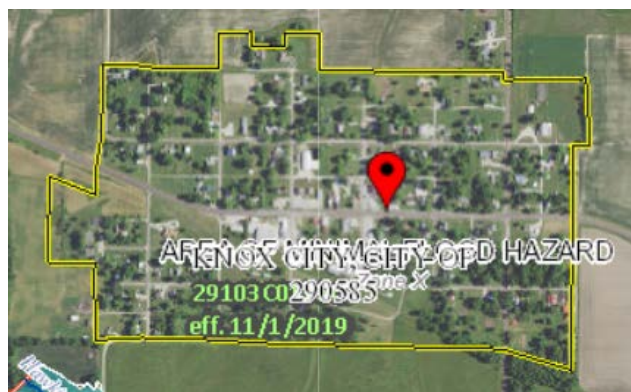


Figure 3.11. Village of Newark

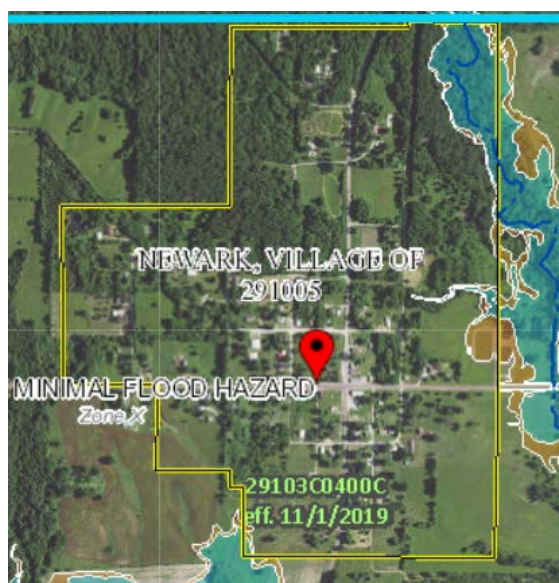


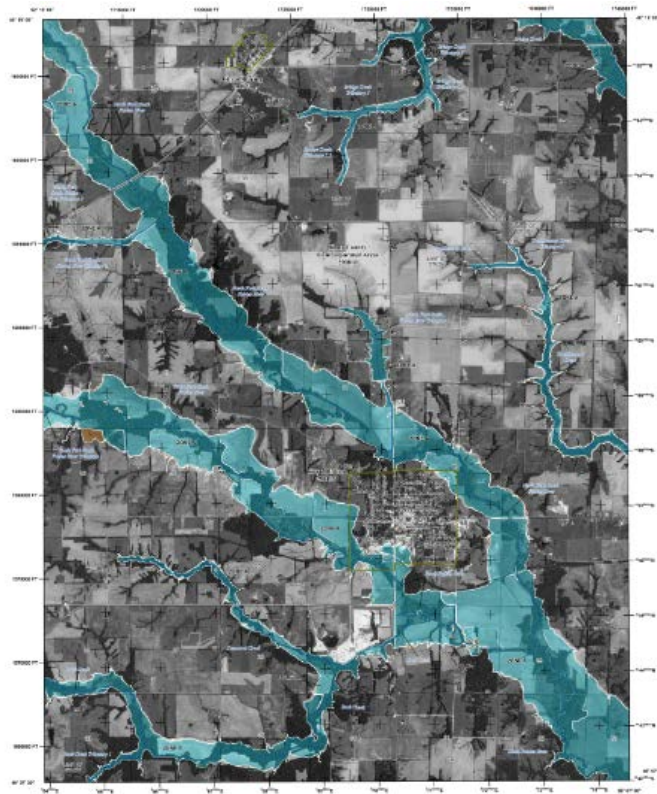
Figure 3.12. Village of Novelty



Figure 3.13. Knox County R-I School District



Figure 3.14. Knox County



Source: FEMA Map Service Center; <https://msc.fema.gov/portal/home>

Table 3.15. Knox County NCEI Flood Events by Location, 2000-2019

Location	# of Events
Unincorporated Knox County	4
-Unincorporated Knox County (unspecified)- 3 flood events	
-Unincorporated Knox County (Locust Hill)- 1 flood events	

Source: National Centers for Environmental Information, 03/06/2020

Flash flooding occurs in SFHAs and those locations in the planning area that are low-lying. They also occur in areas without adequate drainage to carry away the amount of water that falls during intense rainfall events. NCEI database was used to determine which jurisdictions are most prone to flash flooding during a 20-year time period. **Table 3.16** shows the number of flash flood events by location recorded in NCEI for the 20-year period.

Table 3.16. Knox County NCEI Flash Flood Events by Location, 2000-2019

Location	# of Events
Unincorporated Knox County	22
-Unincorporated Knox County (unspecified)- 4 flood events	
-Unincorporated Knox County (Greensburg)- 8 flood events	
-Unincorporated Knox County (Colony)- 5 flood events	
-Unincorporated Knox County (Locust Hill)- 2 flood events	
City of Baring	2
-Baring (unspecified)- 2 flood events	
Village of Newark	1
-Newark (unspecified)- 1 flood events	

Source: National Centers for Environmental Information, 03/06/2020

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 3.17. NFIP Participation in Knox County

Community ID #	Community Name	NFIP Participant (Y/N/Sanctioned)	Current Effective Map Date	Regular-Emergency Program Entry Date
	City of Baring	N		

290195A	City of Edina	Y	11/01/2019 (M)	06/18/1987
	City of Hurdland	N		
	City of Knox City	N		
291005A	Village of Newark	S	11/01/2019	S 11/01/2020
290971A	Village of Novelty	S	11/01/2019	S 11/01/2020
290810A	Knox County	S	11/01/2019	S 11/01/2020

Source: NFIP Community Status Book, 3/6/2020; 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

Knox County, Village of Novelty, and Village of Newark do not currently participate in NFIP because they are sanctioned due to no significant damages from past flooding events.

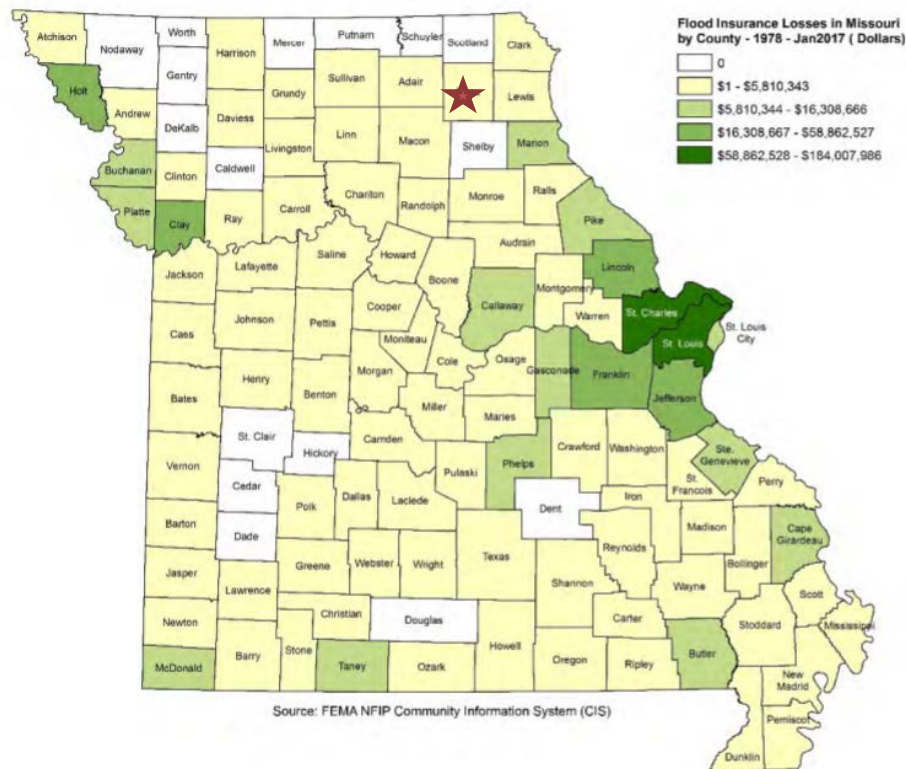
Table 3.18. NFIP Policy and Claim Statistics as of Date

Community Name	Policies in Force	Insurance in Force	Closed Losses	Total Payments
City of Edina	0	0	4	\$1,062,027.58

Source: NFIP Community Status Book, 3/6/2020; 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 1/1/1978 – 9/30/2018

There are no NFIP policies enforced in Knox County.

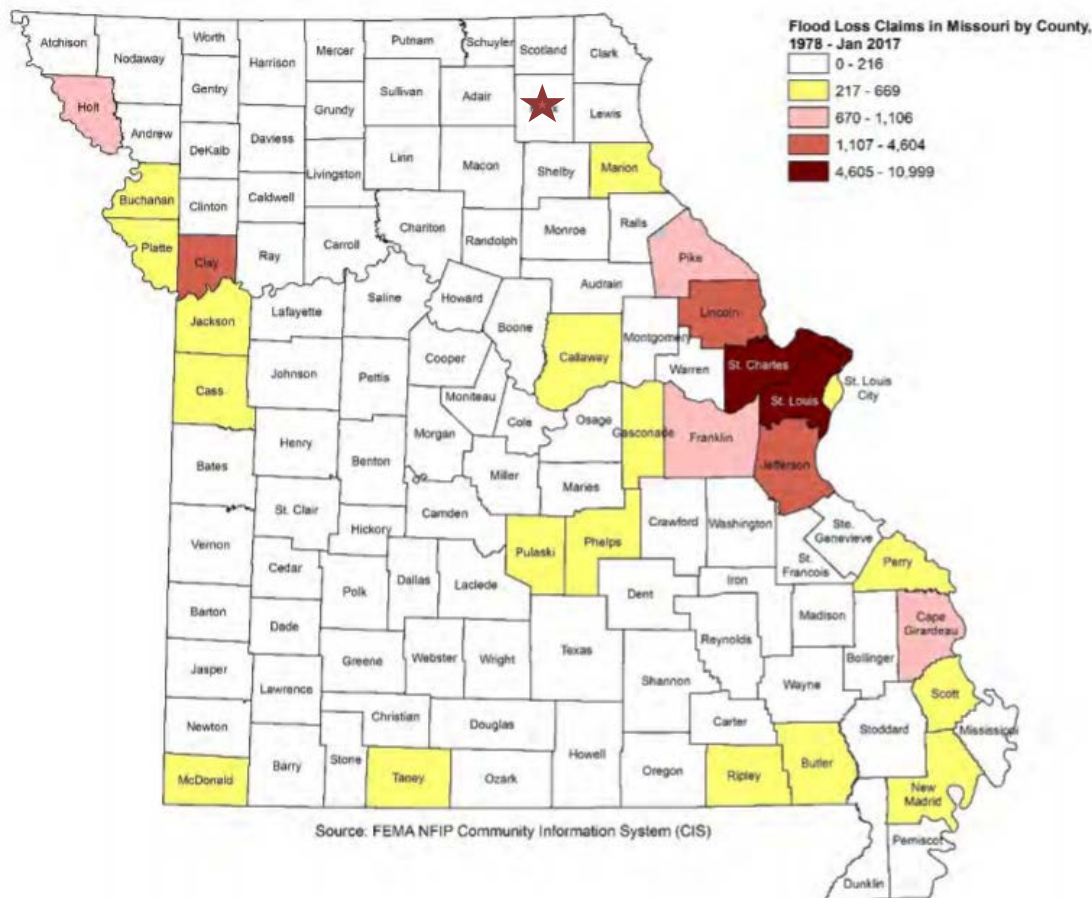
Figure 3.15. Map of Dollars Paid Historically for Flood Insurance Losses 1978 – 2017



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

Figure 3.15 shows that during the period of 1978-January 2017, Knox County received between \$1 – \$5,810,343 in flood insurance payments.

Figure 3.16. Flood Loss Claims in Missouri by County 1978 – 2017



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

Figure 3.16 demonstrates that between the period of 1978 and January 2017, Knox County had between 0 - 216 flood loss claims.

Repetitive Loss/Severe Repetitive Loss Properties

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, there are no repetitive loss properties in Knox County.

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

There are no severe repetitive loss properties located in Knox County.

Previous Occurrences

Table 3.19. NCEI Knox County Flash Flood Events Summary, 2000 to 2019

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damages
2001	1	0	0	\$0	\$0
2002	1	0	0	\$0	\$0
2003	1	0	0	\$0	\$0
2004	1	0	0	\$0	\$0
2008	5	0	0	\$2,000	\$0
2009	4	0	0	\$0	\$0
2010	2	0	0	\$0	\$0
2011	2	0	0	\$0	\$0
2014	1	0	0	\$0	\$0
2015	2	0	0	\$200,00	\$0
2019	2	0	0	\$0	\$0

Source: NCEI, data accessed 3/15/2020

Table 3.20. NCEI Knox County Riverine Flood Events Summary, 2000 to 2019

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damages
2001	1	0	0	\$0	\$0
2002	2	0	0	\$0	\$0
2008	1	0	0	\$0	\$0

Source: NCEI, 3/15/2020

Probability of Future Occurrence

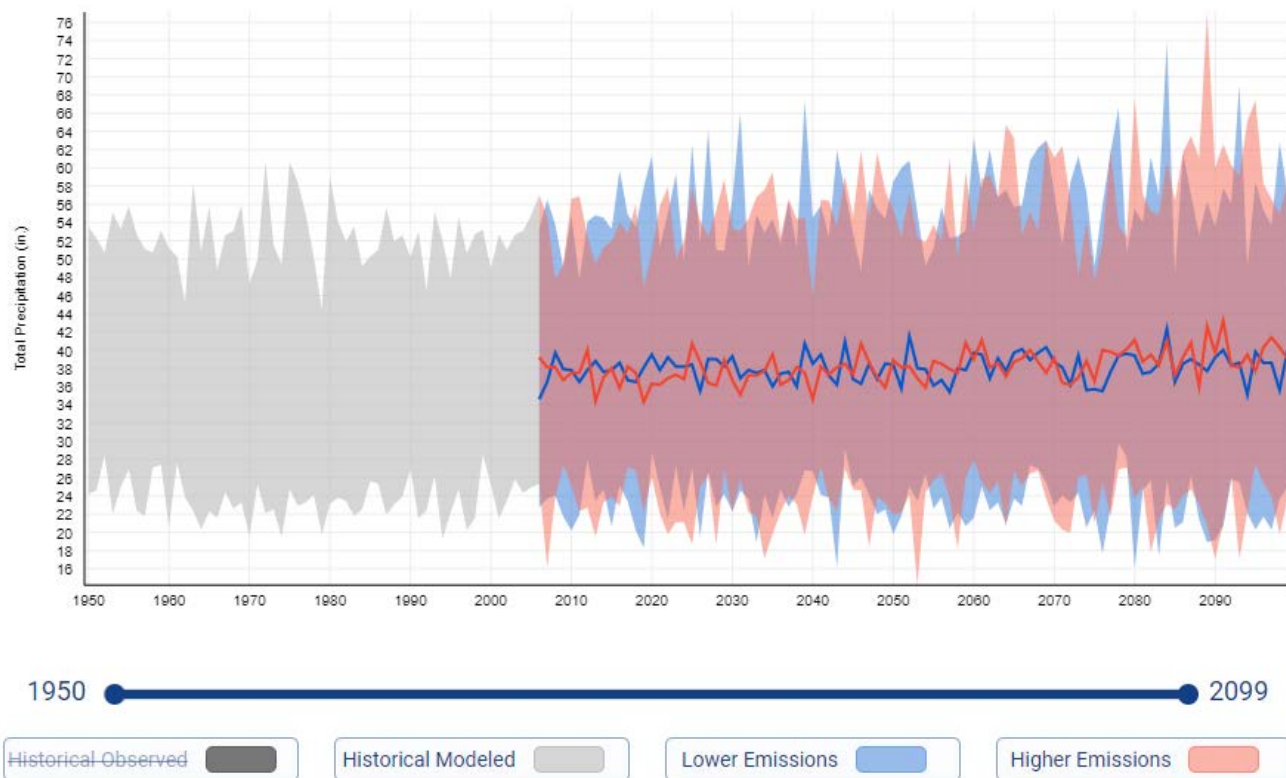
Flash Flooding in the planning area has occurred frequently in the last 20 years with 22 events with an average probability of 1.1% of a flash flood event in any given year.

Riverine Flooding in the planning area has occurred 4 times in the last 20 years making riverine flooding a 20% probability flooding will occur in any given year.

Changing Future Conditions Considerations

According to the National Climate Assessment, extreme rainfall events and flooding have increased during the last century and these trends are expected to continue.

Figure 3.17. Annual Total Precipitation for Knox County



Source: US Climate Resilience Toolkit; <https://toolkit.climate.gov/tools/climate-explorer>

Vulnerability

Vulnerability Overview

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

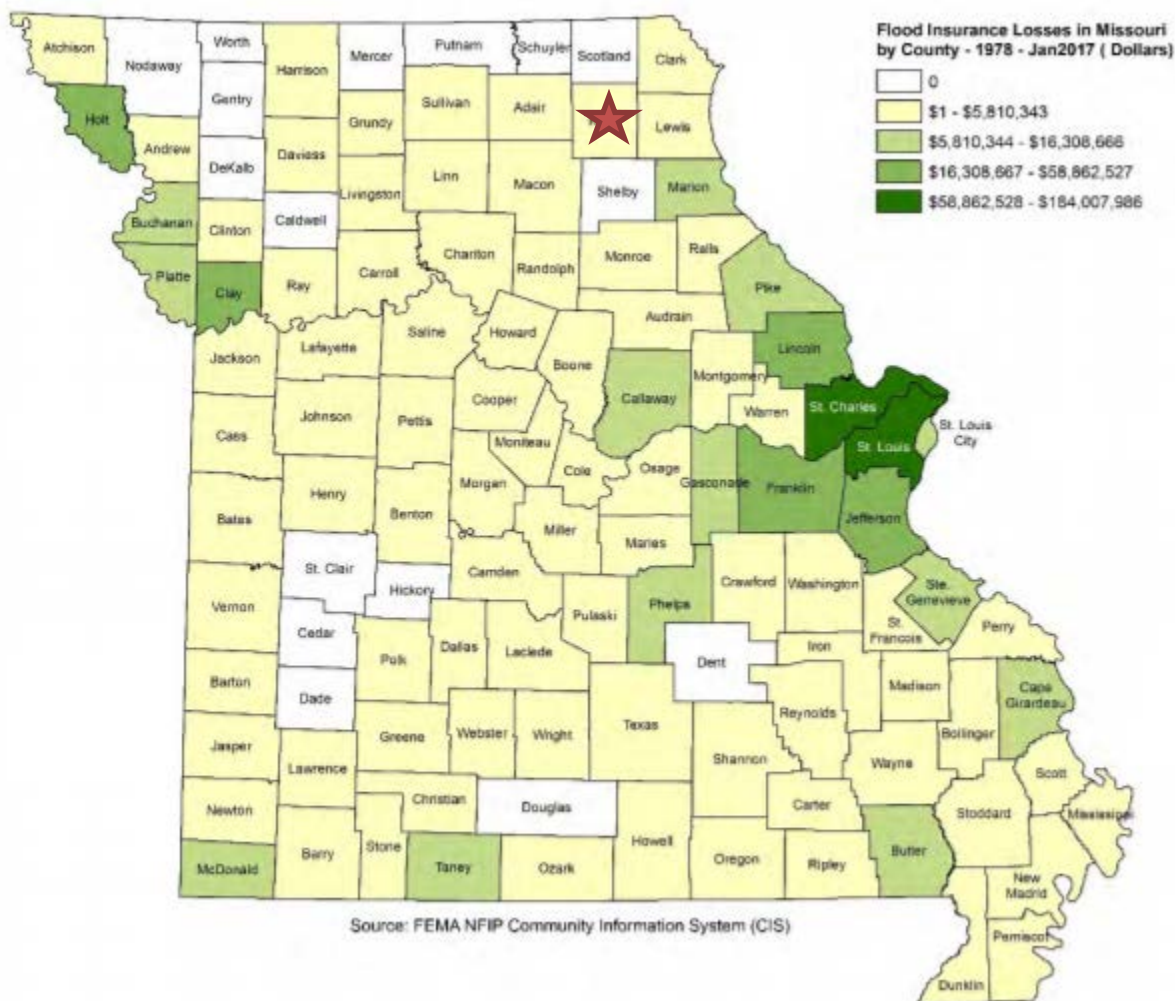
Public health concerns may result from flooding, requiring disease and injury surveillance. Community sanitation to evaluate flood-affected food supplies may also be necessary. Private water and sewage sanitation could be impacted, and vector control (for mosquitoes and other entomology concerns) may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

When roads and bridges are inundated by water, damage can occur as the water scours materials around bridge abutments and gravel roads. Floodwaters can also cause erosion undermining road beds. In some instances, steep slopes that are saturated with water may cause mud or rock slides onto roadways. These damages can cause costly repairs for state, county, and city road and bridge maintenance departments. When sewer back-up occurs, this can result in costly clean-up for home and business owners as well as present a health hazard.

According to the 2018 Missouri State Hazard Mitigation Plan, Knox County ranged at the lower end of

Flood Insurance Losses between \$1 – \$5,810,343 shown below in **Figure 3.18**.

Figure 3.18. Map of Dollars Paid Historically for Flood Insurance Losses in Missouri by 1978 – January 2017



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

Potential Losses to Existing Development

Using the data obtained from Flood Insurance Administration, Knox County and the participating jurisdictions do not have a history of repetitive loss. No flood prone assets were identified in the planning area.

Impact of Previous and Future Development

Any future development in floodplains would increase risk in those areas. For the 1 community participating in the National Flood Insurance Program, enforcement of the floodplain management regulations will ensure mitigation of future construction in those areas. However, even if structures

are mitigated, evacuation may be necessary due to rising waters. In addition, floods that exceed mitigated levels may still cause damages.

Hazard Summary by Jurisdiction

Vulnerability to flooding varies by jurisdiction as each community has a different layout, however, no jurisdictions have a history of repetitive loss. The floodplain maps in the Geographic Location section depict the flood area in each jurisdiction. **Table 3.19** reflects the NCEI Flash Flood Events and the jurisdictions impacted by flooding in Unincorporated Knox County at 22, City of Baring at 2, and Village of Newark at 1.

The Knox County R-1 School District has zero buildings in the SFHA.

Problem Statement

Local governments should make a strong effort to improve emergency warning systems to ensure future deaths and injuries do not occur. Local governments should consider making improvements to roads and low water crossings that consistently flood by placing them on a hazard mitigation projects list, and actively seek funding to successfully complete the projects. Local jurisdictions and the County itself should begin participating in NFIP and maintain good standing.

3.4.2 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.

Information can be obtained from:

- National Resources Conservation Service: <http://www.nrcs.usda.gov>
- DamSafetyAction.org: <https://damsafety.org/missouri>

Table 3.21. MoDNR Dam Hazard Classification Definitions

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

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

Table 3.22. NID Dam Hazard Classification Definitions

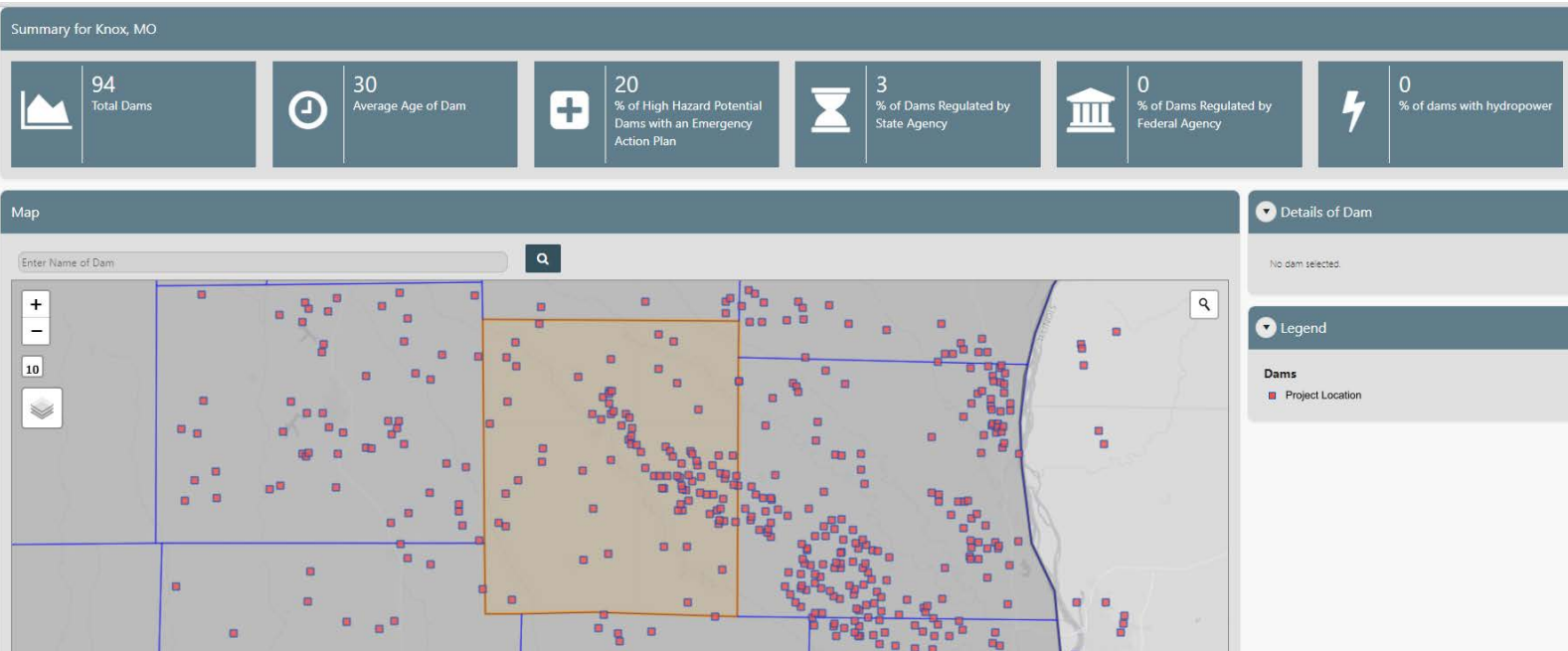
Hazard Class	Definition
Low Hazard	A dam located in an area where failure could damage only farm or other uninhabited buildings, agricultural or undeveloped land including hiking trails, or traffic on low volume roads that meet the requirements for low hazard dams.
Significant Hazard	A dam located in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

Figure 3.19. Dams in Knox County – MoDNR Data

Name	ID #	Owner Type	Height (ft)	Storage (acre-ft)	Hazard Potential
BARING & BARING LAKE DAM	MO10010	Private	35	1200	Low
EDINA RESERVOIR SECT-7 DAM	MO10039	Local	30	225	Low
EDINA CITY RESERVOIR DAM	MO10040	Local	40	693	Low
JAMES LAKE DAM	MO10069	Private	26	85	Low
HENRY SEVER DAM	MO10110	State	41	2265	High
HURDLAND SEVERS LAKE DAM	MO10145	Private	31	249	High
SEVER LAKE NORTH DAM	MO10241	Local	25	170	Low
MONONAME 76	MO10454	Private	20	86	Low
MILLER LAKE DAM	MO10455	Private	26	117	Low
SCHULTZ LAKE DAM	MO10456	Private	25	80	High
WALTER R TOMPSON DAM	MO10668	Private	20	86	Low
WILSON LAKE DAM	MO10707	Private	25	120	Low
STEFFAN LAKE DAM	MO11188	Private	34	1182	High
GREENLY FARM LAKE DAM	MO11326	State	23	147	Significant
GELBACH FARMS LAKE DAM	MO11377	Private	24	565	Low
WAMSLEY LAKE DAM	MO11396	Private	20	107	Low
TAYLOR LAKE DAM	MO11559	Private	20	107	High
ROCK CREEK BRANCH DAM	MO11560	Private	26	87	Significant
BROWN FARM LAKE DAM	MO50247	Private	26	101	Low
DENT FARM LAKE DAM	MO50248	Private	29	125	Low
DOUGLAS FARM LAKE DAM	MO50249	Private	29	193	Low
HAMM FARMS LAKE DAM	MO50250	Private	26	51	Low
HUNZIKER LAKE DAM NO 2	MO50251	Private	26	80	Low
MAUZY LAKE DAM	MO50252	Private	26	30	Low
ROLAND & KLOFENSTEIN FARM DAM	MO50253	Private	26	88	Low
TROUBLESOME CREEK WATERSHED DAM T- 28	MO50254	Local	19	102	Low
TROUBLESOME CREEK WATERSHED DAM T- 29	MO50255	Local	20	128	Low
TROUBLESOME CREEK WATERSHED DAM T- 25	MO50256	Local	22	223	Low
TROUBLESOME CREEK WATERSHED DAM T- 26	MO50257	Local	17	68	Low
TROUBLESOME CREEK WATERSHED DAM T- 27	MO50258	Local	16	127	Low
TROUBLESOME CREEK WATERSHED DAM T- 30	MO50259	Local	20	131	Low
TROUBLESOME CREEK WATERSHED DAM T- 31	MO50260	Local	20	104	Low
TROUBLESOME CREEK WATERSHED DAM T- 33	MO50261	Local	21	114	Low
WHITE OAK LAKE	MO50780	Private	26.4	30	Low
TROUBLESOME CREEK WATERSHED DAM T- 48	MO50903	Local	34	116	Low
TROUBLESOME CREEK WATERSHED DAM T- 53	MO50904	Local	34	165	Low
TROUBLESOME CREEK WATERSHED DAM T- 58	MO50905	Local	35	146	Low
TROUBLESOME CREEK WATERSHED DAM T-122	MO50906	Local	27	51	Low
TROUBLESOME CREEK WATERSHED DAM T-124	MO50907	Local	34	116	Low
TROUBLESOME CREEK WATERSHED DAM T- 34	MO50921	Local	25	163	Low
TROUBLESOME CREEK WATERSHED DAM T- 39	MO50922	Local	28	192	Low
TROUBLESOME CREEK WATERSHED DAM T- 42	MO50923	Local	29	156	Low
TROUBLESOME CREEK WATERSHED DAM T- 45A	MO50924	Local	28	176	Low
TROUBLESOME CREEK WATERSHED DAM T- 65	MO50925	Local	26	82	Low
TROUBLESOME CREEK WATERSHED DAM T- 66	MO50926	Local	29	195	Low
TROUBLESOME CREEK WATERSHED DAM T- 68	MO50927	Local	24	95	Low
TROUBLESOME CREEK WATERSHED DAM T- 82	MO50928	Local	31	96	Low
TROUBLESOME CREEK WATERSHED DAM T- 83	MO50929	Local	26	110	Low
TROUBLESOME CREEK WATERSHED DAM T- 50	MO50930	Local	25	154	Low
TROUBLESOME CREEK WATERSHED DAM T- 55	MO50931	Local	27	86	Low
TROUBLESOME CREEK WATERSHED DAM T- 61	MO50932	Local	27	196	Low
TROUBLESOME CREEK WATERSHED DAM T- 62	MO50933	Local	26	127	Low

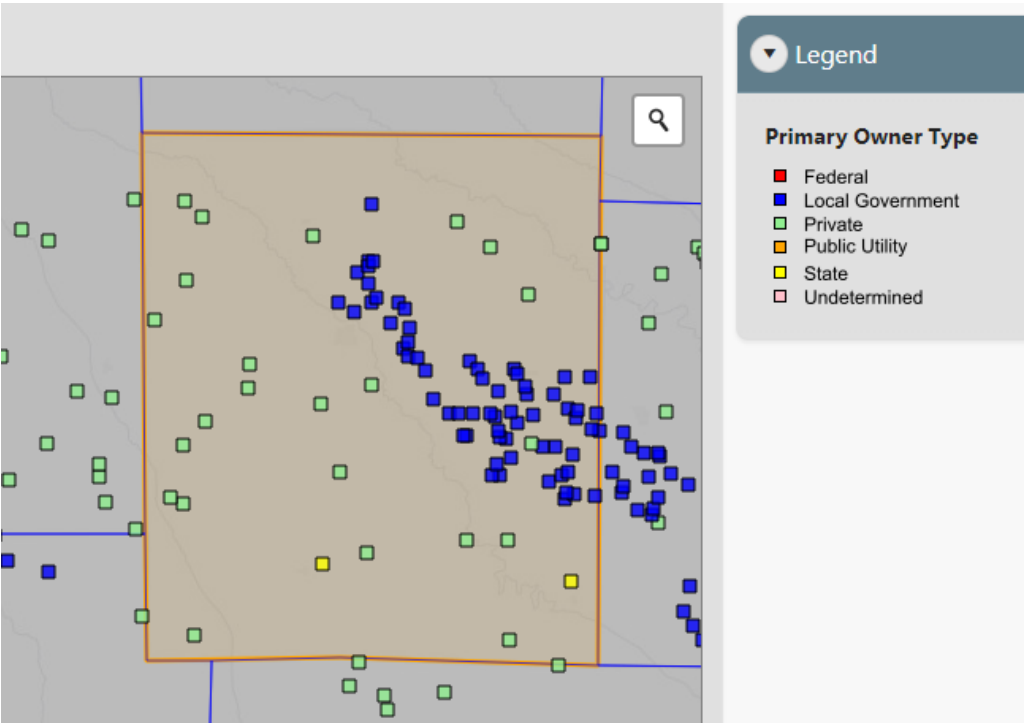
TROUBLESOME CREEK WATERSHED DAM T- 63	MO50934	Local	27	69	Low
TROUBLESOME CREEK WATERSHED DAM T- 69	MO50935	Local	27	154	Low
TROUBLESOME CREEK WATERSHED DAM T- 70	MO50936	Local	28	191	Low
TROUBLESOME CREEK WATERSHED DAM T- 81A	MO50937	Local	29	200	Low
TROUBLESOME CREEK WATERSHED DAM T- 85	MO50938	Local	25	106	Low
TROUBLESOME CREEK WATERSHED DAM T- 87	MO50939	Local	25	115	Low
TROUBLESOME CREEK WATERSHED DAM T- 89	MO50940	Local	29	105	Low
TROUBLESOME CREEK WATERSHED DAM T- 92	MO50941	Local	31	115	Low
TROUBLESOME CREEK WATERSHED DAM T- 93	MO50942	Local	27	181	Low
TROUBLESOME CREEK WATERSHED DAM T-105	MO50943	Local	28	259	Low
TROUBLESOME CREEK WATERSHED DAM T-121	MO50944	Local	25	89	Low
TROUBLESOME CREEK WATERSHED DAM T-123	MO50945	Local	28	128	Low
TROUBLESOME CREEK WATERSHED DAM T- 36	MO50946	Local	29	150	Low
TROUBLESOME CREEK WATERSHED DAM T- 43	MO50947	Local	26	88	Low
TROUBLESOME CREEK WATERSHED DAM T-127	MO50948	Local	26	96	Low
TROUBLESOME CREEK WATERSHED DAM T- 46	MO50949	Local	27	155	Low
STRONG DAM	MO50978	Private	29	91	Low
JOE GODI DAM	MO51099	Private	33	29	Low
TROUBLESOME CREEK WATERSHED DAM T- 57	MO51247	Local	29	128	Low
TROUBLESOME CREEK WATERSHED DAM T- 78	MO51248	Local	34	60	Low
TROUBLESOME CREEK WATERSHED DAM T- 79	MO51249	Local	28	78	Low
TROUBLESOME CREEK WATERSHED DAM T-114	MO51250	Local	26	67	Low
TROUBLESOME CREEK WATERSHED DAM T- 59	MO51251	Local	28	59.5	Low
TROUBLESOME CREEK WATERSHED DAM T- 72	MO51252	Local	26	64.5	Low
TROUBLESOME CREEK WATERSHED DAM T-110	MO51253	Local	25	52.9	Low
TROUBLESOME CREEK WATERSHED DAM T-113	MO51254	Local	25	53.2	Low
TROUBLESOME CREEK WATERSHED DAM T-116	MO51255	Local	22	53.2	Low
LEIFIELD DAM	MO51265	Private	32	19.29	Low
TROUBLESOME CREEK WATERSHED DAM T- 52A	MO51346	Local	25	76.89	Low
TROUBLESOME CREEK WATERSHED DAM T- 60	MO51347	Local	34	132.1	Low
TROUBLESOME CREEK WATERSHED DAM T- 64	MO51348	Local	25	87.09	Low
TROUBLESOME CREEK WATERSHED DAM T- 49B	MO51362	Local	30	121.5	Low
TROUBLESOME CREEK WATERSHED DAM T-120	MO51391	Local	25	65.2	Low
TROUBLESOME CREEK WATERSHED DAM T-111	MO51393	Local	27	64.6	Low
ZEISET DAM	MO51404	Private	30	17.89	Low
TROUBLESOME CREEK WATERSHED DAM T- 44A	MO51423	Local	27	83.5	Low
CIRCLE V DAM	MO51500	Private	29	52.09	Low
DEVENY DAM	MO51501	Private	31	44.29	Low
SPARKS DAM	MO51502	Private	30	32.1	Low
TROUBLESOME CREEK WATERSHED DAM T-112	MO51574	Local	31	92	Low
TROUBLESOME CREEK WATERSHED DAM T- 56	MO51575	Local	26	96.59	Low
TROUBLESOME CREEK WATERSHED DAM T- 80	MO51609	Local	30	65	Low

Figure 3.20. Dams in Knox County – NID Data



Source: National Inventory of Dams (NID) <https://nid.sec.usace.army.mil/ords/f?p=105:113:784713719204::NO::>

Figure 3.21. Knox County Dams by Owner Type



Source: National Inventory of Dams (NID) <https://nid.sec.usace.army.mil/ords/f?p=105:113:784713719204::NO::>

Geographic Location

There are 94 dams located inside the county boundaries and 5 high hazard dams using both NID and MoDNR data.

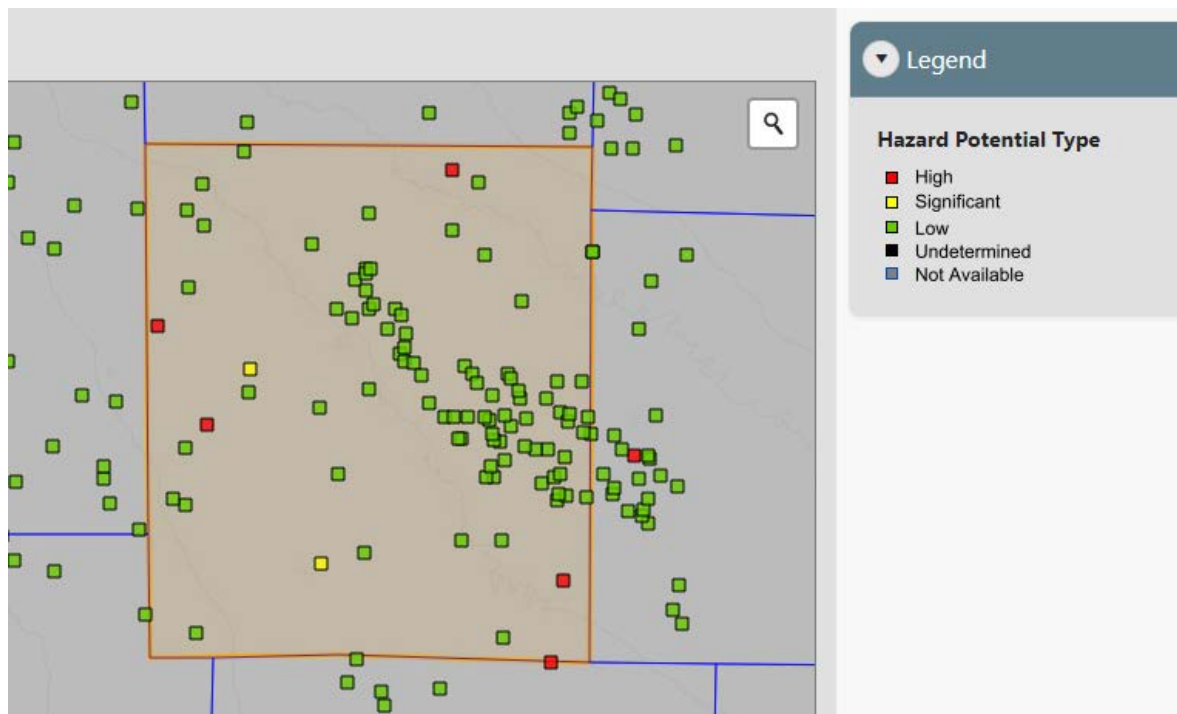
The below table list the names, locations, and other pertinent information for all high hazard dams in the planning area.

Table 3.23. High Hazard Dams in the Knox County Planning Area

Dam Name	Emergency Action Plan (EAP)	Dam Height (Ft)	Normal Storage (Acre-Ft)	Last Inspection Date	River	Nearest Downstream City	Distance To Nearest City (Miles)	Dam Owner
HENRY SEVER DAM	Y	41	2265	5/12/2015	MEYERS BRANCH	NEWARK	1	STATE
HURDLAND SEVERS LAKE DAM	N	31	249	-	TR-LITTLE FABIUS RIVER	NOVELTY	9	PRIVATE
SCHULTZ LAKE DAM	N	25	80	-	TR-MIDDLE FABIUS RIVER	COLONY	5	PRIVATE
STEFFAN LAKE DAM	N	34	1182	9/11/1987	TR-LITTLE FABIUS RIVER	NEWARK	0	PRIVATE
TAYLOR LAKE DAM	N	20	107	-	TR-LONG BR S FK S FABIUS	BARING	0	PRIVATE

Sources: Missouri Department of Natural Resources, <https://dnr.mo.gov/geology/wrc/dam-safety/damsinmissouri.htm> and National Inventory of Dams, http://nid.usace.army.mil/cm_apex/f?p=838:12.

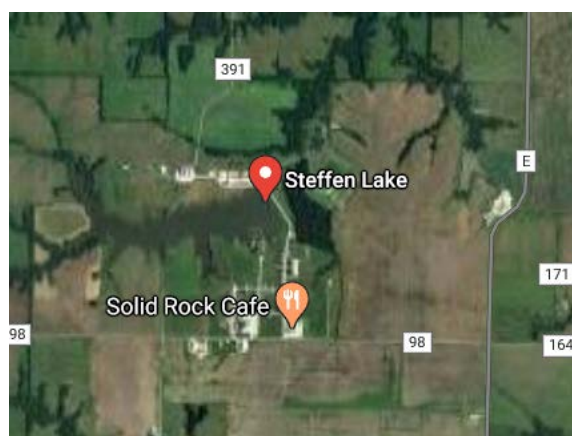
Figure 3.22. High Hazard Dams in Knox County



Source: National Inventory of Dams (NID) <https://nid.sec.usace.army.mil/ords/f?p=105:113:784713719204::NO>

Figure 3.23. High Hazard Dam Locations in Knox County and Areas Impacted in the Event of Breach

Steffen Lake Dam



Henry Sever Dam



Hurdland Severs Lake Dam



Taylor Lake Dam



Shultz Lake Dam



Source: Google Maps

Upstream Dams Outside the Planning Area

The Missouri Department of Natural Resources was consulted to see if dams located outside of the county would impact Knox County in the event of a failure. It was determined that there are no upstream dams that would place Knox County in any danger.

Strength/Magnitude/Extent

The strength/magnitude of dam failure would be similar in some cases to flood events (see the flood hazard vulnerability analysis and discussion). The strength/magnitude/extent of dam failure is related to the volume of water behind the dam as well as the potential speed of onset, depth, and

velocity. For this reason, dam failures could flood areas outside of mapped flood hazards. Henry Sever Dam is the only high hazard dam regulated by the State throughout the planning area. Its last inspection date was 5/12/2015 with a height of 41 feet and storage capacity of 2265 acre-feet.

Previous Occurrences

To determine previous occurrences of dam failure within Knox County, the previously approved county hazard mitigation plan, the 2018 Missouri State Hazard Mitigation Plan, and the Stanford University's National Performance of Dams Program (<http://npdp.stanford.edu>) were consulted. There are no records of dam failure within the county boundaries.

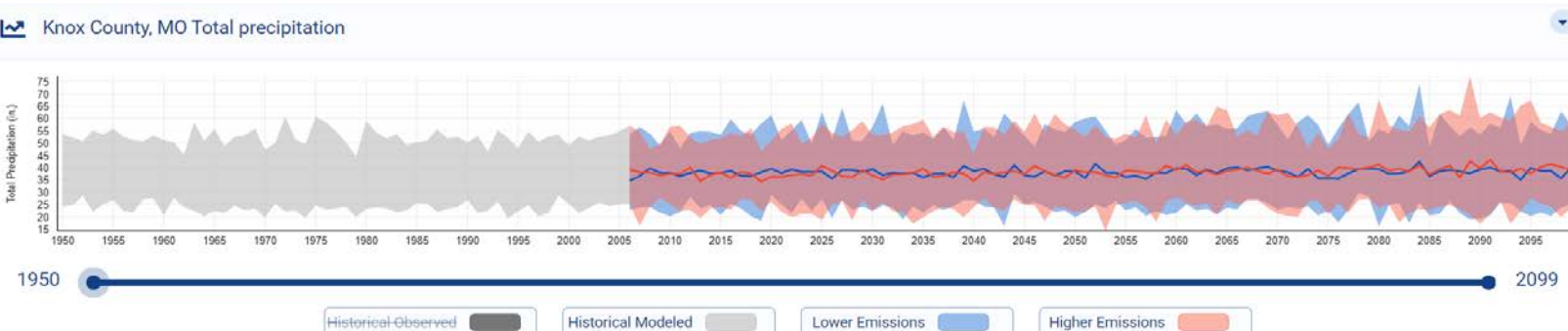
Probability of Future Occurrence

Knox County consists of 0 Class 1 dams and 5 High Hazard dams in the county which puts areas in the county in danger of being affected by a dam breach. However, due to no record of previous occurrences, the probability of a future occurrence cannot be calculated.

Changing Future Conditions Considerations

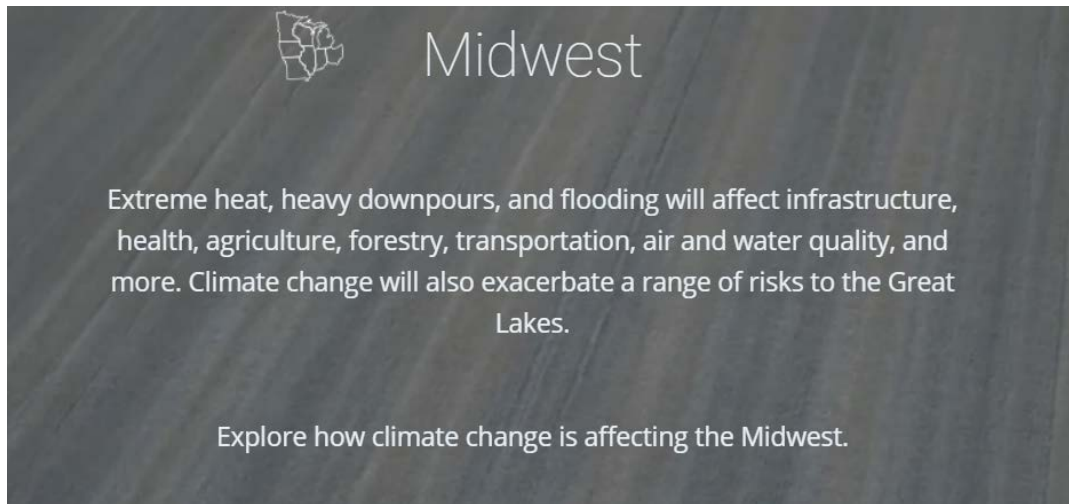
Figure 3.24 shows the projected precipitation for Knox County and shows there is not a large decrease in the amount of precipitation and indicates the amount water held by dams will remain steady.

Figure 3.24. Projected Precipitation for Knox County



Source: US Climate Resilience Toolkit; <https://toolkit.climate.gov/tools/climate-explorer>

Figure 3.25. Climate Change in the Midwest



Source: National Climate Assessment; <https://nca2014.globalchange.gov/>

Landowners should be aware of the changing climate, and regularly inspect private dams to ensure the safety of life and lower the loss of infrastructure damages.

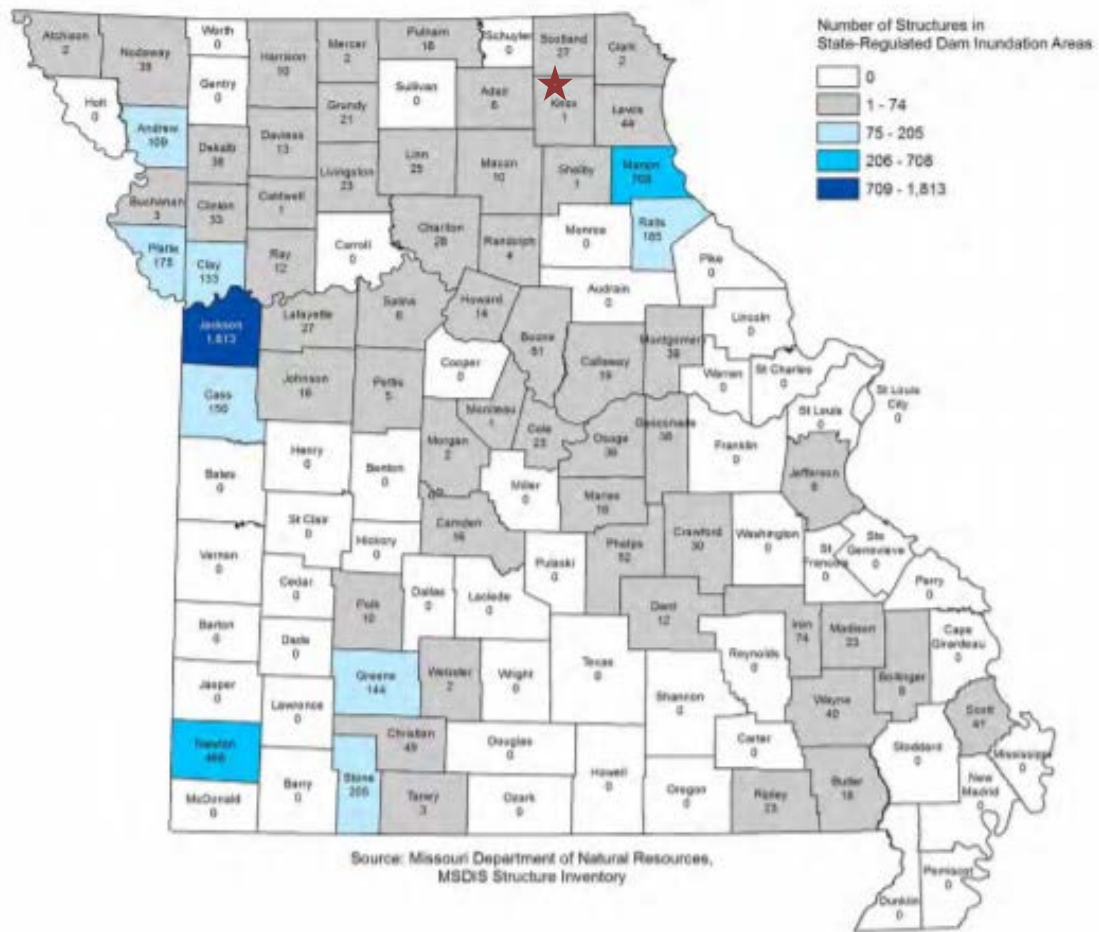
Vulnerability

Vulnerability Overview

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

According to the 2018 Missouri State Hazard Mitigation Plan, there is 1 structure vulnerable to failure of state regulated dams in Knox County as shown in **Figure 3.26** below.

Figure 3.26. Estimated # of Buildings Vulnerable to Dam Failure of State Regulated Dam



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

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

There is 1 structure within Knox County that could be affected by State Regulated dams.

Impact of Previous and Future Development

There are 5 high hazard dams within the planning area, 1 of which is state regulated. Prior to future development in those areas, the jurisdiction should be contacted and a review of impact of new development in the event of a breach in dam should be reviewed.

Hazard Summary by Jurisdiction

The vast majority of Knox County is not in danger of being inundated due to a breach in a dam. No further analysis of dam failure hazard will be conducted for this plan update. It will be helpful for residents near the high hazard dams to get familiarized with the dam's Emergency Action Plan (EAP)

and work closely with County EOP and participate in dam emergency exercises.

Problem Statement

A lack of regular inspection/maintenance of un-regulated high hazard dams was noted by the Mitigation Planning Committee. Possible solutions include the training landowners how to properly inspect dams and encourage dams to be inspected on a regular schedule.

3.4.3 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.

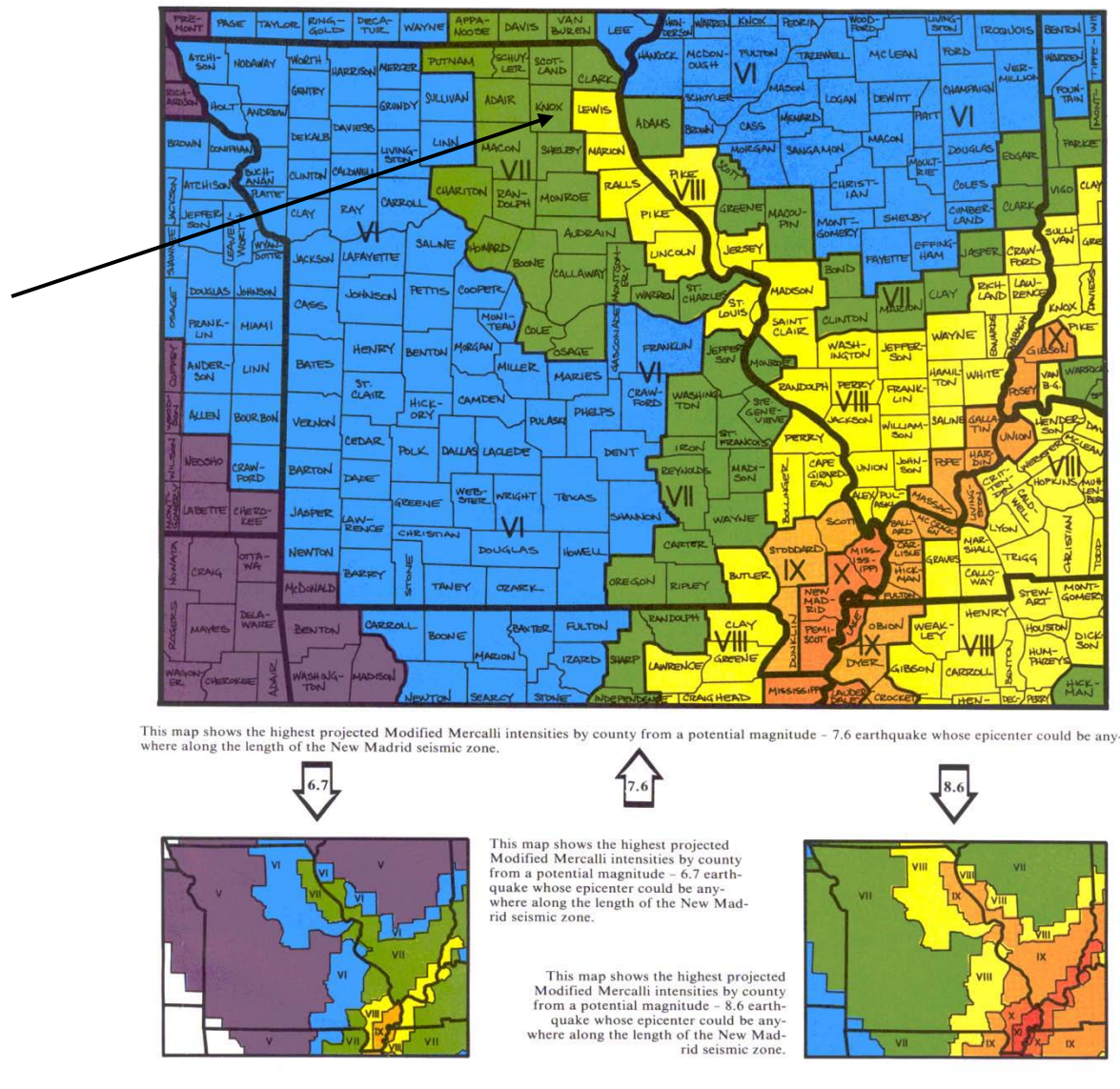
Some earthquakes occur in the middle of plates, as is the case for seismic zones in the Midwestern United States. The most seismically active area in the Midwest is the New Madrid Seismic Zone. The possibility of the occurrence of a catastrophic earthquake in the central and Eastern United States is real as evidenced by history. The impacts of significant earthquakes affect large areas, terminating public services and systems needed to aid the suffering and displaced. As with hurricanes, mass relocation may be necessary, but the residents who are suffering from the earthquake can neither leave the heavily impacted areas nor receive aid or even communication in the aftermath of a significant event.

Geographic Location

Seismic activity on the New Madrid Seismic Zone of Southeastern Missouri is very significant both historically and at present. On December 16, 1811 and January 23 and February 7 of 1812, three earthquakes struck the central U.S. with magnitudes estimated to be 7.5-8.0. These earthquakes caused violent ground cracking and volcano-like eruptions of sediment (sand blows) over an area of >10,500 km², and uplift of a 50 km by 23 km zone (the Lake County uplift). The shaking was felt over a total area of over 10 million km² (the largest felt area of any historical earthquake). Of all the historical earthquakes that have the U.S., an 1811-style event would do the most damage if it recurred today. If an 1811 earthquake occurred in Knox County the earthquake intensity would not vary within the county. Damage would be to buildings of good design and construction, slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures and some chimneys broken.

The following SEMA map (**Figure 3.27**) shows the highest projected Modified Mercalli intensities by county from a potential magnitude 7.6 earthquake whose epicenter could be anywhere along the length of the New Madrid Seismic Zone. The below figure indicates Knox County and the affects that could be felt from the earthquake.

Figure 3.27. Impact Zones for Earthquake Along the New Madrid Fault



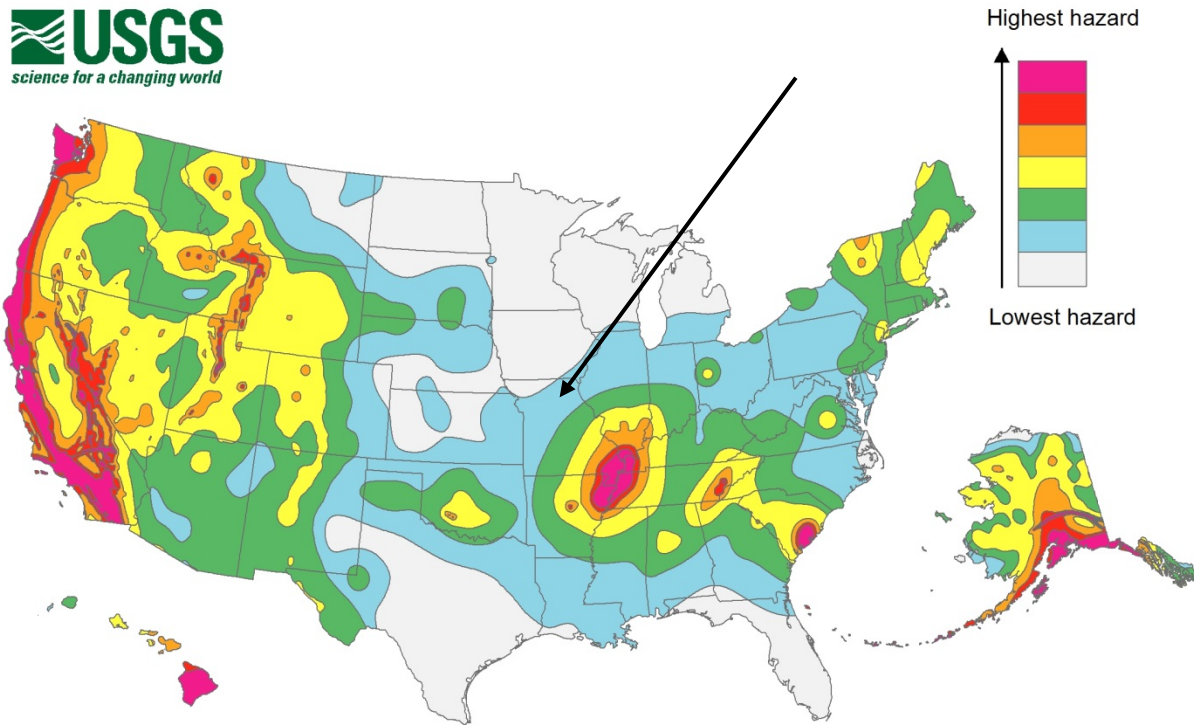
Source: https://sema.dps.mo.gov/docs/EQ_Map.pdf

Figure 3.28. Projected Earthquake Intensities

MODIFIED MERCALLI INTENSITY SCALE

- | | |
|--|--|
| <p>I People do not feel any Earth movement.</p> <p>II A few people might notice movement.</p> <p>III Many people indoors feel movement. Hanging objects swing.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> | <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> |
|--|--|
- 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.
- Prepared and distributed by
THE MISSOURI STATE
EMERGENCY MANAGEMENT AGENCY
P.O. BOX 116
JEFFERSON CITY, MO 65102
Telephone: 573-526-9100

Figure 3.29. 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

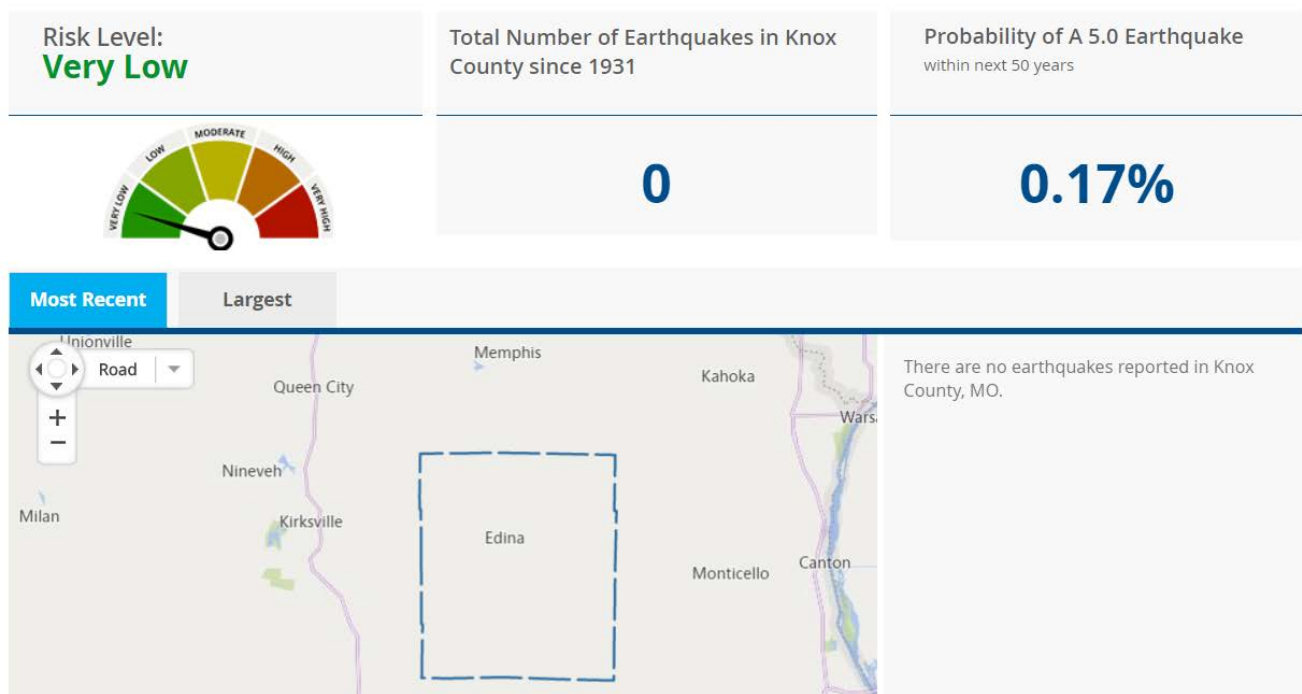
The intensity of an earthquake is measured by the effect of the earthquake on the earth's surface. The intensity scale is based on the responses to the quake, such as people awakening, movement of furniture, damage to chimneys, etc. The intensity scale currently used in the United States is the Modified 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

There have been 0 earthquakes within 30 miles of Knox County since 1931.

Probability of Future Occurrence

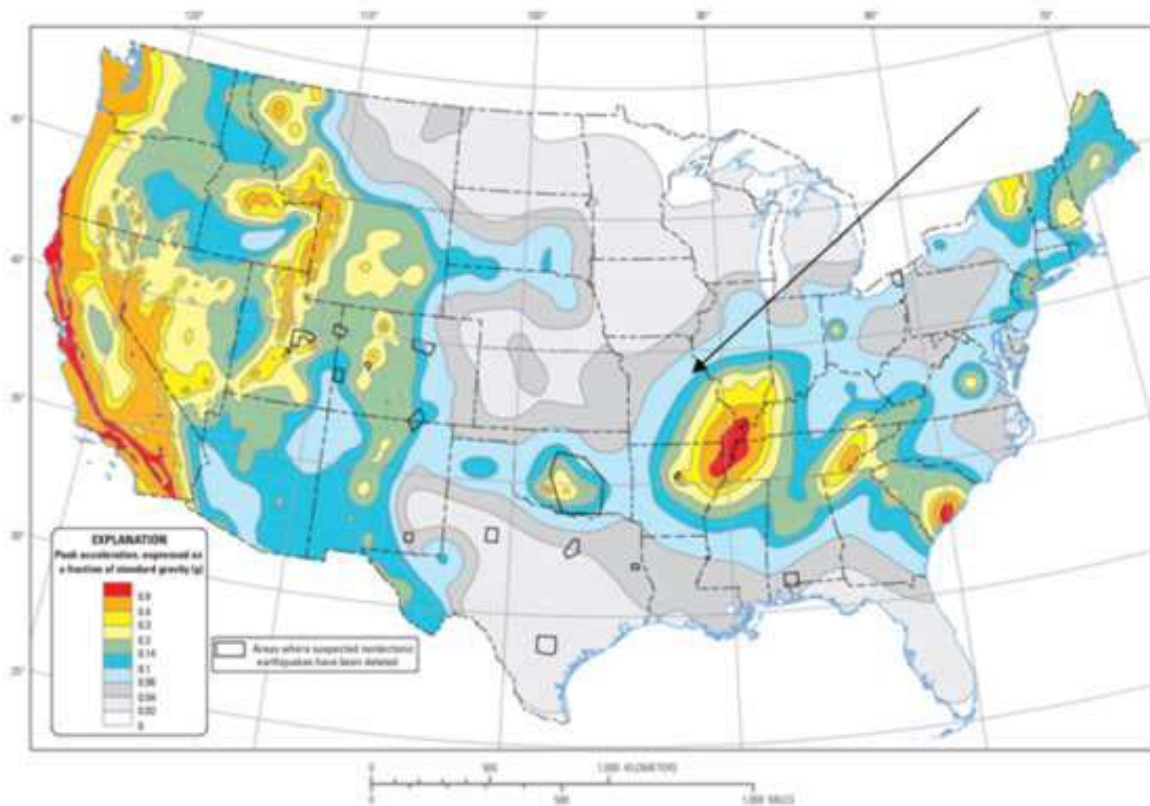
Figure 3.30. Earthquake Profile for Knox County



Source: <https://www.homefacts.com/earthquakes/Missouri/Knox-County.html>

Knox County has a very low earthquake risk, with a total of 0 earthquakes since 1931. The USGS database shows that there is a 0.17% chance of a major earthquake within 50 km of Knox County in the next 50 years.

Figure 3.31. 2% Probability of Exceedance in 50 Years Map of Peak Ground Acceleration



Source: <https://earthquake.usgs.gov/hazards/hazmaps/conterminous/index.php#2014> *Arrow indicates Knox County

Changing Future Conditions Considerations

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

Vulnerability

Vulnerability Overview

According to the HAZUS-MH Earthquake Loss Estimation data obtained from the 2018 State Plan, Knox County is listed as having a 2% Probability of Exceedance in 50 years. The total loss is estimated at \$2,666.

The State of Earthquake Coverage Report states that the average premium for earthquake coverage in Knox County during 2018 was \$66.

Potential Losses to Existing Development

The Hazus building inventory counts are based on the 2010 census data adjusted to 2014 numbers using the Dun & Bradstreet Business Population Report. Inventory values reflect 2014 valuations, based on RSMeans (a supplier of construction cost information) replacement costs. Population counts are 2010 estimates from the U.S. Census Bureau.

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.

Hazard Summary by Jurisdiction

Since earthquake intensity is not likely to vary greatly throughout the planning area, the risk will be the same throughout. Knox County is not near the New Madrid Shock Zone, but it will likely endure mild effects from the earthquake such as structure damage environmental impacts and economic disruption/losses. However, damages could vary due to structural variations in the planning area's built environment. Knox County would likely be impacted by the number of refugees traveling through the area seeking safety and assistance.

Problem Statement

Although Knox County is not located in an area that will likely see catastrophic damage from an earthquake, the County will be impacted by the loss of communications, transportation, the disruption of roads, rail and pipelines, water transportation, and the area will see a significant amount of refugees fleeing from Southern Missouri if a quake hits that area. Education is minimal for earthquakes do to the low likely hood of impact. There is one Emergency Management Director for the County who knows where all the generators and emergency buildings are. Not all citizens utilize social media and texting. An emergency plan for earthquakes needs to be made available to all residents and stated what would happen in the event of an earthquake with details for communications and transportation. Downtown building owners need to know plan in case damage is done to their building. Residents need to be made aware of where the generators and emergency buildings are located. Utilization of social media and texting needs to be encouraged.

3.4.4 Land Subsidence/Sinkholes

Hazard Profile

Hazard Description

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

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

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

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

According to the 2018 Missouri State Hazard Mitigation Plan, there are 19 mines in Knox County and 1 sinkhole.

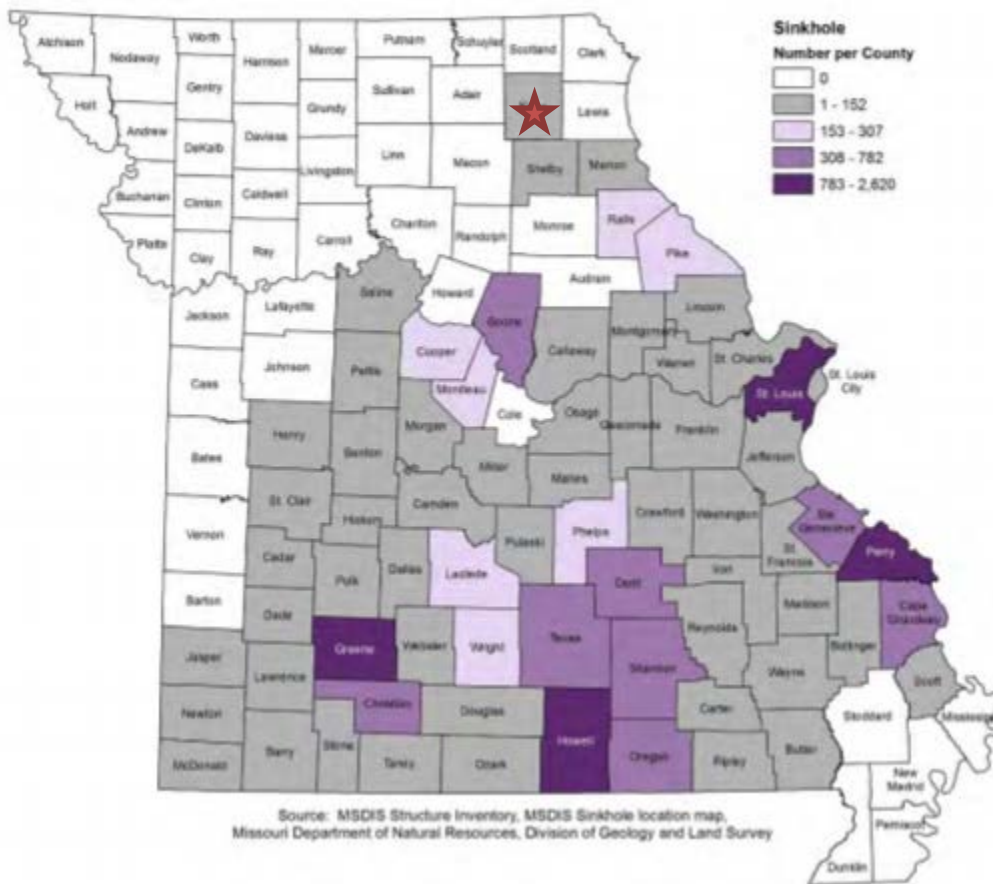
Geographic Location

Figure 3.32. Sinkhole and Mine Counts in Knox County

County	Number of Sinkholes Per County	Number of Mines Per County
Knox	1	19

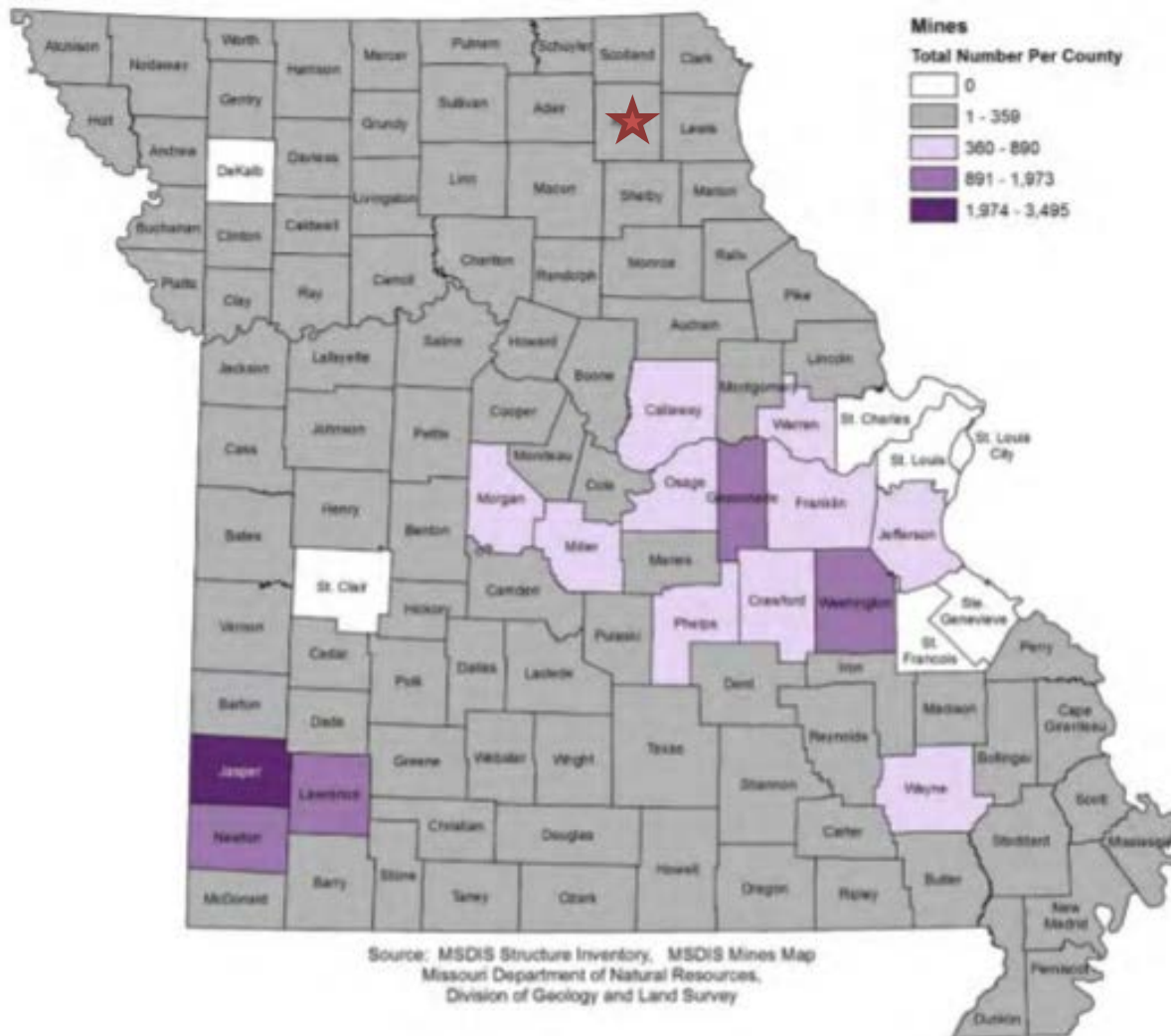
Source: 2018 Missouri State Hazard Mitigation Plan

Figure 3.33. Sinkholes by County



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

Figure 3.34. Mine Counts by County



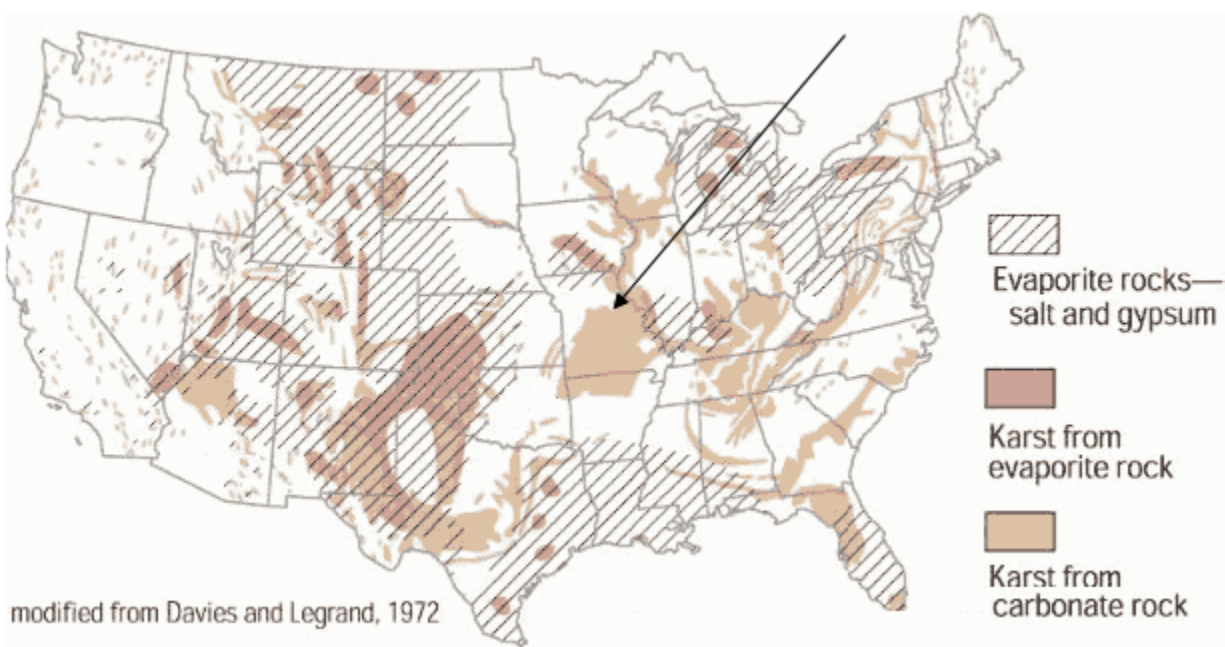
Source: 2018 Missouri State Hazard Mitigation Plan *Red star indicates Knox County

Figure 3.35. Sinkholes in Missouri



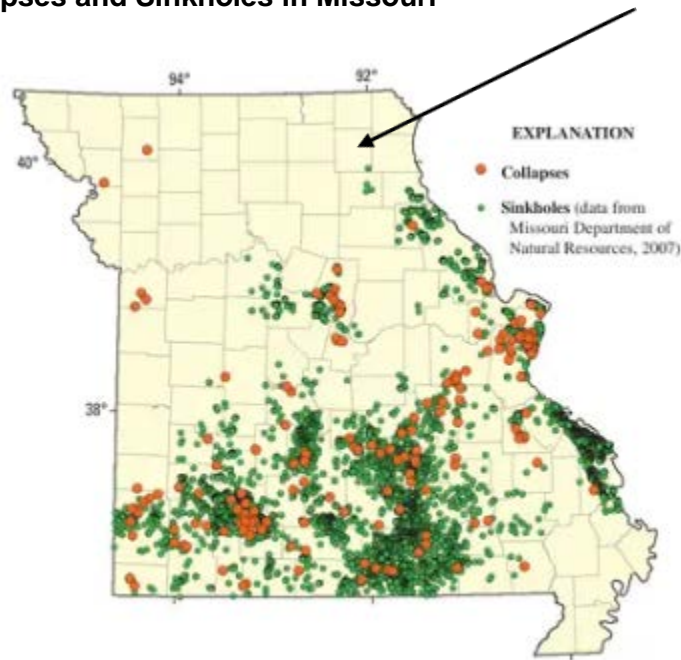
Source: Missouri Department of Natural Resources; <http://www.dnr.mo.gov/geology/geosrv/envgeo/sinkholes.htm> *Arrow indicates Knox County

Figure 3.36. Karst in Missouri



Source: <http://strangesounds.org/2013/07/us-sinkhole-map-these-maps-show-that-around-40-of-the-u-s-lies-in-areas-prone-to-sinkholes.html>

Figure 3.37. Collapses and Sinkholes in Missouri



Source: <http://www.businessinsider.com/where-youll-be-swallowed-by-a-sinkhole-2013-3> *Red star indicates Knox 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.

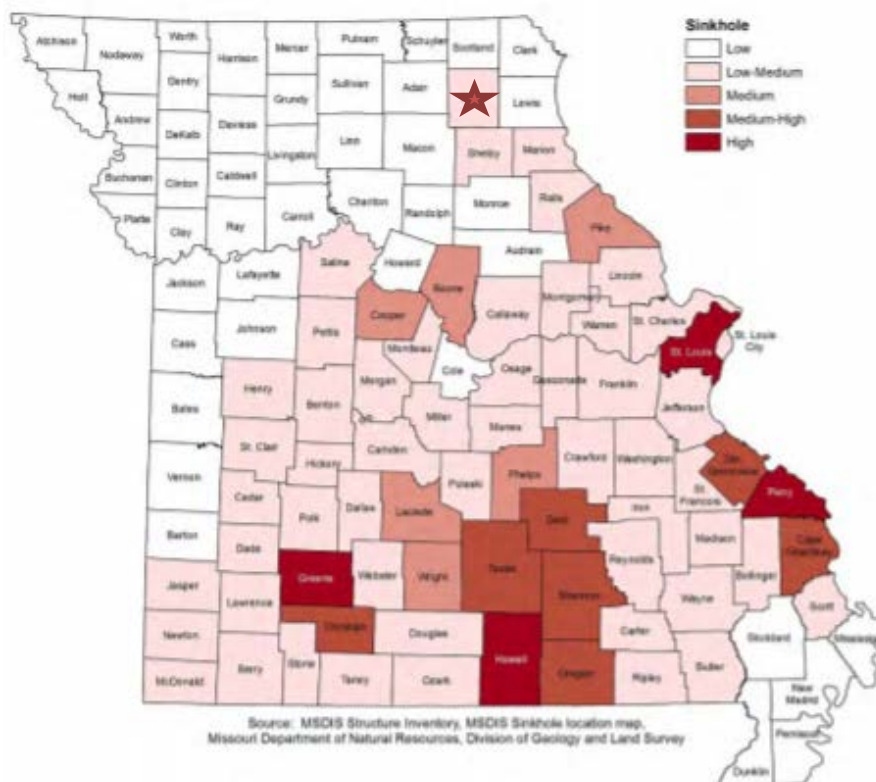
Previous Occurrences

As noted in the 2018 State Plan, sinkholes are a regular occurrence in Missouri, but rarely are the events of any significance. There is no record of previous occurrences in Knox County.

Probability of Future Occurrence

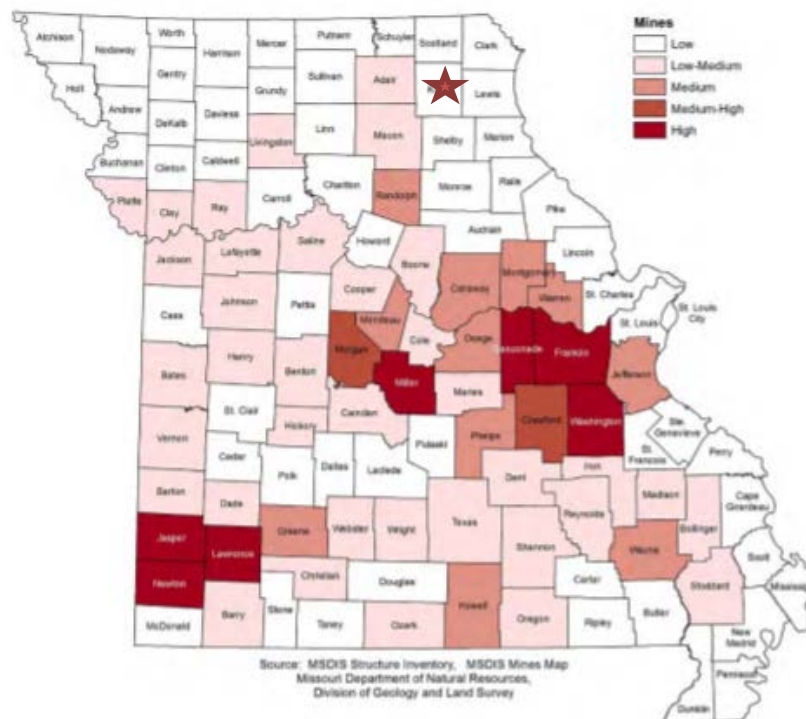
Factor	1 (Low)	2 (Low-medium)	3 (Medium)	4 (Medium-high)	5 (High)
Sinkholes per county	0	1 – 200	201 – 400	401 – 800	801+
Mines per county	0 - 100	101 - 250	251 – 500	501 – 750	751 +

Source: 2018 Missouri State Hazard Mitigation Plan



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

Figure 3.40. Mine Rating Value by County



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

There are no records of previous event dates in the planning area, therefore, the probabilities cannot be calculated due to limited information. As represented in the figures above, the sinkholes and mines located in Knox County have been rated at a low-medium risk and low risk, respectively.

Changing Future Conditions Considerations

According to the 2018 Missouri State Hazard Mitigation Plan, 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 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.

Vulnerability

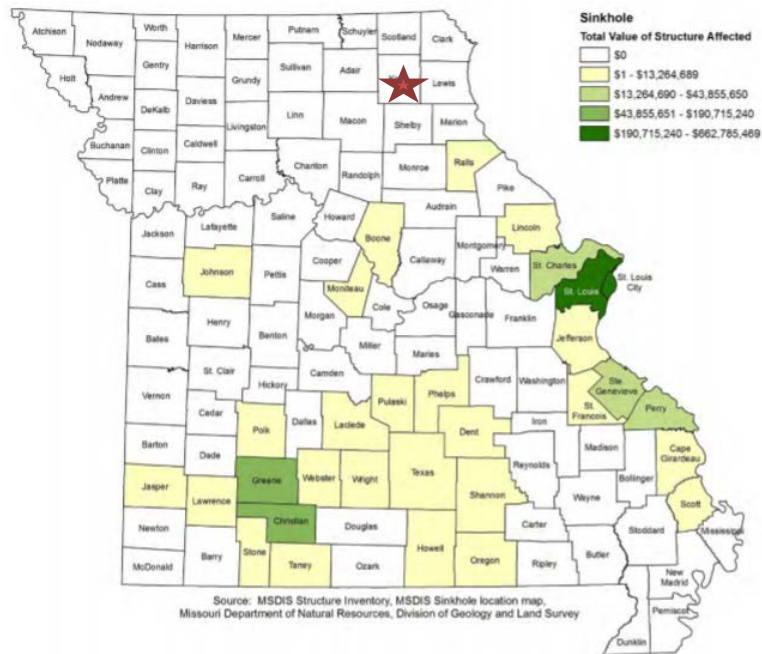
Vulnerability Overview

Sinkholes in the planning area are not common occurrence due to composition of the land. While some sinkholes may be considered a slow changing nuisance; other more sudden, catastrophic collapses can destroy property, delay construction projects and contaminate ground water resources.

The Missouri Department of Natural Resources shows 1 sinkhole for the planning area.

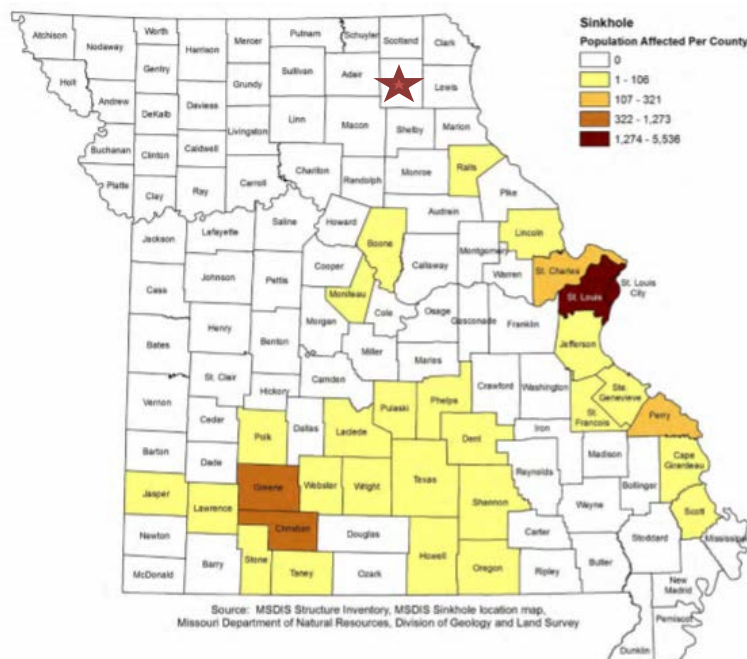
Potential Losses to Existing Development

Figure 3.41. Ranking of Structures Potentially Impacted by Sinkholes by County



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

Figure 3.42. Ranking of Population Potentially Impacted by Sinkholes by County



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

The potential impact of sinkholes on existing structures is difficult to determine due to the lack of data on historic damages caused by sinkholes. The mapping of potential sinkholes is difficult, if not impossible, to predict where a sinkhole will collapse and how significant the collapse will be. Because sinkhole collapse is not predictable and previous events have not occurred in the rural area, there is not significant data to estimate the future losses due to a sinkhole.

Impact of Previous and Future Development

As more development occurs on unmapped rural areas, the vulnerability to the hazard will increase. However, sinkholes are unpredictable and the development in rural areas is difficult to limit due to the lack of occurrence. Knox County and participating jurisdictions have no plans to limit construction due to sinkholes.

Hazard Summary by Jurisdiction

The risk for development is uniform throughout the planning and has not affected one jurisdiction specifically.

Problem Statement

Sinkholes can occur at any time and without warning and vary by size. There can be a disruption of transportation services and not residents in the dangerous areas are not educated on what to do if a sinkhole occurs. Education needs to occur on the danger areas of a sinkhole occurring and what to

3.4.5 Drought

Hazard Profile

Hazard Description

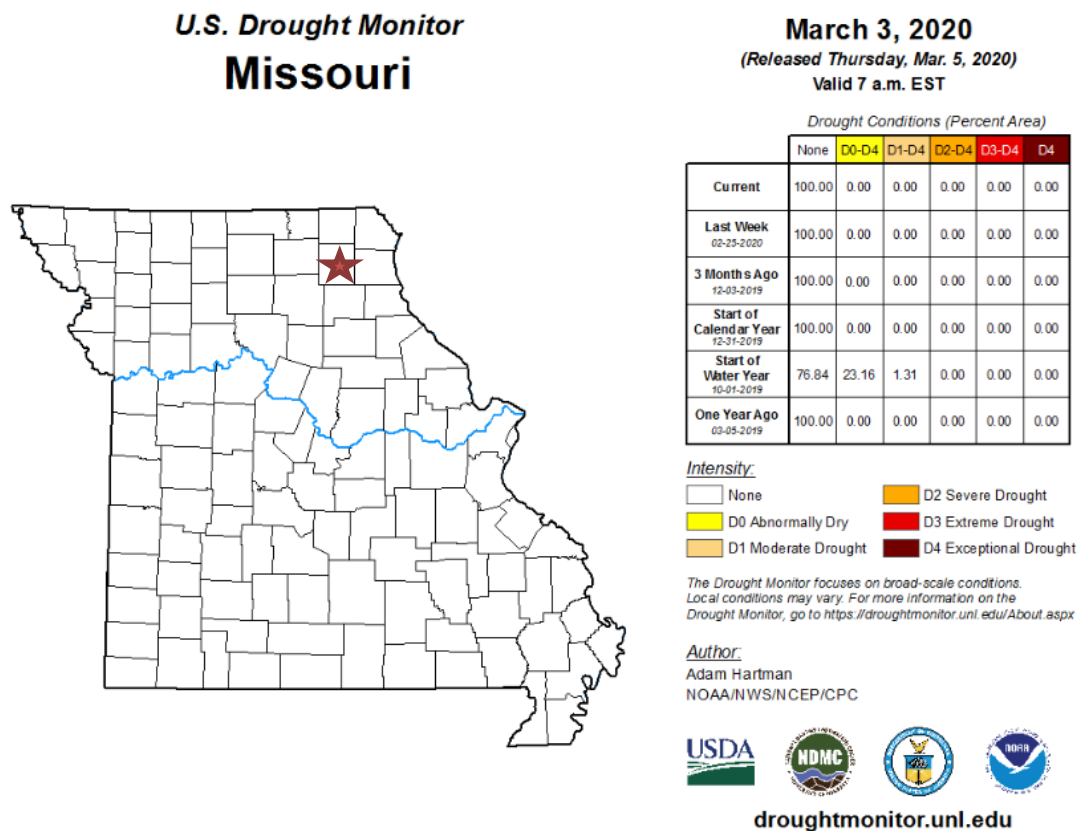
Drought is generally defined as a condition of moisture levels significantly below normal for an extended period of time over a large area that adversely affects plants, animal life, and humans. A drought period can last for months, years, or even decades. There are four types of drought conditions relevant 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 in nature. All areas of the United States are vulnerable to the risk of drought and extreme heat. Droughts can be widespread or localized events. The extent of the droughts varies both in terms of the extent of the heat and range of precipitation. The severity of a drought depends on locations, duration, and geographical extent. Additionally, drought severity depends on the water supply, usage demands made by human activities, vegetation and agricultural operations. Drought brings several different problems that must be addressed. The quality and quantity of crops, livestock and other agricultural assets will be affected during a drought. Drought can adversely impact forested areas leading to an increased potential for extremely destructive forest and woodland fires that could threaten residential, commercial, and recreational structures. According to the 2017 Census of Agriculture, Knox County consists of 235,398 acres land in farms, crop sales generate \$97,852,000 and livestock sales generate \$46,149,000. A drought would directly impact livestock production and the agriculture economy in Knox County.

Figure 3.43. U.S. Drought Monitor Map of Missouri on March 3, 2020



Source: U.S. Drought Monitor, <https://droughtmonitor.unl.edu/Maps/MapArchive.aspx> *Red star indicates Knox County

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.

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

Table 3.24. Drought Payments in Knox County

Drought Year	Insurance Payment
2014	\$119,937
2015	\$221,086
2016	\$210,477
2017	\$663,676
2018	\$25,020,500
2019	\$65,273
Total	\$26,300,949

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

According to the National Drought Mitigation Center's Drought Impact Reporter, during the 20-year period from January 2000 to December 2019, Knox County had 24 drought impacts and 21 reports.

Figure 3.44. Drought Impacts in Knox County

Impacts Advanced Search

You searched Impacts that were occurring between:
1/1/2000 and 12/31/2019

in:
Knox County

for:
Agriculture, Business & Industry, Fire, Plants & Wildlife, Relief, Response & Restrictions, Water Supply & Quality

from:
User, CoCoRaHS, Media, National Weather Service, Other Agency, Hawaii, Legacy

scale(s):
County

Sources
The Drought Impact Reporter found 24 Impacts matching your query.

Category/ies
18 in Agriculture
1 in Business & Industry
4 in Fire
4 in Plants & Wildlife
13 in Relief, Response & Restrictions
4 in Water Supply & Quality

Sources
4 in User
2 in CoCoRaHS
12 in Media
0 in National Weather Service
2 in Other Agency
0 in Hawaii
5 in Legacy

Source: <https://droughtreporter.unl.edu/map/>

Figure 3.45. Drought Reports in Knox County

Reports Advanced Search

You searched Reports describing conditions that were occurring between:
1/1/2000 and 12/31/2019

in:
Knox County













for:
Agriculture, Business & Industry, Fire, General Awareness, Plants & Wildlife, Relief, Response & Restrictions, Water Supply & Quality, Ranching *, Ornamentals *, Fruits and Nuts (orchard) *, Produce (fruits and vegetables) *, Other Agriculture *

from:
User, CoCoRaHS, Media, National Weather Service, Other Agency, Hawaii







scale(s):
County

The Drought Report Reporter found **21** Reports matching your query.

Category/ies

20 in	 Agriculture
2 in	 Business & Industry
4 in	 Fire
3 in	 General Awareness
5 in	 Plants & Wildlife
12 in	 Relief, Response & Restrictions
8 in	 Water Supply & Quality
0 in	 Ranching *
0 in	 Ornamentals *
0 in	 Fruits and Nuts (orchard) *
0 in	 Produce (fruits and vegetables) *
0 in	 Other Agriculture *

Sources

7 in	 User
3 in	 CoCoRaHS
9 in	 Media
0 in	 National Weather Service
2 in	 Other Agency
0 in	 Hawaii

Source: Drought Impact Reporter; <http://droughtreporter.unl.edu/>

Probability of Future Occurrence

According to the 2018 State Plan, Knox County has a High total rating for droughts and is very likely to experience droughts in the future. Knox County has a 10.72% chance of a severe drought.

Table 3.25. Vulnerability of Knox County to Drought

County	SOVI Index Rating	USDA RMA Total Drought Crop Claims	Average Annualized Crop Claims	USDA Claims Rating	2012 Crop Exposure	Crop Exposure Rating	Likelihood of Severe Drought (%)	Drought Occurrence Rating	Total Rating	Total Rating (Text) Drought
Knox	4	\$54,204,968	\$6,022,774	5	\$37,762,000	3	10.72	5	17	High

Source: 2018 Missouri State Hazard Mitigation Plan

Table 3.26. Ranges for Drought Vulnerability Factor Ratings

Factors Considered	Low (1)	Low-medium (2)	Medium (3)	Medium-high-4	High (5)
Social Vulnerability Index	1	2	3	4	5
Crop Exposure Ratio Rating	\$886,000 - \$10,669,000	\$10,669,001 - \$33,252,000	\$33,252,001 - \$73,277,000	\$73,277,001 - \$155,369,000	\$155,369,001 - \$256,080,000
Annualized USDA Crop Claims Paid	< \$340,000	\$670,000-\$669,999	\$670,000-\$999,999	\$1M-\$1,299,999	> \$1,300,000
Likelihood of Occurrence of severe or extreme drought	1-1.9%	2-3.9%	4-5.9%	6-8.9%	9-10.72%
Total Drought Vulnerability Rating	7-8	9-10	11-12	13-14	15-17

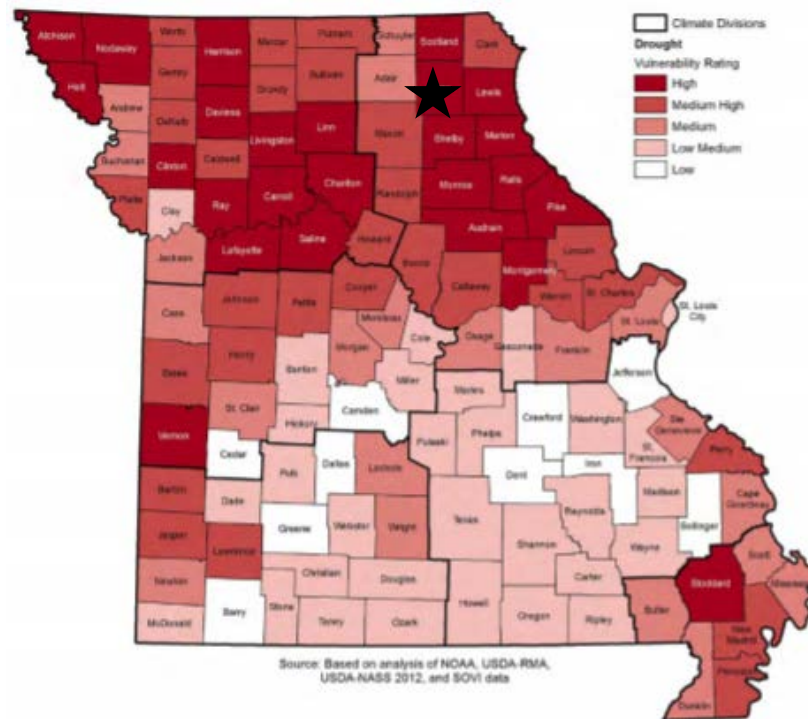
Source: 2018 Missouri State Hazard Mitigation Plan

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

In the 2018 Missouri State Plan, Severe drought, a natural part of Missouri's climate, is a risk to this agriculture-dependent state. Future increases in evaporation rates due to higher temperatures may increase the intensity of naturally-occurring droughts. The number of heavy rainfall events is predicted to increase, yet researchers currently expect little change in total rainfall amounts, indicating that the periods between heavy rainfalls will be marked by an increasing number of dry days. Higher temperatures and increased evapotranspiration increase the likelihood of a drought. This could lead to agricultural drought and suppressed crop yields.

Figure 3.46. Missouri Drought Vulnerability by County



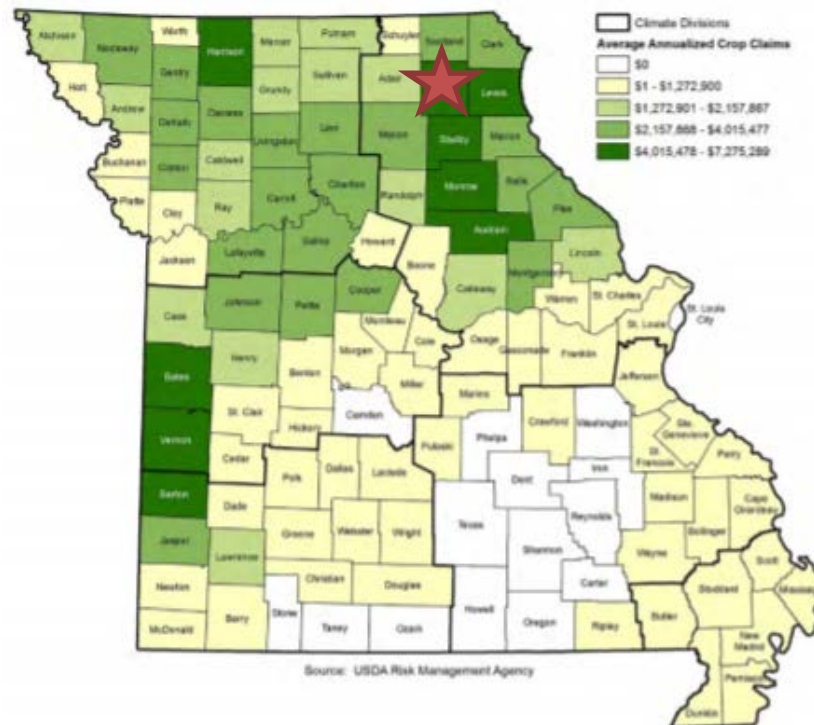
Source: 2018 Missouri State Hazard Mitigation Plan *Black star indicates Knox County

According to the analysis from the 2018 State Plan, Knox County is a high vulnerability county for droughts.

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.

Figure 3.47. Annualized Drought Crop Insurance Claims Paid from 2007 – 2016



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

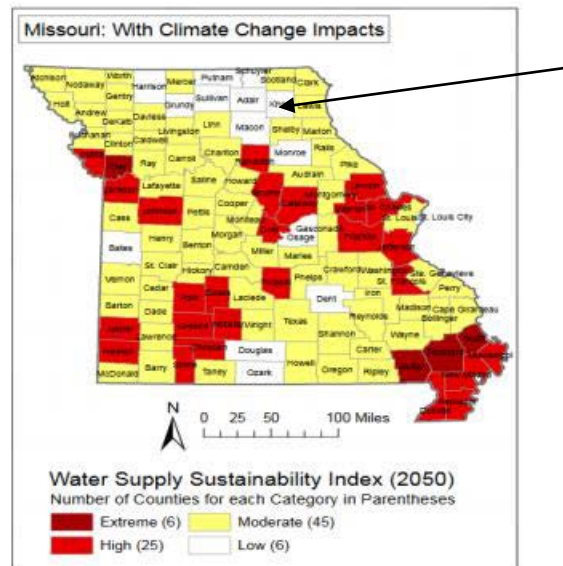
Future development will remain vulnerable to drought. Typically, some urban and rural areas are more susceptible than others. For example, urban areas are subject to water shortages during periods of drought. Excessive demands of the populated area place a limit on water resources.

In rural areas, crops and livestock may suffer from extended periods of heat and drought. As the size of farms increase more crops will be exposed to drought-related agricultural losses. Dry conditions can lead to the ignition of wildfires that could threaten residential, commercial and recreational areas.

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.

Figure 3.48. Climate Change Impacts



Source: <http://www.nrdc.org/globalWarming/watersustainability/> *Arrow indicates Knox County

Hazard Summary by Jurisdiction

The entire planning area will be affected by drought of some degree. The unincorporated agricultural areas of Knox County are the most vulnerable to drought, while drought conditions will also affect the cities, except the magnitude would be different with only lawns and local gardens being impacted. In addition, damage to crops, produce, livestock, soils and building foundations could be weakened due to shrinking and expanding soil.

Problem Statement

Knox County is at a high risk for a severe drought, which is an extra strain placed on the water supply system. Possible solutions include the development of agreements with neighboring communities for a secondary water source and review of local ordinance/regulation for inclusion of water-use restrictions during periods of drought.

3.4.6 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 in **Figure 3.49** 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.

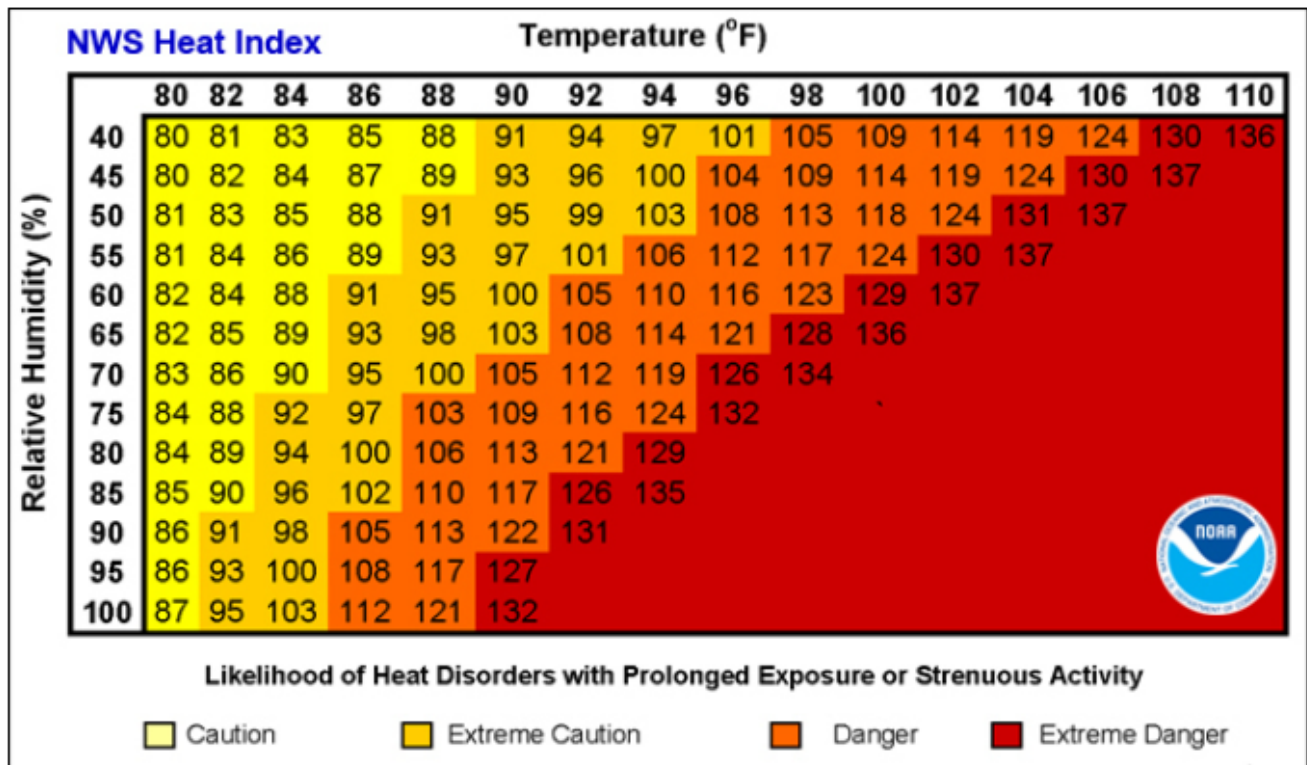
Geographic Location

The entire planning area is subject to extreme heat and all participating jurisdictions are affected.

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.

Figure 3.49. Heat Index (HI) Chart

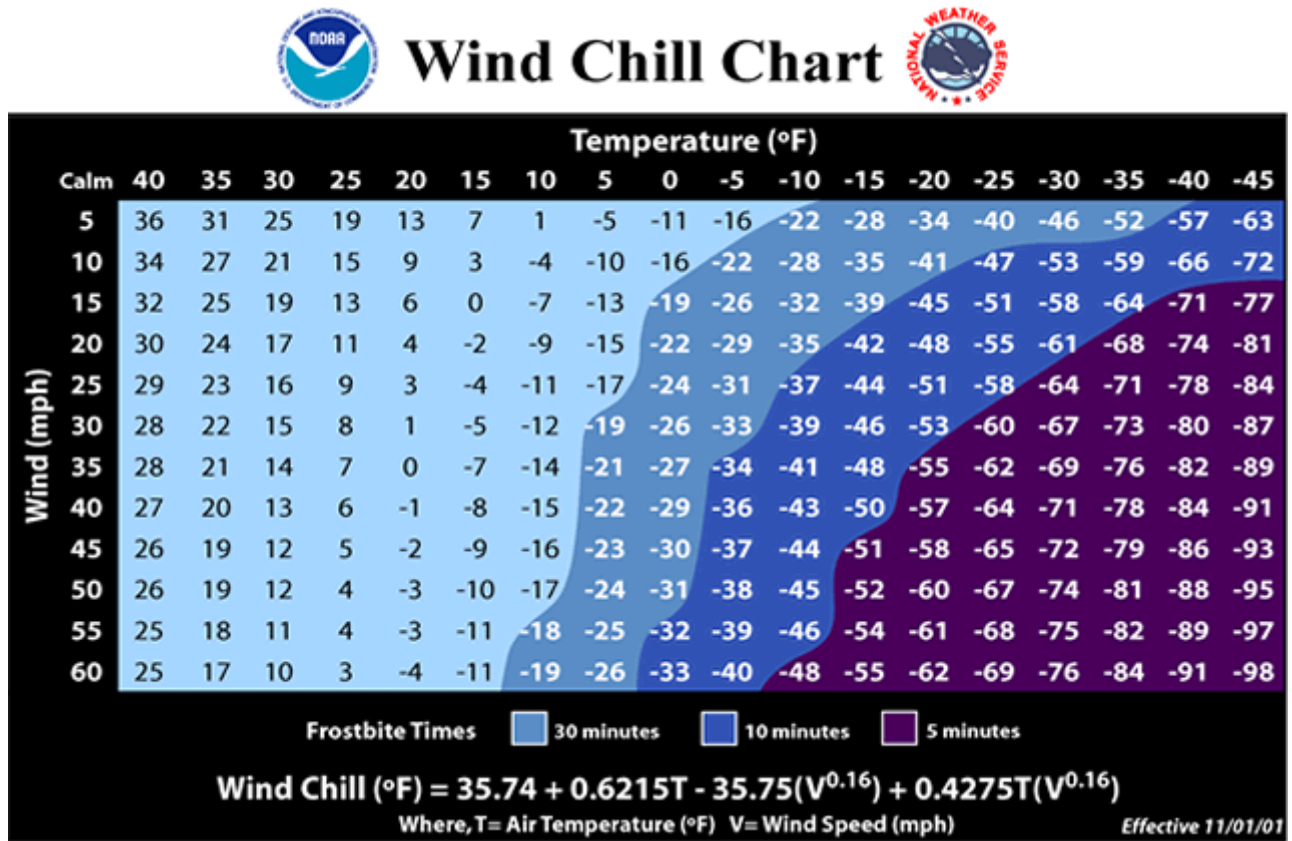


Source: National Weather Service (NWS); <https://www.weather.gov/safety/heat-index>

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.

Figure 3.50. Wind Chill Chart

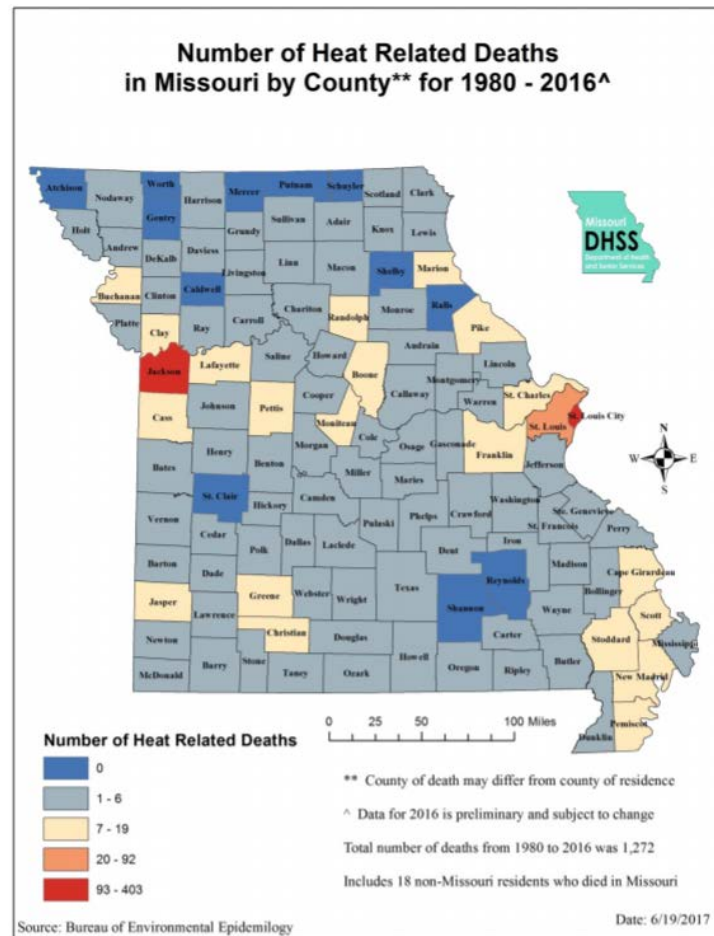


Source: <https://www.weather.gov/safety/cold-wind-chill-chart>

Previous Occurrences

The recorded events in the National Centers for Environmental Information (NCEI) database state there have been 19 recorded events of excessive heat in the 20-year period of 2000-2019. There were no deaths or injuries associated with these events. The NCEI database show 1 recorded event of extreme cold/wind chill, with 0 deaths or injuries associated with this event. **Figure 3.51** illustrates between 1-6 heat related deaths in Knox County between the time of 1980-2016.

Figure 3.51. Heat Related Deaths in Missouri 2000 - 2016



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

Table 3.27. Agricultural Insurance Due to Extreme Temperatures – Heat

2009	0
2010	0
2011	406,688.60
2012	952,207.64
2013	247,217
2014	12,147
2015	0
2016	725
2017	1,208
2018	1,930.36
2019	0

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

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 2009 to 2019 were \$1,622,123.60. 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, 0 deaths were 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

NCEI, dating back to 1999 indicates 5 years without extreme heat events (2008, 2013, 2017, 2018, 2019). In ten years, there were multiple extreme heat events. Based on this historical data, the calculated probability of an extreme heat event in any given year is 47.62%. The probability was determined by taking the number of years with an extreme heat event (10) divided by the number of years (21) data was obtained for. Based on the historical data, the calculated probability of an extreme cold event in any given year is 4.8%. The probability was determined by taking the number of years with an extreme cold event (1) divided by the number of years (21) data was obtained for.

Changing Future Conditions Considerations

According to the 2018 Missouri State Plan, average annual temperatures are projected to most likely exceed historical record levels by the middle of the 21st century. The impacts of extreme heat events are experienced most acutely by the elderly and other vulnerable populations. High temperatures are exacerbated in urban environments, a phenomenon known as the urban heat island effect, which in turn tend to have higher concentrations of vulnerable populations. Higher demand for electricity as people try to keep cool amplifies stress on power systems and may lead to an increase in the number of power outages. Atmospheric concentrations of ozone occur at higher air temperatures, resulting in poorer air quality, while harmful algal blooms flourish in warmer water temperatures, resulting in poorer water quality.

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.

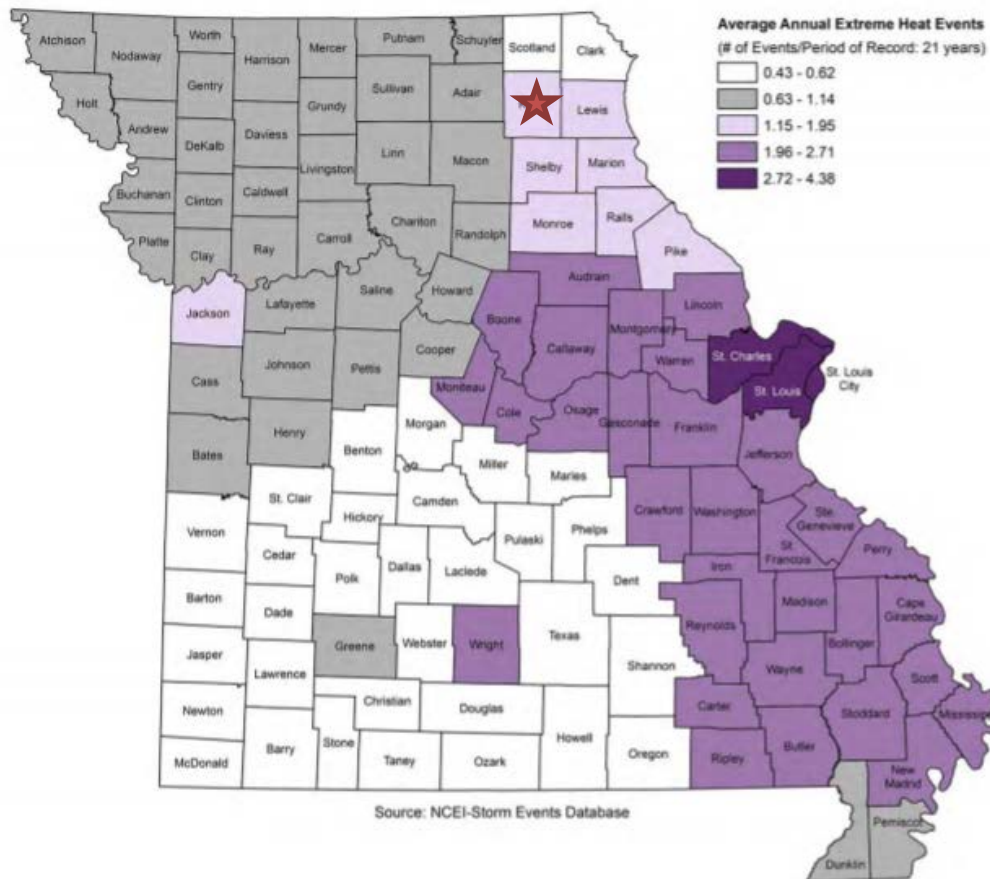
Table 3.28 lists typical symptoms and health impacts due to exposure to extreme heat.

Table 3.28. 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

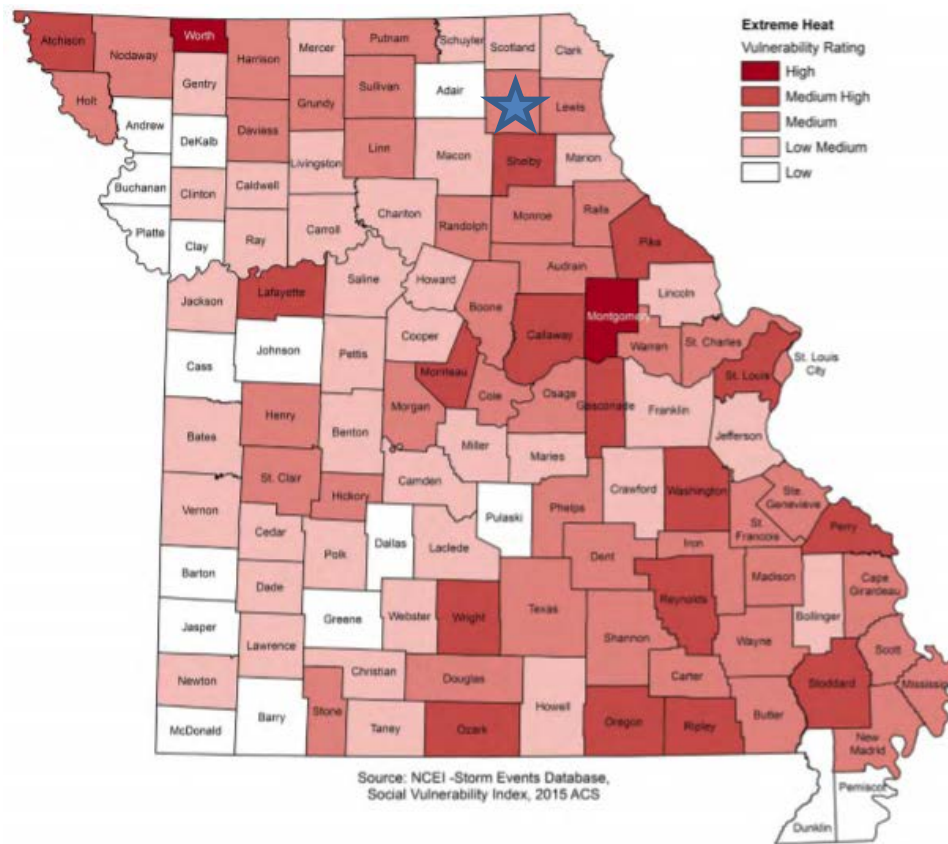
Source: National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml

Figure 3.52. Average Annual Occurrence for Extreme Heat



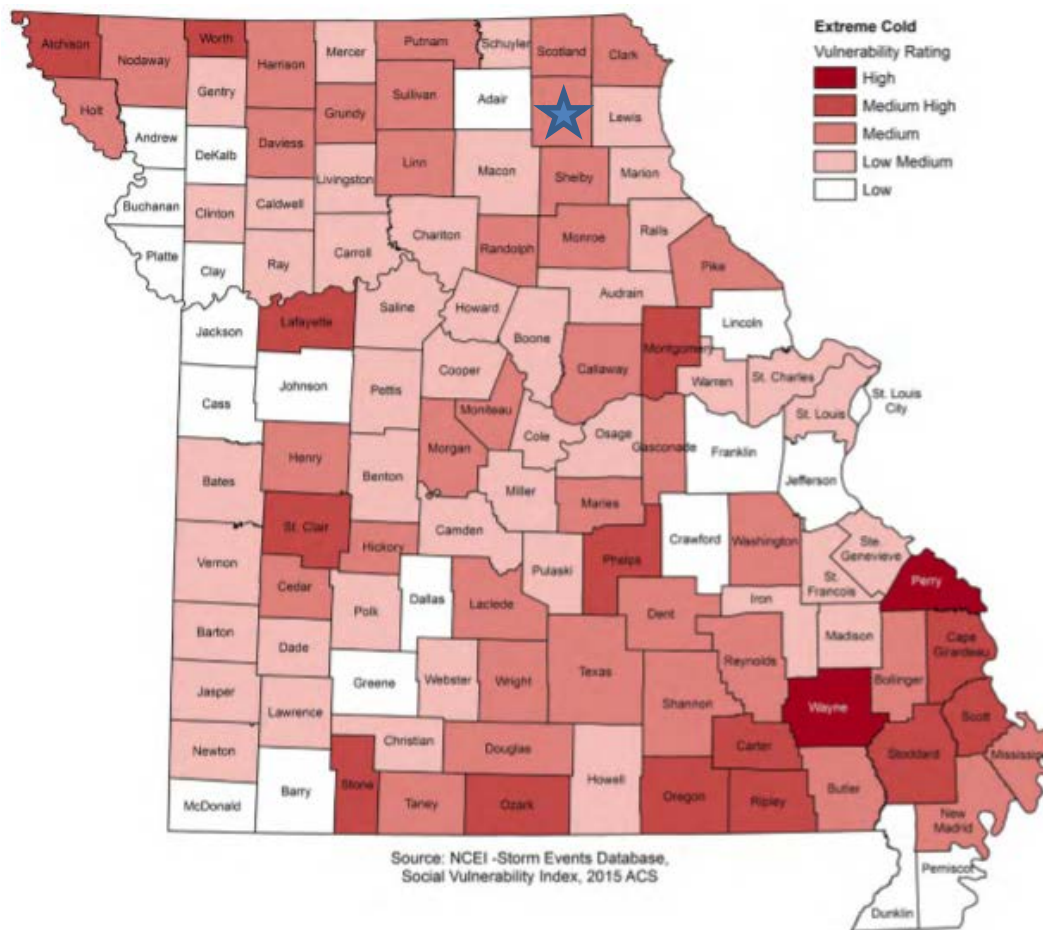
Source: 2018 Missouri State Hazard Mitigation Plan *Red star indicates Knox County

Figure 3.53. Vulnerability Rating for Extreme Heat



Source: 2018 Missouri State Hazard Mitigation Plan *Blue star indicates Knox County

Figure 3.54. Vulnerability Rating for Extreme Cold



Source: 2018 Missouri State Hazard Mitigation Plan *Blue star indicates Knox County

Potential Losses to Existing Development

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

Impact of Previous and Future Development

Population growth can result in increases in the age-groups that are most vulnerable to extreme heat and extreme cold. Population growth also increases the strain on electricity infrastructure, as more electricity is needed to accommodate the growing population.

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 3.29** 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 3.29. Knox County Population Under Age 5 and Over Age 65, 2010 Census Data

Jurisdiction	Population Under 5 yrs	Population 65 yrs and over
Knox County	264	828
Baring	4	26
Edina	58	283
Hurdland	10	32
Knox City	15	47
Newark	3	19
Novelty	6	30

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

Problem Statement

Knox County has a growing population of residents over 65 years, who are at a greater risk for extreme-temperature related illnesses, injuries, and death. Possible solutions include organizing outreach to the vulnerable elderly populations, including establishing and promoting accessible heating or cooling centers in the community and creating a database in coordination with the Health Department to track those individuals at high risk.

3.4.7 Severe Thunderstorms Including High Winds, Hail, and Lightning

Hazard Profile

Hazard Description

Thunderstorms

A thunderstorm is defined as a storm that contains lightning and thunder which is caused by unstable atmospheric conditions. When cold upper air sinks and warm moist air rises, storm clouds or 'thunderheads' develop resulting in thunderstorms. This can occur singularly, as well as in clusters or lines. The National Weather Service defines a thunderstorm as "severe" if it includes hail that is one inch or more, or wind gusts that are at 58 miles per hour or higher. At any given moment across the world, there are about 1,800 thunderstorms occurring. Severe thunderstorms most often occur in Missouri in the spring and summer, during the afternoon and evenings, but can occur at any time. Other hazards associated with thunderstorms are heavy rains resulting in flooding (discussed separately in **Section 3.4.1**) and tornadoes (discussed separately in **Section 3.4.9**).

High Winds

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

Lightning

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

Hail

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

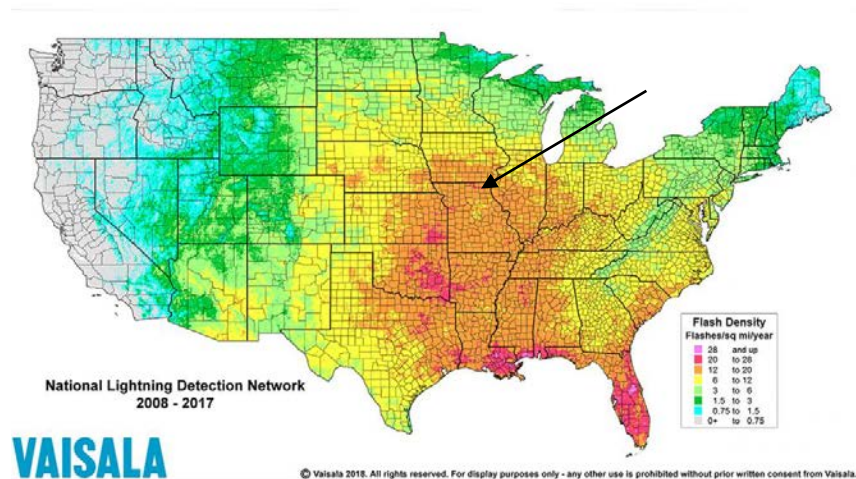
At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 miles per hour, while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 miles per hour. According to the NOAA, the largest hailstone in diameter recorded in the United States was found in Vivian, South Dakota on

July 23, 2010. It was eight inches in diameter, almost the size of a soccer ball. Soccer-ball-sized hail is the exception, but even small pea-sized hail can do damage.

Geographic Location

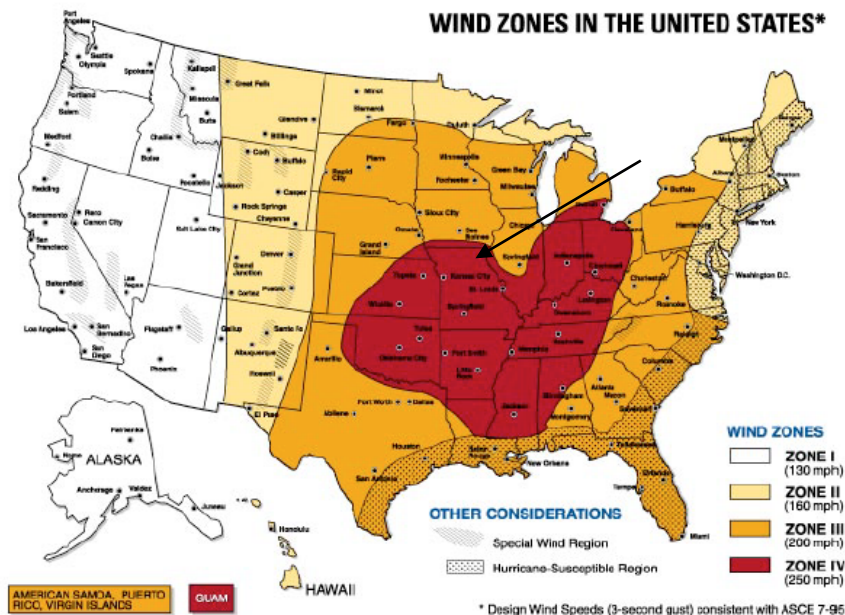
Thunderstorms/high winds/hail/lightning events are an area-wide hazard that can happen anywhere in the county. Although these events occur similarly throughout the planning area, they are more frequently reported in more urbanized areas. In addition, damages are more likely to occur in more densely developed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

Figure 3.55. Location and Frequency of Lightning in Missouri



Source: National Weather Service, <http://www.vaisala.com/en/products/thunderstormandlightningdetectionsystems/Pages/NLDN.aspx>. *Arrow indicates Knox County

Figure 3.56. 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 *Arrow indicates Knox County

Strength/Magnitude/Extent

Based on information provided by the Tornado and Storm Research Organization (TORRO), **Table 3.30** below describes typical damage impacts of the various sizes of hail.

Table 3.30. Tornado and Storm Research Organization Hailstorm Intensity Scale

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

Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University *Notes: In addition to

hail diameter, factors including number and density of hailstones, hail fall speed and surface wind speeds affect severity.
<http://www.torro.org.uk/site/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

The following four tables include NCEI reported events and damages for at least the past 10 years for all four included hazards when information is available.

Table 3.31. Crop Insurance Claims Paid in Knox County from Thunderstorms, 2010 – 2019

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
	No Reports		
Total			\$0

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

Table 3.32. Crop Insurance Claims Paid in Knox County from High Winds, 2010 – 2019

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
2019	Soybeans	Wind/Excess Wind	\$4,247
Total			\$4,247

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

Table 3.33. Crop Insurance Claims Paid in Knox County from Lightning, 2010 – 2019

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
	No Reports		
Total			

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

Table 3.34. Crop Insurance Claims Paid in Knox County from Hail, 2010 – 2019

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
2010	Corn	Hail	\$10,799
2011	Corn	Hail	\$2,441
2011	Soybeans	Hail	\$22,584.50
2014	Corn	Hail	\$822
2017	Soybeans	Hail	\$1,953
2019	Soybeans	Hail	\$130.50
Total			\$38,730

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

Probability of Future Occurrence

Thunderstorms

Due to no reports, adequate calculations cannot be configured at this time.

High Winds

Based on this data, there has been 1 event in a 10-year period, producing an average of 0.1 high wind events each year in Knox County.

Lightning

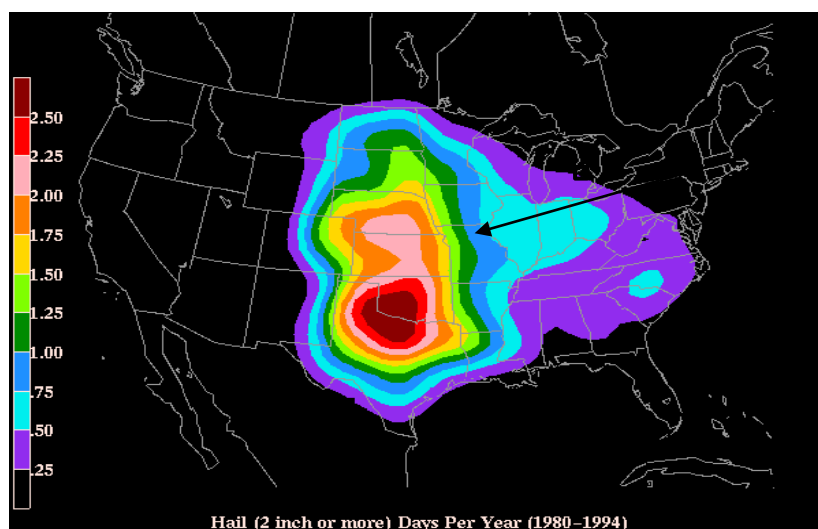
Due to no reports, adequate calculations cannot be configured at this time.

Hail

Based on this data, there have been 6 events in a 10-year period, producing an average of 0.6 hail events each year in Knox County.

Figure 3.57 is based on hailstorm data from 1980-1994. It shows the probability of hailstorm occurrence (2" diameter or larger) based on number of days per year. Knox County is located in the region to receive between .75 and 1 hailstorm annually.

Figure 3.57. Annual Hailstorm Probability (2" diameter or larger), U 1980- 1994



Source: NSSL, http://www.nssl.noaa.gov/users/brooks/public_html/bighail.gif *Arrow indicates Knox County

Changing Future Conditions Considerations

According to the 2018 Missouri State Plan, 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

Most damages occur to electronic equipment located inside buildings, but structural damage can also occur when a lightning strike causes a building fire. Communications equipment, warning transmitters, and receivers can also be knocked out by lightning strikes. There has not been any fatalities or injuries due to lightning in Knox County during the 10-year period reviewed. When the review period was extended to 20 years there was 0 reported lightning events in which individuals injured. There have been several insurance claims due to wind, lightning and hail due to loss of property.

Hail

There were 6 reported crop insurance claims for a 10-year period resulting in \$38,730 in insurance payments.

High Winds

There were 1 reported crop insurance claims for a 10-year period resulting in \$4,247 in insurance payments.

Lightning

The total number of Lightning crop insurance claims for a 10-year period could not be determined as claims were listed under "Other (Snow, Lightning, Etc.)".

Previous and Future Development

Knox County's future development plans will likely increase vulnerability to thunderstorms, high winds, hail and lightning. If the development of housing neighborhoods and businesses occur in the future, the increased population will be vulnerable to all the hazards.

Hazard Summary by Jurisdiction

Thunderstorms, high winds, lightning, and hail events are area-wide. NCEI data did not indicate that any particular community had higher losses as compared to another.

Problem Statement

Severe thunderstorms can damage power lines with the high winds or fallen debris such as tree limbs. Not everyone in the county utilizes social media, texting or have access to a weather radio, communities would benefit from updated sirens. Possible solutions include review of local ordinance and building codes to address high winds and/or construction techniques to include structural bracing, straps and clips, or anchor bolts.

3.4.8 Severe Winter Weather

Hazard Profile

Hazard Description

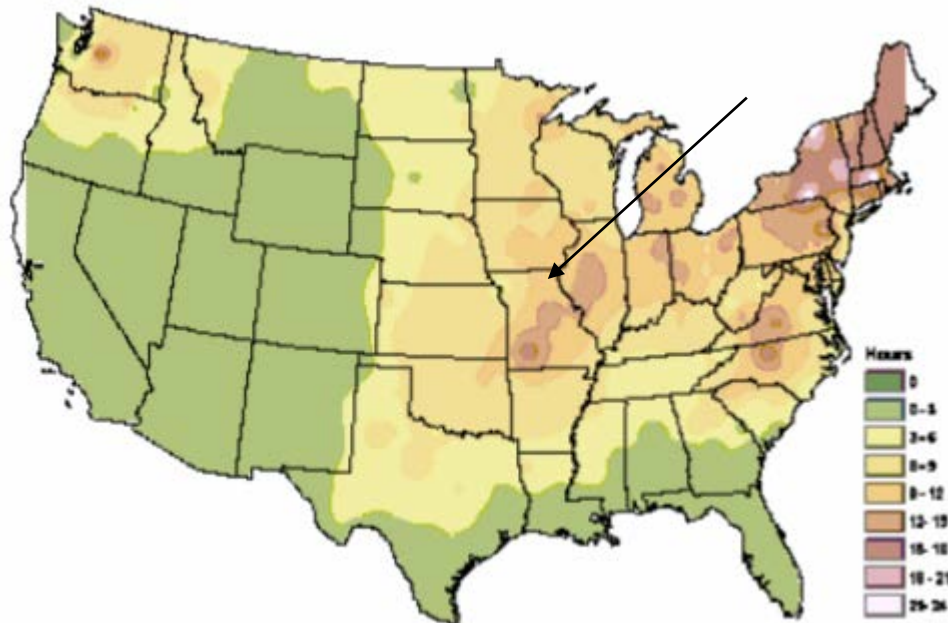
A major winter storm can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. The National Weather Service describes different types of winter storm events as follows.

- **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 Knox County is vulnerable to heavy snow, ice, extreme cold temperatures and freezing rain as seen below in **Figure 3.58**.

Figure 3.58. 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>
*Arrow indicates Knox County

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 3.35 includes NCEI reported events and damages for at least the past 10 years. Events include blizzard, cold/wind chill, extreme cold/wind chill, heavy snow, ice storm, sleet, winter storm, and winter weather.

Table 3.35. NCEI Knox County Winter Weather Events Summary, 2010 – 2019

Type of Event	Inclusive Dates	Magnitude	# of Injuries	Property Damages	Crop Damages
Blizzard	2/1/2011		0	0	0
Blizzard	11/25/2018		0	0	0
Cold/Wind Chill	1/1/2010		0	0	0
Cold/Wind Chill	1/6/2014		0	0	0
Heavy Snow	2/21/10		0	0	0
Heavy Snow	2/25/2013		0	0	0
Heavy Snow	3/24/2013		0	0	0
Heavy Snow	1/11/2019		0	0	0
Ice Storm	2/6/2019		0	0	0
Winter Storm	1/31/2011		0	0	0
Winter Storm	2/1/2011		0	0	0
Winter Storm	2/21/2013		0	0	0
Winter Storm	12/21/2013		0	0	0
Winter Storm	2/4/2014		0	0	0
Winter Weather	1/6/2010		0	0	0

Source: NCEI, data accessed 3/13/2020

Winter storms, cold, frost and freeze take a toll on crop production in the planning area. **Table 3.36** shows the USDA's Risk Management Agency payments for insured crop losses in the planning area as a result of cold conditions and snow for the past 10 years.

Table 3.36. Crop Insurance Claims Paid in Knox County as a Result of Cold Conditions and Snow 2010 – 2019

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid (\$)
2010	CORN	Cold Wet Weather	\$6,358.50
2010	CORN	Cold Wet Weather	\$25,855.50
2010	CORN	Cold Wet Weather	\$5,474.33
2010	CORN	Cold Wet Weather	\$1,550
2010	SOYBEANS	Cold Wet Weather	\$10,796
2011	WHEAT	Freeze	\$1,361
2011	WHEAT	Freeze	\$1,361
2011	WHEAT	Cold Winter	\$640.50
2011	WHEAT	Cold Winter	\$640.50
2011	WHEAT	Cold Winter	\$640.50
2011	WHEAT	Cold Winter	\$11,450
2011	WHEAT	Cold Winter	\$640.50
2011	WHEAT	Cold Winter	\$11,450

2011	CORN	Cold Winter	\$1,978
2011	CORN	Cold Wet Weather	\$8,951.50
2011	CORN	Cold Wet Weather	\$880
2011	CORN	Cold Wet Weather	\$688,012.50
2011	CORN	Cold Wet Weather	\$290,309
2011	SOYBEANS	Cold Winter	\$9,504
2011	SOYBEANS	Cold Wet Weather	\$20,982
2011	SOYBEANS	Cold Wet Weather	\$8,339.50
2012	CORN	Cold Wet Weather	\$19,084.33
2012	CORN	Cold Wet Weather	\$25,255.50
2013	WHEAT	Cold Winter	\$1,536
2013	WHEAT	Cold Wet Weather	\$220
2013	WHEAT	Cold Wet Weather	\$13,805
2013	WHEAT	Cold Wet Weather	\$1,078
2013	WHEAT	Cold Wet Weather	\$2,377
2013	WHEAT	Cold Wet Weather	\$409
2013	CORN	Cold Wet Weather	\$10,539
2013	CORN	Cold Wet Weather	\$10,260
2013	SOYBEANS	Cold Wet Weather	\$30,910
2013	SOYBEANS	Cold Wet Weather	\$7,616.50
2014	WHEAT	Freeze	\$2,593
2014	WHEAT	Cold Winter	\$5,576
2014	WHEAT	Cold Winter	\$8,144.50
2014	WHEAT	Cold Winter	\$5,727
2014	WHEAT	Cold Winter	\$588.50
2014	WHEAT	Cold Winter	\$844
2014	WHEAT	Cold Winter	\$548
2014	WHEAT	Cold Winter	\$329
2014	WHEAT	Cold Winter	\$6,487
2014	WHEAT	Cold Wet Weather	\$435.75
2014	WHEAT	Cold Wet Weather	\$435.75
2014	SOYBEANS	Freeze	\$1,525
2014	SOYBEANS	Cold Winter	\$3,561
2015	CORN	Cold Wet Weather	\$979
2015	SOYBEANS	Cold Wet Weather	\$3,848.50
2016	WHEAT	Freeze	\$7,748
2016	CORN	Cold Wet Weather	\$26,233
2016	CORN	Cold Wet Weather	\$2,182
2016	SOYBEANS	Cold Wet Weather	\$14,553.50
2016	SOYBEANS	Cold Wet Weather	\$11,656
2017	WHEAT	Cold Wet Weather	\$1,526
2017	CORN	Cold Wet Weather	\$48,101
2017	CORN	Cold Wet Weather	\$326,085
2017	SOYBEANS	Cold Wet Weather	\$12,871
2018	SOYBEANS	Cold Wet Weather	723

2019	WHEAT	Cold Winter	\$1,042
2019	WHEAT	Cold Winter	\$693.50
2019	WHEAT	Cold Winter	\$17,496
2019	WHEAT	Cold Wet Weather	\$204
2019	WHEAT	Cold Wet Weather	\$664
2019	CORN	Cold Wet Weather	\$2,647
2019	CORN	Cold Wet Weather	\$21,511
2019	SOYBEANS	Cold Wet Weather	\$2,165
Total			\$1,769,988.16

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

Probability of Future Occurrence

The entire planning area is vulnerable to the effects of winter storm/blizzard, ice storms, winter weather, cold/wind chill and heavy snow. All effects of winters tend to make driving more treacherous and can impact the response of emergency vehicles. The probability of utility and infrastructure failure increases during winter weather due to the freezing rain accumulation on utility poles and power lines. Elderly populations are considered particularly vulnerable to the impact of winter weather.

Changing Future Conditions Considerations

According to the 2018 Missouri State Plan, 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

The method used to determine vulnerability to severe winter weather across Missouri was statistical analysis of data from several sources: National Centers for Environmental Information (NCEI) storm events data (1996 to December 31, 2016), HAZUS Building Exposure Value data, housing density data from the U.S. Census (2015 ACS), and the calculated Social Vulnerability Index for Missouri Counties from the Hazards and Vulnerability Research Institute in the Department of Geography at the University of South Carolina. From the statistical data collected, five factors were considered in determining overall vulnerability to severe winter weather as follows: housing density, building exposure, social vulnerability, likelihood of occurrence, and average annual property loss. Based on natural breaks in the statistical data, a rating value of 1 through 5 was assigned to each factor. These rating values correspond to the following descriptive terms: 1) Low 2) Low-medium 3) Medium 4) Medium-high 5) High.

Table 3.37. Ranges for Severe Winter Weather Vulnerability Factor Rating

Factors Considered	Low (1)	Low Medium (2)	Medium (3)	Medium High (4)	High (5)
Common Factors					
Housing Density (# per sq. mile)	4.11-44.23	44.24-134.91	134.92-259.98	259.99-862.69	862.70-2836.23
Building Exposure (\$)	\$269,532-\$3,224,641	\$3,224,642-\$8,792,829	\$8,792,830-\$22,249,768	\$22,249,769-\$46,880,213	\$46,880,214-\$138,887,850
Social Vulnerability	1	2	3	4	5
Likelihood of Occurrence (# of events/ yrs. of data)	1.05-1.43	1.44-1.76	1.77-2.10	2.11-2.67	2.68-4.57
Average Annual Property Loss (annual property loss/ yrs. Of data)	\$0-\$143,095.24	\$143,095.25-\$406,666.67	\$406,666.68-\$1,191,000.95	\$1,191,000.96-\$3,184,761.90	\$3,184,761.91-\$5,861,666.67

Source: 2018 Missouri State Hazard Mitigation Plan

Table 3.38. Ranges for Severe Winter Weather Combined Vulnerability Rating

	Low (1)	Low-medium (2)	Medium (3)	Medium-high-4	High (5)
Severe Winter Weather Combined Vulnerability	7-8	8-10	10-12	12-15	15-22

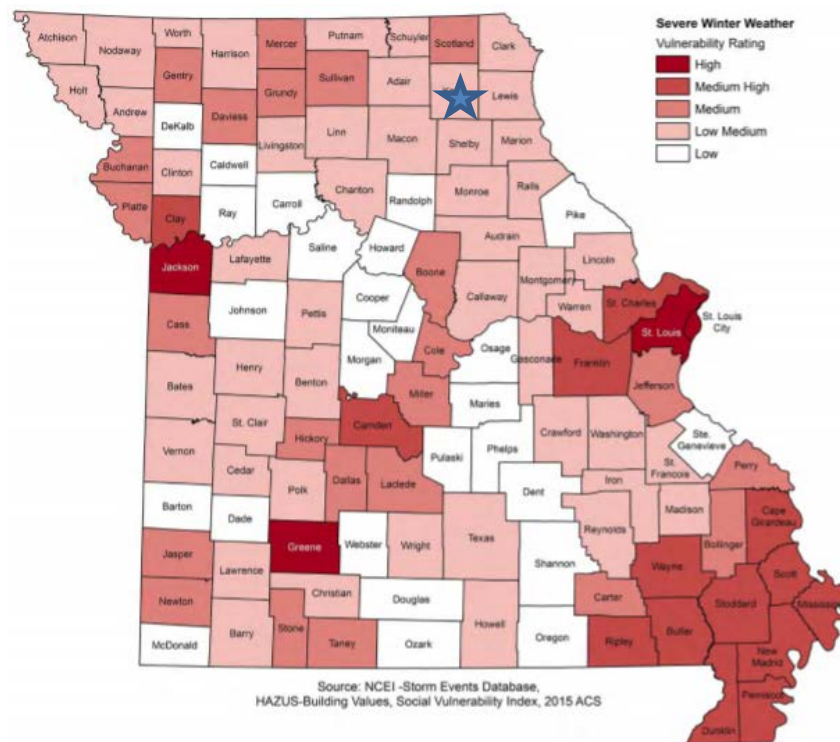
Source: 2018 Missouri State Hazard Mitigation Plan

Table 3.39. Housing Density, Building Exposure, and SOVI Data by County

County	Total Building Exposure (Hazes)	Building Exposure Rating	Housing Density	Housing Density Rating	SOVI Ranking	SOVI Rating
Knox	\$438,423,000	1	4.51	1	Medium High	4

Source: 2018 Missouri State Hazard Mitigation Plan

Figure 3.59. Vulnerability Summary for Severe Winter Weather



Source: 2018 Missouri State Hazard Mitigation Plan *Blue star indicates Knox County

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

The next severe winter storm will most likely close schools and businesses for multiple days, and make roadways hazardous for travel. Heavy ice accumulation may damage electrical infrastructures causing prolonged power outages for large portions of the region. In addition, freezing temperatures make water lines vulnerable to freeze/thaw. Fallen tree limbs also pose a threat to various structures/infrastructures across the county.

Previous and Future Development

Future development could potentially increase vulnerability to this hazard by increasing demand on the utilities and increasing the exposure of infrastructure networks.

Hazard Summary by Jurisdiction

Although crop loss as a result of severe winter storm occurs more in the unincorporated portions of the planning area, the density of vulnerable populations is higher in the urban areas of the planning areas. It is considered that the magnitude of this hazard is relatively equal. The factors of probability, warning time, and duration are also equal across the planning area. Therefore, the conclusion is the hazard does not substantially vary by jurisdiction.

Problem Statement

Knox County is expected to experience at least one severe winter weather event annually. The county has a low-medium vulnerability rating. Jurisdictions should enhance their weather monitoring to be better prepared for severe weather hazards. If jurisdictions monitor winter weather, they can dispatch road crews to prepare for the hazard. County and city crews can also trim trees along power lines to minimize the potential for outages due to snow and ice. Citizens should also be educated about the benefits of being proactive to alleviate property damage as well as preparing for power outages. Education needs to occur to ensure all residents are aware of the shelters in the County, residents are educated on emergency supplies to have and the utilization of social media and texting increases.

3.4.9 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

Tornados can occur in the entire planning area and no area is immune from tornado suffering.

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 3.40**) 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 3.40. 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 3.41**. The damage descriptions are summaries. For the actual EF scale it is necessary to look up the damage indicator (type of structure damaged) and refer to the degrees of damage associated with that indicator. Information on the Enhanced Fujita Scale's damage indicators and degrees of damage is located online at www.spc.noaa.gov/efscale/ef-scale.html.

Table 3.41. 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.
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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

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.

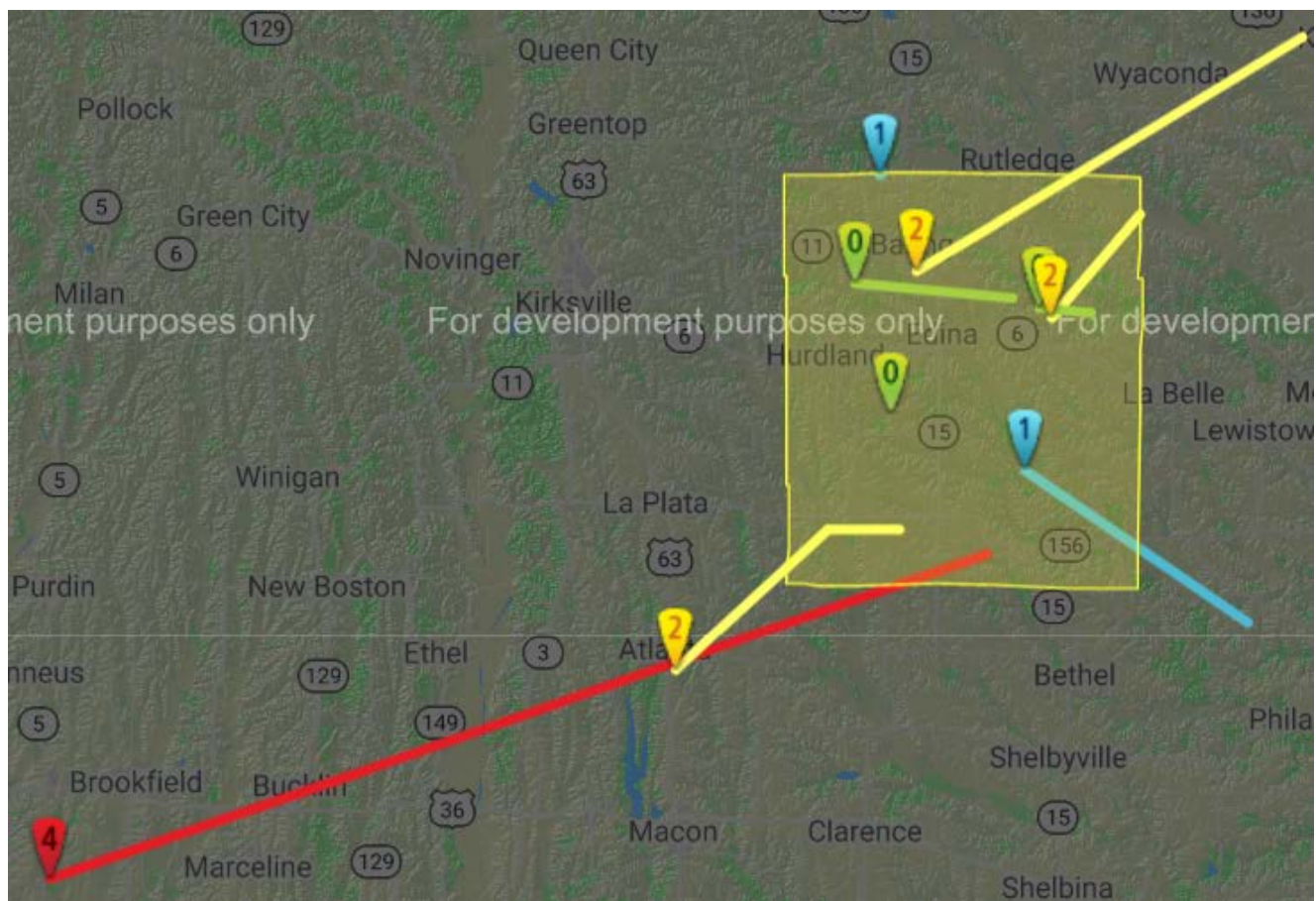
Table 3.42. Recorded Tornadoes in Knox County, 1993 – Present

Date	Beginning Location	Ending Location	Length (miles)	Width (yards)	F/EF Rating	Death	Injury	Property Damage	Crop Damages
4/8/1999	8SW Novelty	1SW Novelty	7 mi	100 yd	F2	0	0	\$500,000	\$0
5/10/2003	2S Baring	4NNW Colony	7 mi	200 yd	F2	0	0	\$0	\$0
5/13/2009	1NE Kenwood	4ENE Edina	9.23 mi	200 yd	EF0	0	0	\$0	\$0
5/13/2009	4NW Knox City	3NNE Knox City	3.13 mi	100 yd	EF0	0	0	\$0	\$0
4/27/2016	1WNW Greensburg	1WNW Greensburg	0.03 mi	40 yd	EF0	0	0	\$0	\$0
	Total					0	0	\$500,000	\$0

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

Figure 3.60 shows historic tornado paths in the planning area.

Figure 3.60. Knox County Map of Historic Tornado Events



Source: Missouri Tornado History Project, <http://www.tornadohistoryproject.com/tornado/Missouri>

Data from the USDA Risk Management Agency showed 1 insurance payment paid in 1999 for crop damages as a result of a tornado in Knox County. Data was collected for the time period from 1993 to present.

Probability of Future Occurrence

The National Center for Environmental Information reported 4 tornadoes in Knox County in a 20-year time period, which calculates to a 20 percent chance of tornado in any given year. Therefore, it is a low probability that some portion of Knox County will experience tornado activity in any given year.

Changing Future Conditions Considerations

According to the 2018 Missouri State Hazard Mitigation Plan, scientists do not know how the frequency and severity of tornadoes will change. Research published in 2015 suggests that changes in heat and moisture content in the atmosphere, brought on by a warming world, could be playing a role in making tornado outbreaks more common and severe in the U.S. The research concluded that the number of days with large outbreaks have been increasing since the 1950s and that densely concentrated tornado outbreaks are on the rise. It is notable that the research shows that the area of

tornado activity is not expanding, but rather the areas already subject to tornado activity are seeing the more densely packed tornadoes. Because Missouri experiences on average around 39.6 tornadoes a year, such research is closely followed by meteorologists in the state.

Vulnerability

Vulnerability Overview

Knox County is located in a region of the U.S. with high frequency of dangerous and destructive tornadoes referred to as “Tornado Alley”. **Figure 3.60** illustrates areas where dangerous tornadoes historically have occurred.

From the statistical data collected, six factors were considered in determining overall vulnerability to tornadoes as follows: building exposure, population density, social vulnerability, percentage of mobile homes, likelihood of occurrence, and annual property loss. Based on natural breaks in the statistical data, a rating value of 1 through 5 was assigned to each factor. These rating values correspond to the following descriptive terms: 1) Low 2) Low-medium 3) Medium 4) Medium-high 5) High.

Table 3.43. Ranges for Tornado Vulnerability Factor Ratings

Factors Considered	Low (1)	Low-medium (2)	Medium (3)	Medium-High (4)	High (5)
Common Factors					
Building Exposure (\$)	\$269,532- \$3,224,641	\$3,224,642- \$8,792,829	\$8,792,830- \$22,249,768	\$22,249,769- \$46,880,213	\$46,880,214- \$138,887,850
Population Density (#per sq. mile)	4.11-44.23	44.24-134.91	134.92-259.98	259.99-862.69	862.70-2,836.23
Social Vulnerability	1	2	3	4	5
Percent Mobile Homes	0.2-4.5%	4.51-8.8%	8.81-14%	14.01-21.2%	21.21-33.2%
Likelihood of Occurrence (# of events/ yrs. of data)	0.119 - 0.208	0.209 - 0.313	0.314 - 0.417	0.418 - 0.552	0.553 - 0.791
Total Annualized Property Loss (\$ / yrs. of data)	\$974 - \$281,874	\$281,875 - \$991,825	\$991,826 - \$2,099,000	\$2,099,001 - \$5,047,474	\$5,047,475 - \$42,467,109

Source: 2018 Missouri State Hazard Mitigation Plan

Table 3.44. Ranges for Tornado Combined Vulnerability Rating

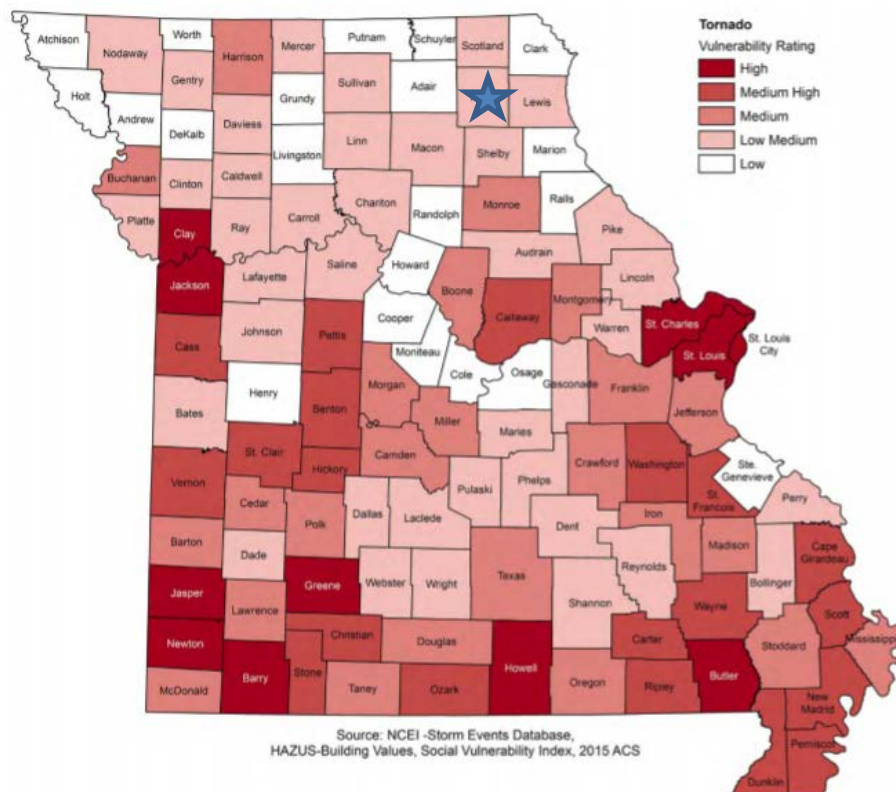
	Low (1)	Low-medium (2)	Medium (3)	Medium-High (4)	High (5)
Tornado Combined Vulnerability	7-10	11-12	13-14	15-16	17-21

Source: 2018 Missouri State Hazard Mitigation Plan

Table 3.45. Building Exposure, Population Density, SOVI, and Mobile Home Data

County	Total Building Exposure (Hazus)	Exposure Rating	Population Density	Population Rating	SOVI Index Ranking	SOVI Rating	Percent Mobile Homes	Mobile Home Rating
Knox	\$438,423,000	1	7.76	1	Medium High	4	12.4	3

Source: 2018 Missouri State Hazard Mitigation Plan

Figure 3.61. Overall Vulnerability for Tornadoes

Source: 2018 Missouri State Hazard Mitigation Plan *Blue star indicates Knox County

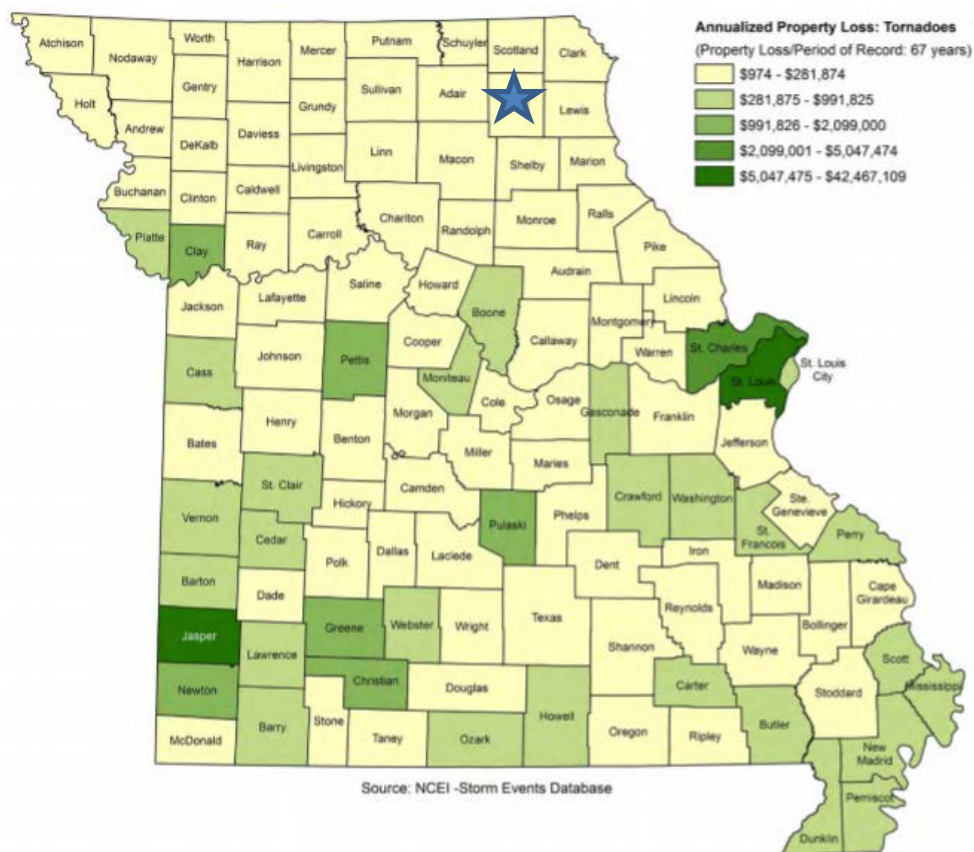
Figure 3.62. Tornado Alley in the U.S.



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

Potential Losses to Existing Development

Figure 3.63. Annualized Property Loss for Tornadoes



Source: 2018 Missouri State Hazard Mitigation Plan *Blue star indicates Knox County

Figure 3.63 shows that in the past 67 years, Knox County has had minimal property (\$974-\$281,874) loss from tornadoes.

Previous and Future Development

Vulnerability to tornadoes is anticipated to remain the same. Future development for public buildings such as schools, government offices, as well as buildings with high occupancy and campgrounds should consider including a tornado safe room to protect occupants in the event of a tornado.

Hazard Summary by Jurisdiction

Tornado events could occur anywhere in the planning area, but all jurisdictions in Knox County would suffer heavy damages because of the age of the housing or the high concentration of mobile homes. Communities that have adopted building codes may also be less vulnerable to damages.

Problem Statement

Knox County has inadequate tornado shelters throughout the county, not everyone utilizes social media and/or texting, the rural areas do not have warning sirens, lack of awareness for available shelters and more education needs to occur. Possible solutions include promoting the use of NOAA weather radios and conducting public education and outreach activities to increase awareness of tornado risk. Another solution of funding becomes available would be the construction of a safe room.

3.4.10 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.

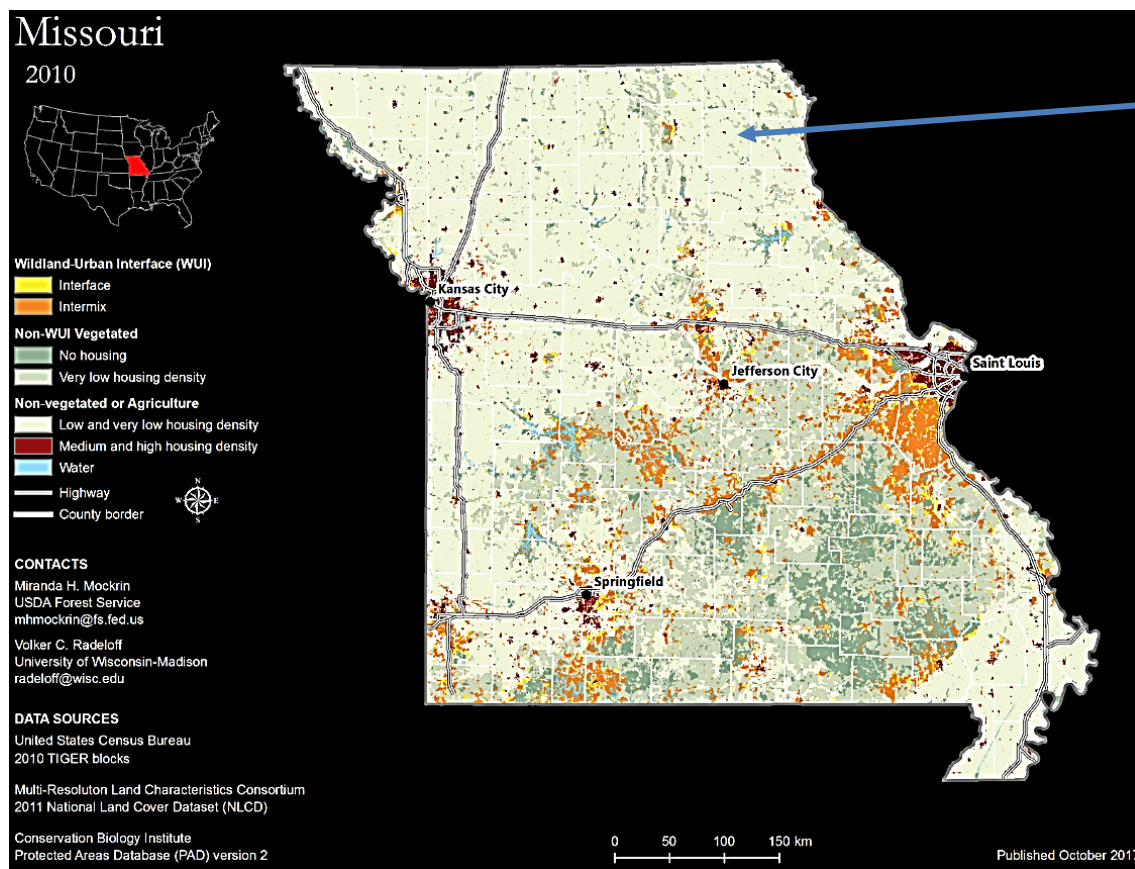
Most of Missouri fires occur during the spring season between February and May. The length and severity of wildland fires depend largely on weather conditions. Spring in Missouri is usually characterized by low humidity and high winds. These conditions result in higher fire danger. In addition, due to 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.

According to the 2018 Missouri State Plan the Wildland-Urban Interface estimated the numbers and values of structures and population vulnerable to wildfire as the following: Total number of structures 266 valued at \$66,082,616 and a population of 475. The breakdown of the structures consists of 56 Agriculture valued at \$13,113,032, 14 Commercial valued at \$9,098,00, 1 Education valued at \$1,447,833, 6 Government valued \$3,780,529, 2 Industrial valued at \$2,251,329 and 187 Residential valued at \$37,391,885.

Figure 3.64. 2010 Missouri Wildland Urban Interface



Source: http://silvis.forest.wisc.edu/GeoData/WUI_cp12/maps/gifs/black/Missouri_WUI_cp12_black_2010.gif *Arrow indicates Knox County

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

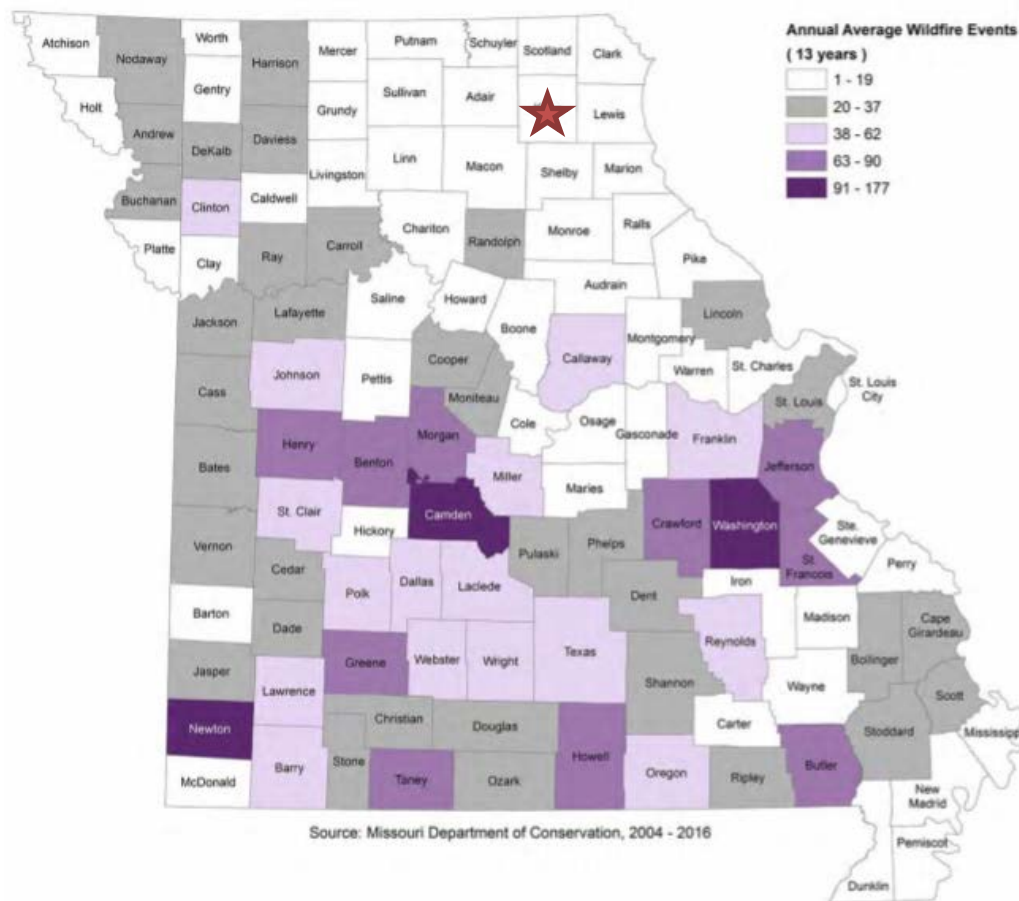
According to the Missouri Division of Fire Safety (MDFS) website, as well as the Missouri Department of Conservation Wildfire data search, there were 17 reported wildland or grass fires in Knox County from 2010 – 2019. In total, these 17 fires burned 563 acres and no injuries were reported. During the 10-year reporting period, 7 of the fires had an unknown cause for starting and burning 405.03 acres, 7 were started by debris and burnt 129.23 acres, 2 of the fires were started by equipment and burnt 26 acres, 1 of the fires was started by lightning and burnt 3 acres.

At this time, no information is available from school districts and special districts regarding previous fire events and the damages resulting from them.

Probability of Future Occurrence

Wildfires in the planning area are most likely to occur every year with very little resulting damage. The wildfires occur in the unincorporated areas and are limited to undeveloped land. The jurisdictions and school districts are largely surrounded by undeveloped land but have not been affected by wildfires. In years of significant drought or excessive heat the potential for a wildfire in planning area increases.

Figure 3.65. Likelihood of Wildfire Events 2004 – 2016



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

When analyzing the wildland fires, there has been an average of 1.7 fires burning 56.3 acres per year. However, it was reported these fires did not result in major damages. The probability score to be likely in any given year that a wildfire could occur in the planning area.

Changing Future Conditions Considerations

Higher temperatures and changes in rainfall are unlikely to substantially reduce forest cover in Missouri, although the composition of trees in the forests may change. More droughts would reduce forest productivity and changing future conditions are also likely to increase the damage from insects and diseases. But longer growing seasons and increased carbon dioxide concentrations could offset the losses from those factors. Forests cover about one-third of the state, dominated by oak and hickory trees. As the climate changes, the abundance of pines in Missouri's forest are likely to increase, while the population of hickory trees is likely to decrease.

Higher temperatures will also reduce the number of days prescribed burning can be performed. Reduction of prescribed burning will allow for growth of understory vegetation-providing fuel for destructive wildfires. Drought is also anticipated to increase in frequency and intensity during summer months under projected future scenarios. Drought can lead to dead or dying vegetation and

landscaping material close to structures which creates fodder for wildfires.

Vulnerability

Vulnerability Overview

According to the 2018 Missouri State Hazard Mitigation Plan, Higher temperatures and changes in rainfall are unlikely to substantially reduce forest cover in Missouri, although the composition of trees in the forests may change. More droughts would reduce forest productivity, and changing future conditions are also likely to increase the damage from insects and diseases. But longer growing seasons and increased carbon dioxide concentrations could more than offset the losses from those factors. Forests cover about one-third of the state, dominated by oak and hickory trees. As the climate changes, the abundance of pines in Missouri's forests is likely to increase, while the population of hickory trees is likely to decrease. Higher temperatures will also reduce the number of days prescribed burning can be performed. Reduction of prescribed burning will allow for growth of understory vegetation – providing fuel for destructive wildfires. Drought is also anticipated to increase in frequency and intensity during summer months under projected future scenarios. Drought can lead to dead or dying vegetation and landscaping material close to structures which creates fodder for wildfires within both the urban and rural settings.

Potential Losses to Existing Development

Table 3.46. Estimated Numbers and Values of Structures and Population Vulnerable to Wildfire in Knox County

County	Number of Structures	Value of Structures	Population
Knox	30	\$8,674,735	58

Source: 2018 Missouri State Hazard Mitigation Plan

Table 3.47. Wildfire Potential Loss Estimates

County	Total WUI Acreage	Total Structure Value Within WUI	Average Value/Acre within WUI	Average Annual Acreage Burned	Potential Loss
Knox	182.33	\$8,674,735	\$47,577	43	\$2,045,796

Source: 2018 Missouri State Hazard Mitigation Plan

Impact of Previous and Future Development

Future and previous development in the wildland-urban interface would increase vulnerability to the hazard.

Hazard Summary by Jurisdiction

The rural jurisdictions in the planning area are all surrounded by undeveloped agricultural land and

face the possibility of a wildfire event. The school districts are located in a rural area and do not face danger of wildfire due to barriers in place around the schools. As long as drought conditions are not seriously inflamed, future wildfires in Knox County should have a negligible adverse impact on the community, as it would affect a small percentage of the population. Nonetheless, homes and businesses located in unincorporated areas are at higher risk from wildfires due to proximity to wood and distance from fire services. Variations in both structural/urban and wildfires are not able to be determined at this time due to lack of data. However, both fire types are expected to occur on an annual basis across the county.

Problem Statement

Residents do not comply with burn bans, education is not available for the levels of burn bans, many residents lack education in fire safety and not all residents utilize social media and texting. Education needs to occur on the dangers associated with not complying with the burn bans, more education for fire safety and encourage utilization of social media and texting. Due to Knox County's high drought rating, they may be more susceptible to fires.

3.4.11 Pandemic

Hazard Profile

Hazard Description

According to the Center for Disease Control, a pandemic is a global outbreak of disease. Pandemics happen when a new virus emerges to infect people and can spread between people sustainably. Because there is little to no pre-existing immunity against the new virus, it spreads worldwide.

Geographic Location

All of Knox County is susceptible to a pandemic outbreak due to its main characteristic of being on a global level.

Strength/Magnitude/Extent

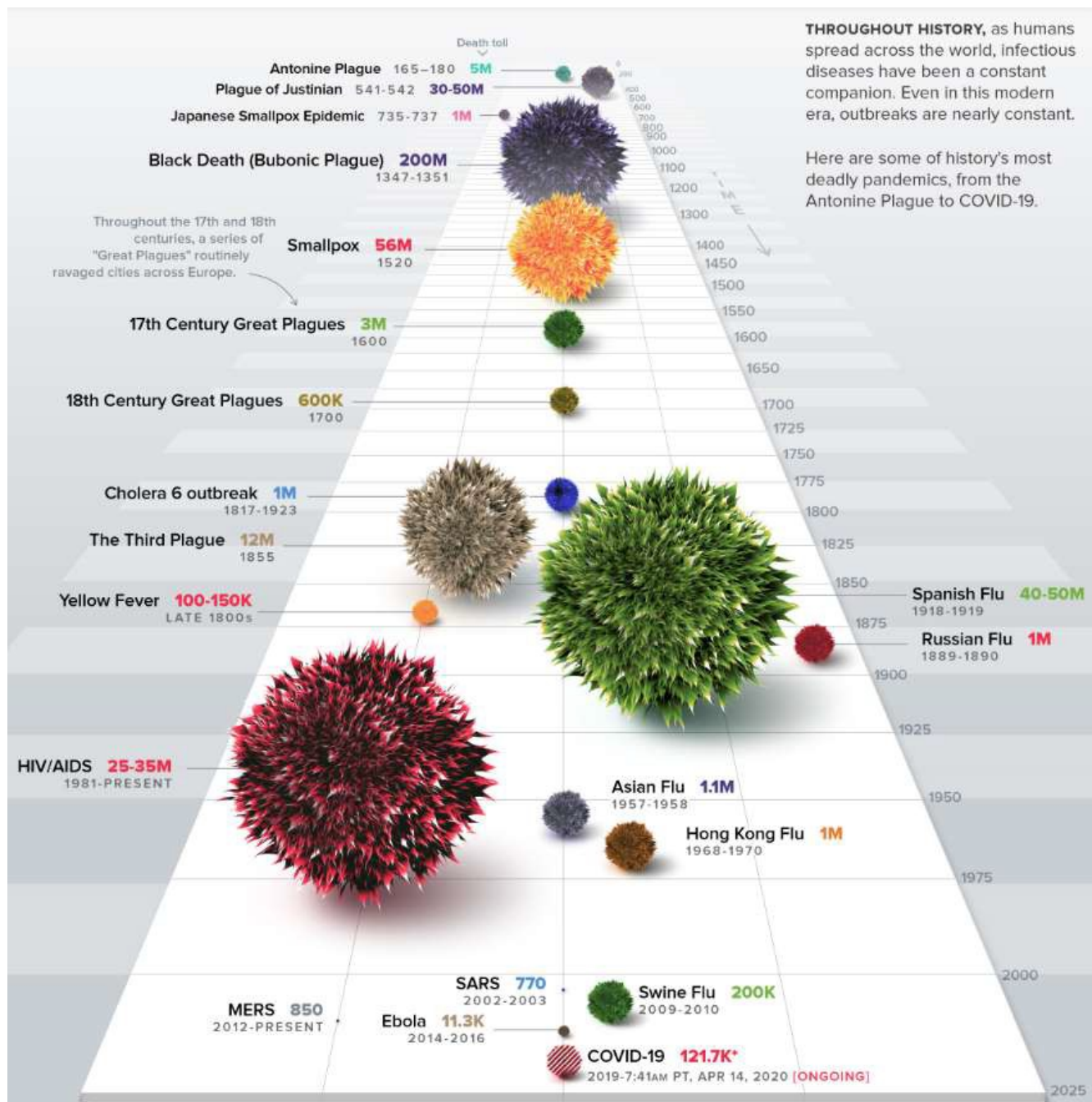
Risk depends on characteristics of the virus, including how well it spreads between people; the severity of resulting illness; and the medical or other measures available to control the impact of the virus (for example, vaccines or medications that can treat the illness) and the relative success of these. In the absence of vaccine or treatment medications, nonpharmaceutical interventions become the most important response strategy. These are community interventions that can reduce the impact of disease.

Previous Occurrences

The planning area, in addition to others across the globe, is currently in the midst of a pandemic. The virus that causes COVID-19 is infecting people and spreading easily from person-to-person. On March 11, 2020 the COVID-19 outbreak was characterized as a pandemic by the World Health Organization. According to the Center for Disease Control, this is the first pandemic known to be caused by a new coronavirus. In the past century, there have been four pandemics caused by the emergence of new influenza viruses. As a result, most research and guidance around pandemics is specific to influenza, but the same premises can be applied to the current COVID-19 pandemic. Pandemics of respiratory disease follow a certain progression outlined in a “Pandemic Intervals Framework.” Pandemics begin with an investigation phase, followed by recognition, initiation, and acceleration phases. The peak of illnesses occurs at the end of the acceleration phase, which is followed by a deceleration phase, during which there is a decrease in illnesses. Different countries can be in different phases of the pandemic at any point in time and different parts of the same country can also be in different phases of a pandemic.

As humans have spread across the world, so have infectious diseases. Even in this modern era, outbreaks are nearly constant, though not every outbreak reaches pandemic level. Figure 3.66 below outlines the history of pandemics dating back to 165.

Figure 3.66. History of Pandemics



Source: <https://www.visualcapitalist.com/history-of-pandemics-deadliest/>

Probability of Future Occurrence

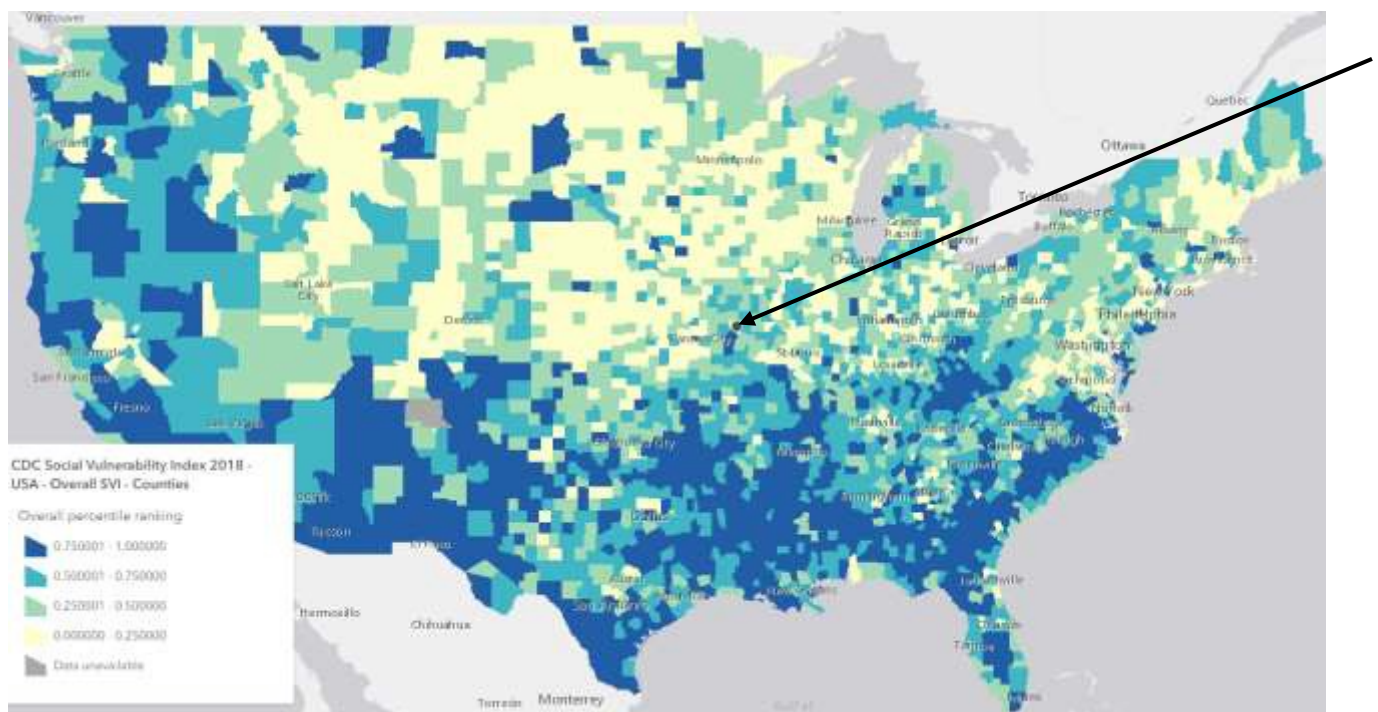
Changing Future Conditions Considerations

Vulnerability

Vulnerability Overview

Each jurisdiction and its population, businesses, and school districts are vulnerable to a pandemic outbreak. Due to an increasing elderly population throughout the planning area, an outbreak of an infectious or viral disease could have major impacts on the communities and the assets each possess.

Figure 3.67. Social Vulnerability Rating in the United States



Source: <https://livingatlas.arcgis.com/policy/browse/?loc=-94.542,39.439,5&col=88f17b4580e846609f92c9f75a9d9eee,2c8fdc6267e4439e968837020e7618f3,48638a1be455429287d6756985013910,02a82293e2dd475391cb3699b5e82d61,d89c527f2e6b4d658db0948ea9d49cd9,48a70b524601428ba297e3106b751401,be559110b5c34591b1a767fbb807bcbf,e0427fbc472f4a45b7d94d182a5e9591,142e65436bed4063973380feae6ed248&viz=2c8fdc6267e4439e968837020e7618f3&hs=1> *Arrow indicates Knox County

Potential Losses to Existing Development

During a pandemic, COVID-19 for example, people have been ordered to stay home, schools adjourned the remainder of the year, restaurants and bars are forced to close their doors. It is very likely the livelihood of the population and some of the planning area's most beloved assets and businesses will not be able to recover the pandemic due to extreme economic loss and health threats.

Impact of Previous and Future Development

Pandemics create unprecedented disruption for global health and the development of communities. Urbanization in the developing world is bringing more and more rural residents into denser neighborhoods, while population increases are putting greater pressure on the environment. In conjunction, air traffic nearly doubled in the past decade. These macro trends are having major impacts on the spread of infectious disease.

Hazard Summary by Jurisdiction

The planning area is largely rural and many have a sense of “safeness” when it comes to an infectious or viral pandemic, in the sense that most of the population can securely distance themselves from one another, whereas larger cities do not have that luxury. Unfortunately, pandemics happen on a global level and no community is immune.

Problem Statement

In order to keep transmission rates low during a pandemic outbreak, residents need to safely distance themselves as best as possible and follow the numerous Center for Disease Control guidelines. Due to the lack of accessibility to ongoing public health information and broadband connectivity, it is especially challenging to inform residents about current and upcoming pandemic updates. It is an issue in rural America to convey the severity of pandemic outbreaks and provide preparedness instruction because social media, website posts, podcasts, etc. are not an option for every resident in the planning area.

4 MITIGATION STRATEGY

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

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

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

- **Mitigation Goals** are general guidelines that explain what you want to achieve. Goals are long-term policy statements and global visions that support the mitigation strategy. The goals address the risk of hazards identified in the plan.
- **Mitigation Actions** are specific actions, projects, activities, or processes taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan’s mission and goals.

4.1 Goals

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

This planning effort is an update to Knox County’s existing hazard mitigation plan approved by FEMA in 2015. Therefore, the goals from the 2015 Knox County Hazard Mitigation Plan were reviewed to see if they were still valid, feasible, practical, and applicable to the defined hazard impacts. The MPC conducted a discussion session during their all-in-one meeting to review and update the plan goals. To ensure that the goals developed for this update were comprehensive and supported State goals, the 2018 State Hazard Mitigation Plan goals were reviewed. The MPC also reviewed the goals from current surrounding county plans.

1. Public Awareness- Using a variety of communication avenues to increase the citizens awareness of and to promote education about the natural hazards that they may face, their vulnerability to these hazards, and how to lessen the effect of future natural hazards.
2. Strengthen communication and coordination between local governments, emergency personnel, public agencies, and citizens to mitigate the effects of future natural hazards.
3. Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties; on natural resources; on infrastructure; and on the local economy.

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 second session of the MPC meeting, the results of the risk assessment update were provided to the MPC members for review and the key issues were identified for specific hazards. Changes in risk since adoption of the previously approved plan were discussed. Actions from the previous plan included completed actions, on-going actions, and actions upon which progress had not been made. The MPC discussed SEMA's identified funding priorities and the types of mitigation actions generally recognized by FEMA.

The MPC included problem statements in the plan update at the end of each hazard profile. The problem statements summarize the risk to the planning area presented by each hazard and include possible methods to reduce that risk. Use of the problem statements allowed the MPC to recognize new and innovative strategies for mitigate risks in the planning area.

The focus of the third session was update of the mitigation strategy. For a comprehensive range of mitigation actions to consider, the MPC reviewed the following information during the third session of the meeting:

- A list of actions proposed in the previous mitigation plan, the current State Plan, and approved plans in surrounding counties,
- Key issues from the risk assessments, including the problem statements concluding each hazard profile and vulnerability analysis,
- State priorities established for HMA grants, and
- Public input during meetings, responses to data collection questionnaires, and other efforts to involve the public in the plan development process.

For the third session of the meeting, individual jurisdictions, including the school, developed final mitigation strategy for submission to the MPC. They were encouraged to review the details of the risk assessment vulnerability analysis specific to their jurisdiction. They were also provided a link to the FEMA's publication, *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013)*. This document was developed by FEMA as a resource for identification of a range of potential mitigation actions for reducing risk to natural hazards and disasters.

The MPC reviewed the actions from the previously approved plan for progress made since the plan had been adopted, using worksheets included in Appendix A of this plan. Prior to the third session, the list of actions for each jurisdiction was emailed to that jurisdiction's MPC representative along with the worksheets. Each jurisdiction was instructed to provide information regarding the "Action Status" with one of the following status choices:

- Completed, with a description of the progress;
- Ongoing, with a description of the progress made to date; or
- Not Yet Started, with a discussion of the reasons for lack of progress.

Additionally, the future inclusion of each mitigation action in the plan update was identified as either keep, delete, or modify. Based on the status updates, there were 0 completed actions, 0 continuing actions (either ongoing or modified), and 32 deleted actions.

Table 4.1 provides a summary of the action statuses for each jurisdiction:

Table 4.1. Action Status Summary

Jurisdiction	Completed Actions	Continuing Actions (ongoing or modify)	Deleted Actions
Knox County	0	0	32
City of Baring	0	0	32
City of Edina	0	0	32
City of Hurdland	0	0	32
City of Knox City	0	0	32
Village of Newark	0	0	32
Village of Novelty	0	0	32

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 (date, amount, funding source)
Deleted Actions	Reason for Deletion
Implement education program on personal and business emergency preparedness (turning off utilities, preparing emergency survival kits that include water, blankets, flashlights, etc).	No specific jurisdiction identified – Deleted to correct
Encourage cities to obtain early warning systems and improved communications systems.	No specific jurisdiction identified – Deleted to correct
Promote use of weather radios by local residents and schools to ensure advanced warning about threatening weather.	No specific jurisdiction identified – Deleted to correct
Partner with local radio stations to ensure that appropriate warning is provided to county residents of impending disasters.	No specific jurisdiction identified – Deleted to correct
Enact tree trimming programs, dead tree removal programs.	No specific jurisdiction identified – Deleted to correct
Examine potential road and bridge upgrades that would reduce danger to residents during occurrences of natural disasters.	No specific jurisdiction identified – Deleted to correct
Promote a self-inspection program at critical facilities to assure that the building infrastructure is earthquake and tornado resistant.	No specific jurisdiction identified – Deleted to correct
Encourage businesses to develop emergency plans.	No specific jurisdiction identified – Deleted to correct
Distribute SEMA brochures at public facilities and events.	No specific jurisdiction identified – Deleted to correct
Distribute press releases from county and city EMD offices concerning hazards, where they strike, frequency and preparation.	No specific jurisdiction identified – Deleted to correct
Inspire local residents to purchase weather radios through press releases and brochures.	No specific jurisdiction identified – Deleted to correct
Ask SEMA mitigation specialists to present information to city councils, county commission	No specific jurisdiction identified – Deleted to correct

and the Northeast Missouri Regional Planning Commission meetings.	
Cities/county should continually re-evaluate hazard mitigation plan and merge with other community planning.	No specific jurisdiction identified – Deleted to correct
Distribute press releases by cities/county regarding adopted mitigation measures to keep public abreast of changes and/or new regulations.	No specific jurisdiction identified – Deleted to correct
Foster county health department and local American Red Cross chapter to use publicity campaigns that make residents aware of proper measures to take during times of threatening conditions.	No specific jurisdiction identified – Deleted to correct
Publicize county or citywide drills.	No specific jurisdiction identified – Deleted to correct
Facilitate joint meetings of different organizations/agencies for mitigation planning.	No specific jurisdiction identified – Deleted to correct
Organize joint training (or drills) between agencies, public & private entities (including schools/businesses).	No specific jurisdiction identified – Deleted to correct
Pool different agency resources to achieve widespread mitigation results.	No specific jurisdiction identified – Deleted to correct
Coordinate meetings between EMD, city/county and SEMA to familiarize officials with mitigation planning and implementation and budgeting for mitigation projects.	No specific jurisdiction identified – Deleted to correct
Encourage communities to budget for enhanced warning systems.	No specific jurisdiction identified – Deleted to correct
Convince all communities to develop stormwater management plans.	No specific jurisdiction identified – Deleted to correct
Coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.	No specific jurisdiction identified – Deleted to correct
Encourage cities to require contractor stormwater management plans in all new development— both residential and commercial properties.	No specific jurisdiction identified – Deleted to correct
Advocate local governments to purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.	No specific jurisdiction identified – Deleted to correct
Encourage communities to discuss zoning repetitive loss properties in the floodplain as open space.	No specific jurisdiction identified – Deleted to correct
Work with SEMA Region I coordinator to learn about new mitigation funding opportunities.	No specific jurisdiction identified – Deleted to correct
Structure funds for road/bridge upgrades so that hazard mitigation concerns are also met.	No specific jurisdiction identified – Deleted to correct
Encourage local governments to budget for mitigation projects.	No specific jurisdiction identified – Deleted to correct
Encourage cities and county to implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.	No specific jurisdiction identified – Deleted to correct
Implement public awareness program about the benefits of hazard mitigation projects, both public and private.	No specific jurisdiction identified – Deleted to correct
Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health and property.	No specific jurisdiction identified – Deleted to correct

Source: Previously approved County Hazard Mitigation Plan; Data Collection Questionnaires.

4.3 Implementation of Mitigation Actions

44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include an action strategy describing how the actions identified in paragraph (c)(2)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefits review of the proposed projects and their associated costs.

Jurisdictional MPC members were encouraged to meet with others in their community to finalize the actions to be submitted for the updated mitigation strategy. Throughout the MPC consideration and discussion, emphasis was placed on the importance of a benefit-cost analysis in determining project priority. The Disaster Mitigation Act requires benefit-cost review as the primary method by which mitigation projects should be prioritized. The MPC decided to pursue implementation according to when and where damage occurs, available funding, political will, jurisdictional priority, and priorities identified in the 2018 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^{7(a)}. During the prioritization process, the jurisdictions used worksheets to assign scores. The worksheets posed questions based on the STAPLEE elements as well as the potential mitigation effectiveness of each action. Scores were based on the responses to the questions as follows:

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

The following questions were asked for each proposed action.

S: Is the action socially acceptable?
T: Is the action technically feasible and potentially successful?
A: Does the jurisdiction have the administrative capability to successfully implement this action?
P: Is the action politically acceptable?
L: Does the jurisdiction have the legal authority to implement the action?
E: Is the action economically beneficial?
E: Will the project have an environmental impact that is either beneficial or neutral? (score "3" if positive and "2" if neutral)

Will the implemented action result in lives saved?
Will the implanted action result in a reduction of disaster damage?

The final scores are listed below in the analysis of each action. The worksheets are attached to this plan as Appendix B. The STAPLEE final score for each action, absent other considerations, such as a localized need for a project, determined the priority. Low priority action items were those that had a total score of between 0 and 24. Moderate priority actions were those scoring between 25 and 29. High priority actions scored 30 or above. A blank STAPLEE worksheet is shown in Figure 4.1

Figure 4.1. Blank STAPLEE Worksheet

STAPLEE Worksheet		
Name of Jurisdiction:		
Action or Project		
Action/Project Number:	Insert a unique action number for this action for future tracking purposes. This can be a combination of the jurisdiction name, followed by the goal number and action number (i.e. Joplin1.1)	
Name of Action or Project:		
Mitigation Category:	Prevention; Structure and Infrastructure Projects; Natural Systems Protection; Education and Outreach; Emergency Services	
STAPLEE Criteria		
Evaluation Rating		Score
Definitely YES = 3	Maybe YES = 2	
Probably NO = 1	Definitely NO = 0	
<p>S: Is it Socially Acceptable</p> <p>T: Is it Technically feasible and potentially successful?</p> <p>A: Does the jurisdiction have the Administrative capacity to execute this action?</p> <p>P: Is it Politically acceptable?</p> <p>L: Is there Legal authority to implement?</p> <p>E: Is it Economically beneficial?</p> <p>E: Will the project have either a neutral or positive impact on the natural Environment?</p> <p>Will historic structures be saved or protected?</p> <p>Could it be implemented quickly?</p>		
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 will 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 + Mitigation Effectiveness)		
<input type="checkbox"/> High Priority (30+ points)	<input type="checkbox"/> Medium Priority (25 - 29 points)	<input type="checkbox"/> Low Priority (<25 points)
Completed by (Name, Title, Phone Number)		

ACTION WORKSHEET

Action Worksheet	
Name of Jurisdiction:	Knox County
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Participate in the NFIP
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Knox County 2020.1
Name of Action or Project:	NFIP Participation
Mitigation Category:	Natural Systems Protection, Structure and Infrastructure Projects, Emergency Services, Education and Outreach
Action or Project Description:	Pursue Knox County's participation in the National Flood Insurance Program.
Estimated Cost:	NA
Benefits:	Protection of life and reduction of damages due to accessibility to citizens in times of need.
Plan for Implementation	
Responsible Organization/Department:	County Commission
Action/Project Priority:	High Priority
Timeline for Completion:	1 Year
Potential Fund Sources:	County Funds
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Knox County
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Flooding Throughout the County
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Knox County 2020.2
Name of Action or Project:	Flood Mitigation
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Implement flood mitigation activities to eliminate effects on Knox County residents.
Estimated Cost:	\$1,000,000
Benefits:	Mitigation actions will limit the future harm to structures and lives in the County.
Plan for Implementation	
Responsible Organization/Department:	County Commission
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Knox County
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Early Warning Sirens
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Knox County 2020.3
Name of Action or Project:	Install/Upgrade Warning Sirens
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Installation or upgrade of warning sirens in areas of the County needing a siren or one upgraded.
Estimated Cost:	\$75,000
Benefits:	Mitigation actions will limit the future harm to structures and lives in the County.
Plan for Implementation	
Responsible Organization/Department:	County Commission
Action/Project Priority:	Medium Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Knox County
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, Severe Thunderstorms, Winter Weather
Problem being Mitigated:	Protecting lives from natural hazards
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Knox County 2020.4
Name of Action or Project:	Maintain Transportation Infrastructure
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Project will make necessary improvements to roads, culverts, low water crossings, road elevations, bank stabilizations, bridges and the general transportation infrastructure throughout the city.
Estimated Cost:	\$750,000
Benefits:	The project protects citizens from harm due to damaged transportation infrastructure.
Plan for Implementation	
Responsible Organization/Department:	County Commission
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Knox County
Risk / Vulnerability	
Hazard(s) Addressed:	Pandemic
Problem being Mitigated:	Protecting lives from pandemic outbreaks.
Action or Project	
Applicable Goal Statement:	Goal 2: Strengthen communication and coordination between local governments, emergency personnel, public agencies, and citizens to mitigate the effect of future natural hazards
Action/Project Number:	Knox County 2020.5
Name of Action or Project:	Response to Pandemic
Mitigation Category:	Emergency Services, Prevention, Public Education
Action or Project Description:	Project will provide necessary resources for the response to pandemic outbreaks.
Estimated Cost:	\$500,000
Benefits:	The project protects citizens from harm due to pandemic outbreaks.
Plan for Implementation	
Responsible Organization/Department:	County Commission
Action/Project Priority:	Medium Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Knox County
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe Thunderstorms
Problem being Mitigated:	Lack of shelter for residents.
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Knox County 2020.6
Name of Action or Project:	Safe Rooms and Storm Shelters
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Build safe rooms and establish local ordinances requiring community storm shelters within sizable mobile home parks and subdivisions.
Estimated Cost:	\$1,000,000
Benefits:	The project protects citizens from harm due to tornados or severe thunderstorms.
Plan for Implementation	
Responsible Organization/Department:	County Commission
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Knox County
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado
Problem being Mitigated:	Generator for Shelter(s)
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Knox County 2020.7
Name of Action or Project:	Generator for Shelter(s)
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Obtain a generator for shelters as funds become available.
Estimated Cost:	\$65,000
Benefits:	Generator will allow for continued use of shelters for service to citizens in the event of an outage, this would be beneficial during any hazard.
Plan for Implementation	
Responsible Organization/Department:	County Commission
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds / RHSOC
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Edina
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado
Problem being Mitigated:	Lack of Generator for Shelter(s)
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Edina 2020.1
Name of Action or Project:	Generator for Shelter(s)
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Obtain a generator for shelters as funds become available.
Estimated Cost:	\$30,000
Benefits:	Generator will allow for continued use of shelters for service to citizens in the event of an outage, this would be beneficial during any hazard.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds / RHSOC
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Edina
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, Severe Thunderstorms, Winter Storms
Problem being Mitigated:	Protecting lives from natural hazards
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Edina 2020.2
Name of Action or Project:	Maintain Transportation Infrastructure
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services, Response
Action or Project Description:	Project will make necessary improvements to roads, culverts, low water crossings, road elevations, bank stabilizations, bridges and the general transportation infrastructure throughout the City.
Estimated Cost:	\$400,000
Benefits:	The project protects citizens from harm due to damaged transportation infrastructures.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Edina
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Early Warning Siren
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Edina 2020.3
Name of Action or Project:	Installation/Upgrade Sirens
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Installation or the upgrade of warning sirens in areas of the City needing a siren or the siren upgraded.
Estimated Cost:	\$25,000
Benefits:	With adequate time for warning of storms, residents are able to seek cover to help minimize the loss of life.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	Medium Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Edina
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Continue to participate in the NFIP
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Edina 2020.4
Name of Action or Project:	NFIP Participation
Mitigation Category:	Natural Systems Protection, Structure and Infrastructure Projects, Emergency Services, Education and Outreach
Action or Project Description:	Continue City of Edina's participation and good standing in the National Flood Insurance Program by regulating future development in floodplain areas.
Estimated Cost:	NA
Benefits:	Protection of life and reduction of damages due to accessibility to citizens in times of need.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1 Year
Potential Fund Sources:	City Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Baring
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Early Warning Siren
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Baring 2020.1
Name of Action or Project:	Installation/Upgrade Sirens
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Installation or the upgrade of warning sirens in areas of the City needing a siren or the siren upgraded.
Estimated Cost:	\$25,000
Benefits:	With adequate time for warning of storms, residents are able to seek cover to help minimize the loss of life.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Baring
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, Severe Thunderstorms, Winter Storms
Problem being Mitigated:	Protecting lives from natural hazards
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Baring 2020.2
Name of Action or Project:	Maintain Transportation Infrastructure
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services, Response
Action or Project Description:	Project will make necessary improvements to roads, culverts, low water crossings, road elevations, bank stabilizations, bridges and the general transportation infrastructure throughout the City.
Estimated Cost:	\$400,000
Benefits:	The project protects citizens from harm due to damaged transportation infrastructures.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Baring
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe Thunderstorms
Problem being Mitigated:	Lack of shelter for residents.
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Baring 2020.3
Name of Action or Project:	Safe Rooms and Storm Shelters
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Build safe rooms and establish local ordinances requiring community storm shelters within sizable mobile home parks and subdivisions.
Estimated Cost:	\$800,000
Benefits:	The project protects citizens from harm due to tornados or severe thunderstorms.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Baring
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Participate in the NFIP
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Baring 2020.4
Name of Action or Project:	NFIP Participation
Mitigation Category:	Natural Systems Protection, Structure and Infrastructure Projects, Emergency Services, Education and Outreach
Action or Project Description:	Begin Baring's participation in the National Flood Insurance Program.
Estimated Cost:	NA
Benefits:	Protection of life and reduction of damages due to accessibility to citizens in times of need.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1 Year
Potential Fund Sources:	City Funds
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Ordinance
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Hurdland
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Early Warning Siren
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Hurdland 2020.1
Name of Action or Project:	Installation/Upgrade Sirens
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Installation or the upgrade of warning sirens in areas of the City needing a siren or the siren upgraded.
Estimated Cost:	\$25,000
Benefits:	With adequate time for warning of storms, residents are able to seek cover to help minimize the loss of life.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Hurdland
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, Severe Thunderstorms, Winter Storms
Problem being Mitigated:	Protecting lives from natural hazards
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Hurdland 2020.2
Name of Action or Project:	Maintain Transportation Infrastructure
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services, Response
Action or Project Description:	Project will make necessary improvements to roads, culverts, low water crossings, road elevations, bank stabilizations, bridges and the general transportation infrastructure throughout the City.
Estimated Cost:	\$300,000
Benefits:	The project protects citizens from harm due to damaged transportation infrastructures.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Hurdland
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe Thunderstorms
Problem being Mitigated:	Lack of shelter for residents.
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Hurdland 2020.3
Name of Action or Project:	Safe Rooms and Storm Shelters
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Build safe rooms and establish local ordinances requiring community storm shelters within sizable mobile home parks and subdivisions.
Estimated Cost:	\$800,000
Benefits:	The project protects citizens from harm due to tornados or severe thunderstorms.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Hurdland
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Participate in the NFIP
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Hurdland 2020.4
Name of Action or Project:	NFIP Participation
Mitigation Category:	Natural Systems Protection, Structure and Infrastructure Projects, Emergency Services, Education and Outreach
Action or Project Description:	Begin City of Hurdland's participation in the National Flood Insurance Program.
Estimated Cost:	NA
Benefits:	Protection of life and reduction of damages due to accessibility to citizens in times of need.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1 Year
Potential Fund Sources:	City Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Knox City
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Early Warning Siren
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Knox City 2020.1
Name of Action or Project:	Installation/Upgrade Sirens
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Installation or the upgrade of warning sirens in areas of the City needing a siren or the siren upgraded.
Estimated Cost:	\$25,000
Benefits:	With adequate time for warning of storms, residents are able to seek cover to help minimize the loss of life.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Knox City
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, Severe Thunderstorms, Winter Storms
Problem being Mitigated:	Protecting lives from natural hazards
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Knox City 2020.2
Name of Action or Project:	Maintain Transportation Infrastructure
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services, Response
Action or Project Description:	Project will make necessary improvements to roads, culverts, low water crossings, road elevations, bank stabilizations, bridges and the general transportation infrastructure throughout the City.
Estimated Cost:	\$300,000
Benefits:	The project protects citizens from harm due to damaged transportation infrastructures.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Knox City
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe Thunderstorms
Problem being Mitigated:	Lack of shelter for residents.
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Knox City 2020.3
Name of Action or Project:	Safe Rooms and Storm Shelters
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Build safe rooms and establish local ordinances requiring community storm shelters within sizable mobile home parks and subdivisions.
Estimated Cost:	\$800,000
Benefits:	The project protects citizens from harm due to tornados or severe thunderstorms.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	City of Knox City
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Participate in the NFIP
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	City of Knox City 2020.4
Name of Action or Project:	NFIP Participation
Mitigation Category:	Natural Systems Protection, Structure and Infrastructure Projects, Emergency Services, Education and Outreach
Action or Project Description:	Begin City of Knox City's participation in the National Flood Insurance Program.
Estimated Cost:	NA
Benefits:	Protection of life and reduction of damages due to accessibility to citizens in times of need.
Plan for Implementation	
Responsible Organization/Department:	City Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1 Year
Potential Fund Sources:	City Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Village of Newark
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Early Warning Siren
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Village of Newark 2020.1
Name of Action or Project:	Installation/Upgrade Sirens
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Installation or the upgrade of warning sirens in areas of the Village needing a siren or the siren upgraded.
Estimated Cost:	\$25,000
Benefits:	With adequate time for warning of storms, residents are able to seek cover to help minimize the loss of life.
Plan for Implementation	
Responsible Organization/Department:	Village Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Village of Newark
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, Severe Thunderstorms, Winter Storms
Problem being Mitigated:	Protecting lives from natural hazards
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Village of Newark 2020.2
Name of Action or Project:	Maintain Transportation Infrastructure
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services, Response
Action or Project Description:	Project will make necessary improvements to roads, culverts, low water crossings, road elevations, bank stabilizations, bridges and the general transportation infrastructure throughout the Village.
Estimated Cost:	\$300,000
Benefits:	The project protects citizens from harm due to damaged transportation infrastructures.
Plan for Implementation	
Responsible Organization/Department:	Village Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Village of Newark
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe Thunderstorms
Problem being Mitigated:	Lack of shelter for residents.
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Village of Newark 2020.3
Name of Action or Project:	Safe Rooms and Storm Shelters
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Build safe rooms and establish local ordinances requiring community storm shelters within sizable mobile home parks and subdivisions.
Estimated Cost:	\$800,000
Benefits:	The project protects citizens from harm due to tornados or severe thunderstorms.
Plan for Implementation	
Responsible Organization/Department:	Village Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Village of Newark
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Participate in the NFIP
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Village of Newark 2020.4
Name of Action or Project:	NFIP Participation
Mitigation Category:	Natural Systems Protection, Structure and Infrastructure Projects, Emergency Services, Education and Outreach
Action or Project Description:	Begin Village of Newark's participation in the National Flood Insurance Program.
Estimated Cost:	NA
Benefits:	Protection of life and reduction of damages due to accessibility to citizens in times of need.
Plan for Implementation	
Responsible Organization/Department:	Village Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1 Year
Potential Fund Sources:	City Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Village of Novelty
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Early Warning Siren
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Village of Novelty 2020.1
Name of Action or Project:	Installation/Upgrade Sirens
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Installation or the upgrade of warning sirens in areas of the Village needing a siren or the siren upgraded.
Estimated Cost:	\$25,000
Benefits:	With adequate time for warning of storms, residents are able to seek cover to help minimize the loss of life.
Plan for Implementation	
Responsible Organization/Department:	Village Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Village of Novelty
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, Severe Thunderstorms, Winter Storms
Problem being Mitigated:	Protecting lives from natural hazards
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Village of Novelty 2020.2
Name of Action or Project:	Maintain Transportation Infrastructure
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services, Response
Action or Project Description:	Project will make necessary improvements to roads, culverts, low water crossings, road elevations, bank stabilizations, bridges and the general transportation infrastructure throughout the Village.
Estimated Cost:	\$300,000
Benefits:	The project protects citizens from harm due to damaged transportation infrastructures.
Plan for Implementation	
Responsible Organization/Department:	Village Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Village of Novelty
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe Thunderstorms
Problem being Mitigated:	Lack of shelter for residents.
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Village of Novelty 2020.3
Name of Action or Project:	Safe Rooms and Storm Shelters
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Build safe rooms and establish local ordinances requiring community storm shelters within sizable mobile home parks and subdivisions.
Estimated Cost:	\$800,000
Benefits:	The project protects citizens from harm due to tornados or severe thunderstorms.
Plan for Implementation	
Responsible Organization/Department:	Village Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Village of Novelty
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Participate in the NFIP
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Village of Novelty 2020.4
Name of Action or Project:	NFIP Participation
Mitigation Category:	Natural Systems Protection, Structure and Infrastructure Projects, Emergency Services, Education and Outreach
Action or Project Description:	Begin Village of Novelty's participation in the National Flood Insurance Program.
Estimated Cost:	NA
Benefits:	Protection of life and reduction of damages due to accessibility to citizens in times of need.
Plan for Implementation	
Responsible Organization/Department:	Village Clerk
Action/Project Priority:	High Priority
Timeline for Completion:	1 Year
Potential Fund Sources:	City Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Knox County R-1
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe Thunderstorms, Earthquake
Problem being Mitigated:	Lack of shelter for students and employees of the district.
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Knox County R-1 2020.1
Name of Action or Project:	Safe Rooms
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Build safe rooms
Estimated Cost:	\$1,000,000
Benefits:	Protect human lives.
Plan for Implementation	
Responsible Organization/Department:	Knox County R-1 Superintendent
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Knox County R-1
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe Thunderstorms, Earthquake
Problem being Mitigated:	Lack of intercom system throughout entire school.
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Knox County R-1 2020.2
Name of Action or Project:	Intercom System
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services, Outreach
Action or Project Description:	Upgrade intercom system.
Estimated Cost:	\$150,000
Benefits:	Protect human lives.
Plan for Implementation	
Responsible Organization/Department:	Knox County R-1 Superintendent
Action/Project Priority:	Medium Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Knox County R-1
Risk / Vulnerability	
Hazard(s) Addressed:	Fire
Problem being Mitigated:	Lack of Water pressure to school to extinguish fires.
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Knox County R-1 2020.3
Name of Action or Project:	Water Tower Installation
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services, Outreach
Action or Project Description:	Water Tower Addition.
Estimated Cost:	1,000,000
Benefits:	Protect human lives / and existing structures
Plan for Implementation	
Responsible Organization/Department:	Knox County R-1 Superintendent
Action/Project Priority:	High Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Action Worksheet	
Name of Jurisdiction:	Knox County R-1
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado
Problem being Mitigated:	Lack of Generator for Shelter(s)
Action or Project	
Applicable Goal Statement:	Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties.
Action/Project Number:	Knox County 2020.4
Name of Action or Project:	Generator(s)
Mitigation Category:	Prevention, Structure and Infrastructure Projects, Emergency Services
Action or Project Description:	Obtain a generator for facilities as funds become available.
Estimated Cost:	\$30,000
Benefits:	Generator will allow for continued use of shelters for service to citizens in the event of an outage, this would be beneficial during any hazard.
Plan for Implementation	
Responsible Organization/Department:	School Superintendent
Action/Project Priority:	Medium Priority
Timeline for Completion:	1-5 Year
Potential Fund Sources:	Hazard Mitigation Grant Funds
Local Planning Mechanisms to be Used in Implementation, if any:	NA
Progress Report	
Action Status:	NEW
Report of Progress:	NEW Project

Table 4.3. Mitigation Action Matrix

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
	Prevention Public Education							
Knox County 2020.2	Flood Mitigation	Knox County	High	3	Flooding	X	X	
Knox County 2020.3	Install/Upgrade Warning Sirens	Knox County	Medium	3	All	X		
Knox County 2020.4	Maintain Transportation Infrastructure	Knox County	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Knox County 2020.5	Response to Pandemic	Knox County	Medium	2	Pandemic	X		
Knox County 2020.6	Safe Rooms and Storm Shelters	Knox County	High	3	Tornado, Severe Thunderstorms	X		
Knox County 2020.7	Generator for Shelter(s)	Knox County	High	3	Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado	X		
Edina 2020.1	Generator for Shelter(s)	City of Edina	High	3	Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado	X		
Edina 2020.2	Maintain Transportation Infrastructure	City of Edina	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Edina 2020.3	Install/Upgrade Sirens	City of Edina	Medium	3	All	X		
Baring 2020.1	Install/Upgrade Sirens	City of Baring	High	3	All	X		
Baring 2020.2	Maintain Transportation Infrastructure	City of Baring	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Baring 2020.3	Safe Rooms and Storm Shelters	City of Baring	High	3	Tornado, Severe Thunderstorms	X		
Hurdland 2020.1	Install/Upgrade Sirens	City of Hurdland	High	3	All	X		
Hurdland 2020.2	Maintain Transportation Infrastructure	City of Hurdland	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Hurdland 2020.3	Safe Rooms and Storm Shelters	City of Hurdland	High	3	Tornado, Severe Thunderstorms	X		
Knox City 2020.1	Install/Upgrade Sirens	City of Knox City	High	3	All	X		
Knox City 2020.2	Maintain Transportation Infrastructure	City of Knox City	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Knox City 2020.3	Safe Rooms and Storm Shelters	City of Knox City	High	3	Tornado, Severe Thunderstorms	X		
Newark 2020.1	Install/Upgrade Sirens	Village of Newark	High	3	All	X		
Newark 2020.2	Maintain Transportation Infrastructure	Village of Newark	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Newark 2020.3	Safe Rooms and Storm Shelters	Village of Newark	High	3	Tornado, Severe Thunderstorms	X		
Novelty 2020.1	Install/Upgrade Sirens	Village of Novelty	High	3	All	X		
Novelty 2020.2	Maintain Transportation Infrastructure	Village of Novelty	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Novelty 2020.3	Safe Rooms and Storm Shelters	Village of Novelty	High	3	Tornado, Severe Thunderstorms	X		
Knox County R-I 2020.1	Safe Rooms	Knox County R-I	High	3	Tornado, Severe Thunderstorms, Earthquake	X		
Knox County R-I 2020.2	Intercom System	Knox County R-I	Medium	3	Tornado, Severe Thunderstorms, Earthquake	X		

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Knox County R-I 2020.3	Water Tower Installation	Knox County R-I	High	3	Fire	X		
Knox County R-I 2020.4	Generator(s)	Knox County R-I	Medium	3	Extreme Temperature, Severe Thunderstorms, Severe Winter Weather, Tornado	X		
Structure and Infrastructure Projects								
Knox County 2020.1	NFIP Participation	Knox County	High	3	Flooding			X
Knox County 2020.2	Flood Mitigation	Knox County	High	3	Flooding	X	X	
Knox County 2020.3	Install/Upgrade Warning Sirens	Knox County	Medium	3	All	X		
Knox County 2020.4	Maintain Transportation Infrastructure	Knox County	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Knox County 2020.6	Safe Rooms and Storm Shelters	Knox County	High	3	Tornado, Severe Thunderstorms	X		
Knox County 2020.7	Generator for Shelters	Knox County	High	3	Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado	X		
Edina 2020.1	Generator for Shelter(s)	City of Edina	High	3	Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado	X		
Edina 2020.2	Maintain Transportation Infrastructure	City of Edina	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Edina 2020.3	Install/Upgrade Sirens	City of Edina	Medium	3	All	X		

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Edina 2020.4	NFIP Participation	City of Edina	High	3	Flooding			X
Baring 2020.1	Install/Upgrade Sirens	City of Baring	High	3	All	X		
Baring 2020.2	Maintain Transportation Infrastructure	City of Baring	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Baring 2020.3	Safe Rooms and Storm Shelters	City of Baring	High	3	Tornado, Severe Thunderstorms	X		
Baring 2020.4	NFIP Participation	City of Baring	High	3	Flooding			X
Hurdland 2020.1	Install/Upgrade Sirens	City of Hurdland	High	3	All	X		
Hurdland 2020.2	Maintain Transportation Infrastructure	City of Hurdland	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Hurdland 2020.3	Safe Rooms and Storm Shelters	City of Hurdland	High	3	Tornado, Severe Thunderstorms	X		
Hurdland 2020.4	NFIP Participation	City of Hurdland	High	3	Flooding			X
Knox City 2020.1	Install/Upgrade Sirens	City of Knox City	High	3	All	x		
Knox City 2020.2	Maintain Transportation Infrastructure	City of Knox City	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Knox City 2020.3	Safe Rooms and Storm Shelters	City of Knox City	High	3	Tornado, Severe Thunderstorms	X		
Knox City 2020.4	NFIP Participation	City of Knox City	High	3	Flooding			X
Newark 2020.1	Install/Upgrade Sirens	Village of Newark	High	3	All	X		
Newark 2020.2	Maintain Transportation Infrastructure	Village of Newark	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Newark 2020.3	Safe Rooms and Storm Shelters	Village of Newark	High	3	Tornado, Severe Thunderstorms	X		

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Newark 2020.4	NFIP Participation	Village of Newark	High	3	Flooding			X
Novelty 2020.1	Install/Upgrade Sirens	Village of Novelty	High	3	All	X		
Novelty 2020.2	Maintain Transportation Infrastructure	Village of Novelty	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Novelty 2020.3	Safe Rooms and Storm Shelters	Village of Novelty	High	3	Tornado, Severe Thunderstorms	X		
Novelty 2020.4	NFIP Participation	Village of Novelty	High	3	Flooding			X
Knox County R-I 2020.1	Safe Rooms	Knox County R-I	High	3	Tornado, Severe Thunderstorms, Earthquake	X		
Knox County R-I 2020.2	Intercom System	Knox County R-I	Medium	3	Tornado, Severe Thunderstorms, Earthquake	X		
Knox County R-I 2020.3	Water Tower Installation	Knox County R-I	High	3	Fire	X		
Knox County R-I 2020.4	Generator(s)	Knox County R-I	Medium	3	Extreme Temperature, Severe Thunderstorms, Severe Winter Weather, Tornado	X		
Natural Systems Protection								
Knox County 2020.1	NFIP Participation	Knox County	High	3	Flooding			X
Edina 2020.4	NFIP Participation	City of Edina	High	3	Flooding			X
Baring 2020.4	NFIP Participation	City of Baring	High	3	Flooding			X
Hurdland 2020.4	NFIP Participation	City of Hurdland	High	3	Flooding			X
Knox City 2020.4	NFIP Participation	City of Knox City	High	3	Flooding			X

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Newark 2020.4	NFIP Participation	Village of Newark	High	3	Flooding			X
Novelty 2020.4	NFIP Participation	Village of Novelty	High	3	Flooding			X
	Emergency Services							
Knox County 2020.1	NFIP Participation	Knox County	High	3	Flooding			X
Knox County 2020.2	Flood Mitigation	Knox County	High	3	Flooding	X	X	
Knox County 2020.3	Install/Upgrade Warning Sirens	Knox County	Medium	3	All	X		
Knox County 2020.4	Maintain Transportation Infrastructure	Knox County	High	3	Flooding, Severe Thunderstorms, Winter Weather	X	X	
Knox County 2020.5	Response to Pandemic	Knox County	Medium	2	Pandemic	X		
Knox County 2020.6	Safe Rooms and Storm Shelters	Knox County	High	3	Tornado, Severe Thunderstorms	X		
Knox County 2020.7	Generator for Shelters	Knox County	High	3	Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado	X		
Edina 2020.1	Generator for Shelter(s)	City of Edina	High	3	Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado	X		
Edina 2020.2	Maintain Transportation Infrastructure	City of Edina	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Edina 2020.3	Install/Upgrade Sirens	City of Edina	Medium	3	All	X		

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Edina 2020.4	NFIP Participation	City of Edina	High	3	Flooding			X
Baring 2020.1	Install/Upgrade Sirens	City of Baring	High	3	All	X		
Baring 2020.2	Maintain Transportation Infrastructure	City of Baring	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Baring 2020.3	Safe Rooms and Storm Shelters	City of Baring	High	3	Tornado, Severe Thunderstorms	X		
Baring 2020.4	NFIP Participation	City of Baring	High	3	Flooding			X
Hurdland 2020.1	Install/Upgrade Sirens	City of Hurdland	High	3	All	X		
Hurdland 2020.2	Maintain Transportation Infrastructure	City of Hurdland	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Hurdland 2020.3	Safe Rooms and Storm Shelters	City of Hurdland	High	3	Tornado, Severe Thunderstorms	X		
Hurdland 2020.4	NFIP Participation	City of Hurdland	High	3	Flooding			X
Knox City 2020.1	Install/Upgrade Sirens	City of Knox City	High	3	All	X		
Knox City 2020.2	Maintain Transportation Infrastructure	City of Knox City	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Knox City 2020.3	Safe Rooms and Storm Shelters	City of Knox City	High	3	Tornado, Severe Thunderstorms	X		
Knox City 2020.4	NFIP Participation	City of Knox City	High	3	Flooding			X
Newark 2020.1	Install/Upgrade Sirens	Village of Newark	High	3	All	X		
Newark 2020.2	Maintain Transportation Infrastructure	Village of Newark	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Newark 2020.3	Safe Rooms and Storm Shelters	Village of Newark	High	3	Tornado, Severe Thunderstorms	X		

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Newark 2020.4	NFIP Participation	Village of Newark	High	3	Flooding			X
Novelty 2020.1	Install/Upgrade Sirens	Village of Novelty	High	3	All	X		
Novelty 2020.2	Maintain Transportation Infrastructure	Village of Novelty	High	3	Flooding, Severe Thunderstorms, Winter Weather	X		
Novelty 2020.3	Safe Rooms and Storm Shelters	Village of Novelty	High	3	Tornado, Severe Thunderstorms	X		
Novelty 2020.4	NFIP Participation	Village of Novelty	High	3	Flooding			X
Knox County R-I 2020.1	Safe Rooms	Knox County R-I	High	3	Tornado, Severe Thunderstorms, Earthquake	X		
Knox County R-I 2020.2	Intercom System	Knox County R-I	Medium	3	Tornado, Severe Thunderstorms, Earthquake	X		
Knox County R-I 2020.3	Water Tower Installation	Knox County R-I	High	3	Fire	X		
Knox County R-I 2020.4	Generator(s)	Knox County R-I	Medium	3	Extreme Temperature, Severe Thunderstorms, Severe Winter Weather, Tornado	X		
Education and Outreach								
Knox County 2020.1	NFIP Participation	Knox County	High	3	Flooding			X
Edina 2020.4	NFIP Participation	City of Edina	High	3	Flooding			X
Baring 2020.4	NFIP Participation	City of Baring	High	3	Flooding			X
Hurdland 2020.4	NFIP Participation	City of Hurdland	High	3	Flooding			X
Knox City 2020.4	NFIP Participation	City of Knox City	High	3	Flooding			X

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Newark 2020.4	NFIP Participation	Village of Newark	High	3	Flooding			X
Novelty 2020.4	NFIP Participation	Village of Novelty	High	3	Flooding			X
Knox County R-I 2020.2	Intercom System	Knox County R-I	Medium	3	Tornado, Severe Thunderstorms, Earthquake	X		
Knox County R-I 2020.3	Water Tower Installation	Knox County R-I	High	3	Fire	X		

5 PLAN MAINTENANCE PROCESS

5 PLAN MAINTENANCE PROCESS5.1

5.1 Monitoring, Evaluating, and Updating the Plan..... 5.1

5.1.1 Responsibility for Plan Maintenance 5.1

5.1.2 Plan Maintenance Schedule 5.1

5.1.3 Plan Maintenance Process..... 5.2

5.2 Incorporation into Existing Planning Mechanisms 5.3

5.3 Continued Public Involvement..... 5.5

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 Knox County MPC is an advisory body and can only make recommendations to the county, city, town, or district elected officials. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information in areas accessible to the public.

5.1.2 Plan Maintenance Schedule

The MPC (or other designated responsible entity) agrees to meet annually and after a state or federally declared hazard event as appropriate to monitor progress and update the mitigation strategy. The Knox County Emergency Management Director will be responsible for initiating the plan reviews and will invite members of the MPC (or other designated responsible entity) to the meeting.

In coordination with all participating jurisdictions, 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.

5.1.3 Plan Maintenance Process

Progress on the proposed actions can be monitored by evaluating changes in vulnerabilities identified in the plan. The MPC during the annual meeting should review changes in vulnerability identified as follows:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions,
- Increased vulnerability due to hazard events, and/or
- Increased vulnerability as a result of new development (and/or annexation).

Future 5-year updates to this plan will include the following activities:

- Consideration of changes in vulnerability due to action implementation,
- Documentation of success stories where mitigation efforts have proven effective,
- Documentation of unsuccessful mitigation actions and why the actions were not effective,
- Documentation of previously overlooked hazard events that may have occurred since the previous plan approval,
- Incorporation of new data or studies with information on hazard risks,
- Incorporation of new capabilities or changes in capabilities,
- Incorporation of growth data and changes to inventories, and
- Incorporation of ideas for new actions and changes in action prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the participating jurisdictions will adopt the following process:

- Each proposed action in the plan identified an individual, office, or agency responsible for action implementation. This entity will track and report on an annual basis to the jurisdictional MPC (or designated responsible entity) member on action status. The entity will provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing risk.
- If the action does not meet identified objectives, the jurisdictional MPC (or designated responsible entity) member will determine necessary remedial action, making any required modifications to the plan.

Changes will be made to the plan to remedy actions that have failed or are not considered feasible. Feasibility will be determined after a review of action consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring of this plan. Updating of the plan will be accomplished by written changes and submissions, as the (MPC or designated responsible entity) deems appropriate and necessary. Changes will be approved by the Knox County Commission and the governing boards of the other participating jurisdictions.

5.2 Incorporation into Existing Planning Mechanisms

44 CFR Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

For the most part the participating jurisdictions did not incorporate the previously approved mitigation plan into other planning mechanism due to other plans already being approved.

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 of this plan. Based on the capability assessments of the participating jurisdictions, communities in Knox 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:

- General or master plans of participating jurisdictions;
- Ordinances of participating jurisdictions;
- Knox County Emergency Operations Plan;
- Capital improvement plans and budgets;
- Other community plans within the County, such as water conservation plans, storm water management plans, and parks and recreation plans;
- School and Special District Plans and budgets; and
- Other plans and policies outlined in the capability assessment sections for each jurisdiction in Chapter 2 of this plan.

The MPC members involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate. The MPC 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 Knox County Emergency Management Director will provide the updated Mitigation Strategy with current status of each mitigation action to the County Commission, as well as all Mayors, City Clerks, 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
Unincorporated Knox County	Emergency Operations Plan	County Commissioners attended all planning meetings and identified actions relating to transportation infrastructure were	Emergency Operations Plan The Hazard Mitigation Plan will be integrated into future plans by

		included in annual update to CIP List	consulting the plan during the planning process.
City of Baring	Annual planning/budget meeting (discussion of development of necessary local plans)	The previous plan was not integrated into previous plans due to the items being not applicable to include.	The Hazard Mitigation Plan will be integrated into future plans by consulting the plan during the planning process.
City of Edina	Emergency Operations Plan Floodplain Ordinance	The previous plan was not integrated into previous plans due to the items being not applicable to include.	The Hazard Mitigation Plan will be integrated into future plans by consulting the plan during the planning process.
City of Hurdland	Annual planning/budget meeting (discussion of development of necessary local plans)	The previous plan was not integrated into previous plans due to the items being not applicable to include.	The Hazard Mitigation Plan will be integrated into future plans by consulting the plan during the planning process.
City of Knox City	Annual planning/budget meeting (discussion of development of necessary local plans)	The previous plan was not integrated into previous plans due to the items being not applicable to include.	The Hazard Mitigation Plan will be integrated into future plans by consulting the plan during the planning process.
Village of Newark	Annual planning/budget meeting (discussion of development of necessary local plans)	The previous plan was not integrated into previous plans due to the items being not applicable to include.	The Hazard Mitigation Plan will be integrated into future plans by consulting the plan during the planning process.
Village of Novelty	Annual planning/budget meeting (discussion of development of necessary local plans)	The previous plan was not integrated into previous plans due to the items being not applicable to include.	The Hazard Mitigation Plan will be integrated into future plans by consulting the plan during the planning process.
Knox County R-I School District	Master Plan	The previous plan was not integrated into previous plans due to the items being not applicable to include.	The Hazard Mitigation Plan will be integrated into future plans by consulting the plan during the planning process.

5.3 Continued Public Involvement

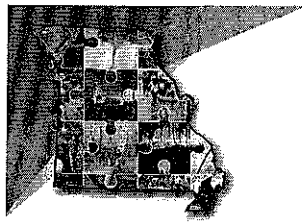
44 CFR Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

The hazard mitigation plan update process provides an opportunity to publicize success stories resulting from the plan's implementation and seek additional public comment. Information about the annual reviews will be posted in the local newspaper, as well as, on the Knox County website 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.

APPENDIX A

REFERENCES

- Missouri State Hazard Mitigation Plan (2010 and 2018)
- Federal Emergency Management Agency, <https://www.fema.gov/data-visualization-summary-disaster-declarations-and-grants>
- State Emergency Management Agency (SEMA)-
http://sema.dps.mo.gov/programs/mitigation_management.php
- Department of Elementary and Secondary Education (DESE)-
<http://mcde.dese.mo.gov/quickfacts/Pages/District-and-School-Information.aspx>
- Data Collection Questionnaires completed by each jurisdiction
- Previously approved planning area Hazard Mitigation Plan 2014
- Transportation for America- <http://t4america.org/maps-tools/bridges/>
- U.S. Department of Transportation- <http://www.fhwa.dot.gov/bridge/nbi/no10/county.cfm>
- U.S. Fish and Wildlife Service- , <http://www.fws.gov/midwest/Endangered/lists/missouri-cty.html>
- Missouri Department of Conservation-
<https://nature.mdc.mo.gov/discover-nature/places>
- Missouri Department of Natural Resources- <http://dnr.mo.gov/shpo/mnrlist.htm>
- Missouri Economic Research and Information Center-
<https://www.missourieconomy.org/employers/default.aspx>
- USDA Ag Census-
https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Missouri/st29_2_007_007.pdf
- Missouri Economic Research Brief-
https://www.missourieconomy.org/pdfs/missouri_farms_and_agribusiness.pdf



SEMA Mitigation Management LOCAL MITIGATION PLAN FORMAT GUIDANCE KICKOFF MEETING INVITATION FOR JURISDICTIONS

Subject: Knox County Multi-Jurisdictional Hazard Mitigation Plan Update

On behalf of Knox County, you are invited to the conference call planning meeting to update the Knox County Multi-Jurisdictional Hazard Mitigation Plan.

Knox County Multi-Jurisdictional Hazard Mitigation Plan Update

Kickoff Meeting

November 11, 2020

Meeting Time: 10:00 AM

Call-in Number: (844)844-0414

Access Code: 511868

Knox County is beginning the process to update the Knox County Multi-Jurisdictional Hazard Mitigation Plan to better protect the people and property of Knox County from the effects of natural hazard events. The existing plan was approved by FEMA in April 2015. The plan update will be prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations. These regulations establish the requirements that hazard mitigation plans must meet in order for Knox County and the participating jurisdictions, to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because Knox County is subject to many kinds of hazards, access to these federal programs is vital.

What is a Hazard Mitigation Plan?

A hazard mitigation plan is the result of a planning process which identifies policies and actions that can be implemented over the long term to reduce the risk and future losses resulting from hazard events. The Knox County Multi-Jurisdictional Hazard Mitigation Plan Update will address a comprehensive list of natural hazards likely to impact the County. The identified mitigation policies and actions will be based on an assessment of hazards, vulnerabilities, and risks.

The hazard mitigation planning process is also heavily dependent on the participation of representatives from local government agencies and departments, the public, and other stakeholder groups. A Hazard Mitigation Planning Committee will be formed to support this project and will include representatives from the County, cities, school districts, private-non-profit entities, business partners, academic institutions, and other local, state, and federal agencies acting in or serving Knox County.

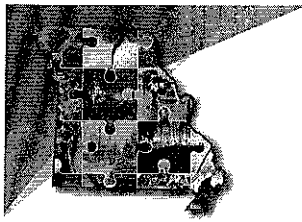
What is My Role in the Planning Process?

The Northeast Missouri Regional Planning Commission has taken the lead in updating this plan. The point of contact is Derek Weber, Executive Director. To successfully complete this project and ensure your organization is eligible for FEMA hazard mitigation assistance funding, we need your participation and input. Jurisdictions (including county and city governments and public school districts) that do not participate in an approved Hazard Mitigation Plan are **NOT eligible** to apply for FEMA's Hazard Mitigation Assistance grants. Participation in the planning process will include:

- Contributing in the planning committee meetings;
- Providing requested data (as available);
- Reviewing and providing comments on plan drafts;
- Advertising, coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan.

What can I expect by participating in the planning committee?

The planning committee will be provided with information on what activities are required to be performed to be included in the plan. Required activities include the following:



SEMA Mitigation Management LOCAL MITIGATION PLAN FORMAT GUIDANCE KICKOFF MEETING INVITATION FOR JURISDICTIONS

- **Required Activities include:** Participating jurisdictions will be required to complete as much of the data questionnaire as possible and return, complete critical/essential facilities and non-government employer form. Review planning meeting PowerPoint including federal planning requirements. Review project timeline.
- **Risk Assessment Meeting.** Review and provide comments on the risk assessment.
- **Mitigation Strategy Meeting.** Updating of existing mitigation actions and identification and development of new mitigation strategies based upon the risk assessment.

Additional Resources

The following links provide additional information on hazard mitigation and the planning process.

- **Knox County Multi-Jurisdictional Hazard Mitigation Plan, April 2015**
http://www.nemorpc.org/wp-content/uploads/2019/02/Knox-County-Hazard-Mitigation-Plan-3_05_2015-dd-rd.pdf
- **The requirements and procedures for state, tribal and local mitigation plans as presented in the Code of Federal Regulations (CFR) at Title 44, Chapter 1, Part 201**
<https://www.fema.gov/hazard-mitigation-planning-laws-regulations-policies>
- **Frequently Asked Questions regarding hazard mitigation planning**
<https://www.fema.gov/hazard-mitigation-planning-frequently-asked-questions>

Please confirm your attendance or provide contact information for your designated alternate by responding to Derek Weber at (660)465-7281 Ext. 1 or derekweber@nemorpc.org.

Thank you,

Derek Weber
Executive Director
Northeast Missouri Regional Planning Commission

Knox County
Multi-Jurisdictional Hazard Mitigation Plan Update
Conference Call Planning Meeting
November 11, 2020
10:00 A.M.

Agenda

Welcome/Introductions Derek Weber, Executive Director
Northeast Missouri RPC

Hazard Mitigation Planning Purpose/Grant Programs

Data Collection Questionnaires

Participation Requirements/Status

Discussion of Hazards

Update Mitigation Goals

Discuss Mitigation Action Updates

Next Steps/Timeline

Questions?

SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE KICKOFF MEETING—SIGN-IN SHEET

Project:	Knox County, Missouri Multi-jurisdictional Hazard Mitigation Plan Update	Meeting Date/Time:	Knox County HMP Conference Call November 11, 2020, 10:00 A.M.
Facilitator:	Derek Weber, Executive Director Northeast Missouri Regional Planning Commission	Call-In #:	(844)844-0414 Access Code: 511868

Name	Title	Department/Agency	Email	Phone #	Signature
Evan Glasgow	Presiding Commissioner	Knox County	glasgow0687@hotmail.com		
Roger Parton	Western Dist. Commissioner	Knox County	westcomm@knoxcountymo.org		
Ronnie Leckbee	Eastern Dist. Commissioner	Knox County	knoxeastcomm@marktwain.net		
Alex Reel	Mayor	Edina	reel.alexandra@gmail.com		
Margaret Gibson	City Clerk	Edina	edinacty@marktwain.net		
Keli Luthenauer	Mayor	Baring	cityofbaring@gmail.com		
Tara Lowe	Clerk	Baring		660-342-4411	
Tara Schrage	Clerk	Hurdland		660-423-5272	
Kris McCarty	Mayor	Hurdland		660-423-5727	
Larry Edwards	Mayor	Knox City	knoxcityhall@marktwain.net		

SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE KICKOFF MEETING—SIGN-IN SHEET

Project:	Knox County, Missouri Multi-jurisdictional Hazard Mitigation Plan Update	Meeting Date/Time:	Knox County HMP Conference Call November 11, 2020, 10:00 A.M.
Facilitator:	Derek Weber, Executive Director Northeast Missouri Regional Planning Commission	Call-In #:	(844)844-0414 Access Code: 511868

Name	Title	Department/Agency	Email	Phone #	Signature
Amanda Frost	Clerk	Knox City		660-434-5366	
Meg Glover	Mayor	Village of Newark		660-733-5658	
Rita Lindsey	Clerk	Village of Newark		660-733-5658	
Jason Violette	Mayor	Village of Novelty		660-739-4511	
Anna Applegate	Clerk	Village of Novelty		660-739-4511	
Andy Turgeon	Superintendent	Knox County R-1	aturgeon@knoxr1.us		
Derek Weber	Executive Director	NEMO RPC	derekweber@nemorpc.org	660-465-7281 Ext. 1	

To **Knox County Hazard Mitigation Planning Committee**
From **Derek Weber, Executive Director**
Northeast Missouri Regional Planning Commission
Tel / E-mail **(660)465-7281 Ext. 1 / derekweber@nemorpc.org**
Date **November 11th, 2020**
Subject **Minutes from Knox County Hazard Mitigation Planning Conference Call held on November 11th 2020 at 10:00 AM**

This document is a record of attendance and a summary of the issues discussed during the above meeting. The presentation began with an introduction on the purpose of hazard mitigation planning, grant programs linked to an approved plan, and the benefits of a multi-jurisdictional approach. The hazard mitigation planning process was reviewed to include requirements for participation and public involvement and the use of data collection questionnaires. The planning committee participated in a discussion of the hazards that have the potential to impact Knox County, including preliminary research on each hazard. The sources for compiling a GIS layer of critical facilities were also discussed and additional sources identified by planning committee members were noted. The meeting concluded with a discussion of the next steps in the planning process. The meeting was held at the meeting was held via conference call beginning at 10:00 AM.

Attendees

Name		Title	Jurisdiction
Evan	Glasgow	Presiding Commissioner	Knox County
Roger	Parton	Western Dist. Commissioner	Knox County
Ronnie	Leckbee	Eastern Dist. Commissioner	Knox County
Alexandra	Reel	Mayor	City of Edina
Margaret	Gibson	City Clerk	City of Edina
Keli	Luthenauer	Mayor	City of Baring
Tara	Lowe	City Clerk	City of Baring
Tara	Schrage	Clerk	City of Hurdland
Kris	McCarty	Mayor	City of Hurdland
Larry	Edwards	Mayor	City of Knox City
Amanda	Frost	Clerk	City of Knox City
Meg	Glover	Mayor	Village of Newark
Rita	Lindsey	Village Clerk	Village of Newark
Jason	Violette	Mayor	Village of Novelty
Anna	Applegate	Village Clerk	Village of Novelty
Andy	Turgeon	Superintendent	Knox County R-1
Derek	Weber	Executive Director	NEMO RPC

Introductions

Derek Weber, Executive Director with Northeast Missouri Regional Planning Commission began the meeting by welcoming and thanking the attendees for coming and having all attendees introduce themselves and the jurisdiction or entity they were representing.

Hazard Mitigation Planning Purpose

Derek Weber, Executive Director with NEMO RPC presented information on the purpose of Hazard Mitigation Planning and the Disaster Mitigation Act of 2000. The attendees were reminded this is an update of the Knox County Hazard Mitigation Plan, previously approved in April, 2015. The current plan expires in April 2020.

Grant Programs Linked to Approved Plan

Derek Weber briefly discussed the FEMA Hazard Mitigation Assistance grants that require participation in an approved Hazard Mitigation Plan for jurisdictions to be eligible to apply. These include: Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program

Participation Requirements

Derek Weber also described the role of the MPC. Each jurisdiction participating in development of the plan must meet the following minimum requirements:

1. Designate a representative to serve on the Knox County MPC.
2. Provide data for and assist in the development of the updated risk assessment that describes how various hazards impact your jurisdiction,
3. Provide data to describe current capabilities,
4. Develop/update mitigation actions (at least one) specific to your jurisdiction,
5. Provide comments on plan drafts as requested,
6. Provide documentation to show time donated to the planning effort (if a FEMA planning grant was awarded to the county); and
7. Formally adopt the mitigation plan.

Jurisdictions that choose not to participate in development of a FEMA-approved mitigation plan **will not** be eligible applicants for FEMA Hazard Mitigation Assistance Grants.

Data Collection Questionnaires

Representatives from local governments and school districts were provided with hard copies of Data Collection Questionnaires. The Data Collection Questionnaire is designed to collect information on existing capabilities within each jurisdiction to implement mitigation initiatives as well as collect information on previous hazard events. The questionnaires are different for local units of government and schools. The Data Collection Questionnaires were reviewed as a group and then meeting participants were given time to review the forms individually and note any questions about the forms.

Discussion/Prioritization of Hazards

Initial research information was presented on the hazards being considered for inclusion in the hazard mitigation plan. The attendees agreed to continue with all of the previous natural hazards covered in the previous plan and also add Pandemic Hazard.

Update Mitigation Goals

Following the discussion of the risk assessment, Derek Weber, facilitated a discussion of the mitigation goals. Common categories of mitigation goals were presented as well as the 2018 State Hazard Mitigation Plan goals.

This planning effort is an update to an existing hazard mitigation plan. As a result, the goals from the previous hazard mitigation plan were reviewed. The updated goals are as follows:

1. Public Awareness- Using a variety of communication avenues to increase the citizens awareness of and to promote education about the natural hazards that they may face, their vulnerability to these hazards, and how to lessen the effect of future natural hazards.
2. Strengthen communication and coordination between local governments, emergency personnel, public agencies, and citizens to mitigate the effects of future natural hazards.
3. Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties; on natural resources; on infrastructure; and on the local economy.

Mitigation Actions Updates

The planning committee members informed they would be contacted to review past mitigation actions and how they wanted to proceed with new mitigation actions. Jurisdictions were informed they were required to have at least one mitigation action.

For each Continuing and New action to be included in the plan, the responsible jurisdiction must complete the STAPLEE Worksheet and record the results on either the spreadsheet OR action plan worksheet. The STAPLEE worksheet provides a framework to determine the general effectiveness in accomplishing the goals of life safety and/or reduction or prevention of damage from a hazard event. This method analyzes the Social, Technical, Administrative, Political, Legal, Economic and Environmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions.

Next Steps

The meeting concluded with a discussion of the remaining steps to complete the planning process. Participants were informed they would be contacted for completion of mitigation action items. Resolutions will need to be adopted by each jurisdiction and a sample will be emailed.

Multi-Jurisdictional Hazard Mitigation Plan
Data Collection Questionnaire
For Local Governments

County: Knox County

Jurisdiction: Unincorporated Knox County _____

Return by: _____

Please complete this data collection questionnaire as accurately and completely as possible as this information will appear in the mitigation plan. A data collection questionnaire must be completed for each "jurisdiction" that wishes to be included in the plan. According to FEMA's definition a jurisdiction is any local government, including counties, municipalities, cities, towns, school districts, special districts, councils of government, and tribal organizations. Any of these entities as well as publicly funded colleges and universities that do not participate in the planning process **will not** be eligible applicants for FEMA mitigation funding programs. Please note: School Districts and other Educational Institutions should complete the Data Collection Questionnaire indicated "For School Districts and Educational Institutions".

Prepared by: Evan Glasgow – Presiding Commissioner _____

Phone: _____

Email: _____

Date: 11/2/2020 _____

Please return questionnaires by mail, email, or fax to:

Name: Derek Weber

Address: 121 S. Cecil St. Memphis, MO 63555

Email: derekweber@nemorpc.org

Fax: 660-465-7163

CAPABILITY ASSESSMENT & INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The purpose of this section is to collect information to document existing capabilities as well as determine existing plans, studies, reports, and technical information that may need to be incorporated in the mitigation plan. Although some of this information may have been captured in your previous mitigation plan, it is important to ensure this information is current in the plan update

Please indicate which of the following your jurisdiction has in place. For elements that do not pertain to your type of public entity, please indicate with "N/A". If applicable, please provide a completion date for the element. If your jurisdiction does not have a particular element, and a higher level of government has the authority pertaining to your jurisdiction, please indicate this in the comments column. If your jurisdiction has any of the **underlined and bolded** elements, please provide a copy of the document to the contact listed on the front and indicate method in the comments column (i.e. available on the web, will email or mail).

Element	Yes No N/A	Comments and/or Weblink
Planning Capabilities		
<u>Comprehensive Plan</u>	Date: NO	
Builder's Plan	Date: NO	
Capital Improvement Plan	Date: NO	
City Emergency Operations Plan	Date: NA	
County Emergency Operations Plan	Date: YES	
Local Recovery Plan	Date: NO	
County Recovery Plan	Date: NO	
City Mitigation Plan	Date: NA	
County Mitigation Plan	Date: YES	
Debris Management Plan	Date: NO	
<u>Economic Development Plan</u>	Date: NO	
Transportation Plan	Date: NO	
Land-use Plan	Date: NO	
Flood Mitigation Assistance (FMA) Plan	Date: NO	
<u>Watershed Plan</u>	Date: NO	
Firewise or other fire mitigation plan	Date: NO	
Critical Facilities Plan (Mitigation/Response/Recovery)	Date: NO	

Element	Yes, No, N/A	Comments and/or Weblink
Policies/Ordinance		
Zoning Ordinance	NO	
Building Code	Version: NO	
Floodplain Ordinance	Date: NO	
Subdivision Ordinance	NO	
Tree Trimming Ordinance	NO	
Nuisance Ordinance	NO	
Stormwater Ordinance	NO	
Drainage Ordinance	NO	
Site Plan Review Requirements	NO	
Historic Preservation Ordinance	NO	
Landscape Ordinance	NO	
Program		
Zoning/Land Use Restrictions	NO	
Codes Building Site/Design	NO	
Hazard Awareness Program	NO	
National Flood Insurance Program (NFIP)	NO	
NFIP Community Rating System (CRS) program	NO	If so, what is your current level rating?
National Weather Service (NWS) Storm Ready Certification	NO	
Firewise Community Certification	NO	
Building Code Effectiveness Grading (BCEGs)	NO	
ISO Fire Rating	Rating:	
Economic Development Program	NO	
Land Use Program	NO	
Public Education/Awareness	NO	
Property Acquisition	NO	
Planning/Zoning Boards	NO	
Stream Maintenance Program	NO	
Tree Trimming Program	NO	
Engineering Studies for Streams (Local/County/Regional)	NO	

Element	Yes, No, N/A	Comments and/or Weblink
Mutual Aid Agreements	Yes	
Studies/Reports/Maps		
<u>Hazard Analysis/Risk Assessment (City)</u>	NO	
<u>Hazard Analysis/Risk Assessment (County)</u>	NO	
Evacuation Route Map	NO	
<u>Critical Facilities Inventory</u>	NO	
<u>Vulnerable Population Inventory</u>	NO	
<u>Land Use Map</u>	NO	
Staff/Department		Full Time or Part Time?
Building Code Official	No	
Building Inspector	No	
Mapping Specialist (GIS)	No	
Engineer	No	
Development Planner	No	
Public Works Official	No	
Emergency Management Coordinator	Yes	PT
NFIP Floodplain Administrator	No	
Emergency Response Team	No	
Hazardous Materials Expert	No	
Local Emergency Planning Committee	Yes	PT
County Emergency Management Commission	No	
Sanitation Department	No	
Transportation Department	Yes	FT
Economic Development Department	No	
Housing Department	No	
Historic Preservation	No	
Non-Governmental Organizations (NGOs)	Is there a local chapter? Yes or No	
American Red Cross	No	
Salvation Army	Yes	
Veterans Groups	Yes	

Element	Yes, No, N/A	Comments and/or Weblink
Local Environmental Organization	no	
Homeowner Associations	no	
Neighborhood Associations	no	
Chamber of Commerce	yes	
Community Organizations (Lions, Kiwanis, etc.	yes	
Financial Resources		Is your jurisdiction able to: Yes or No
Apply for Community Development Block Grants		yes
Fund projects thru Capital Improvements funding		yes
Authority to levy taxes for specific purposes		yes
Fees for water, sewer, gas, or electric services		no
Impact fees for new development		NA
Incur debt through general obligation bonds		yes
Incur debt through special tax bonds		yes
Incur debt through private activities		No
Withhold spending in hazard prone areas		No

For plan updates, the plan maintenance process outlined in your previous plan requires all participating jurisdictions to incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate. A key element of effective implementation of mitigation is for the mitigation plan to be incorporated in existing authorities, policies, programs, and resources. Next to each applicable planning mechanism, indicate how your jurisdiction incorporated the previous mitigation plan. If no incorporation has occurred, please explain, including background information detailing any challenges preventing incorporation.

Planning Capabilities	Method of Incorporation Since Previous Plan or Challenges Preventing Incorporation
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Recovery Plan	
County Recovery Plan	
Debris Management Plan	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Watershed Plan	
Firewise or other Fire Mitigation Plan such as Community Wildfire Protection Plan	

Additional Questions

1. How is your government structure organized? (Commission, Mayor/City Council, how many members)

Commission 3 members

2. List any past or ongoing public education or information programs, such as for responsible water use, fire safety, household preparedness, or environmental education.

NA

3. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities. Be sure to include pending or approved projects submitted for FEMA mitigation grants.

NA

4. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

5. How many outdoor warning sirens are in your community?

4 in County

How are they activated (indicate responsible department/personnel)?

6. Does your community utilize any other warning systems such as Cable Override, Reverse 911, etc? If so, please describe.

no

7. Does your community have designated public tornado shelters/saferooms? If so, are they constructed in accordance with FEMA standards?

NA

Please provide address locations:

8. List residential, commercial and industrial development in your jurisdiction since last plan update.

NA

9. Describe development trends and expected growth areas. Is any new development expected to occur in the 100-year floodplain? Is any new development expected to occur in any other known hazard areas? If possible, please provide a map indicating potential/planned growth areas.

NO

10. Are any new facilities or infrastructure planned for construction during the next five years? If so, please provide facility name and purpose along with proposed locations, if known.

NO

11. Please list major employers in your jurisdiction with an estimated number of employees.

Knox Co Schools
Knox Co Nursing home
Candwell Lumber

12. Please list Mitigation Planning Committee members who served during the development of the previously approved plan. Was the process set forth for monitoring the implementation of the previously approved mitigation plan adhered to? Did the Committee meet as was specified in the previously approved plan? Why or why not?

13. Describe your jurisdiction's participation in the NFIP. Include information about how compliance with the NFIP is enforced locally.

NA

Multi-Jurisdictional Hazard Mitigation Plan

Data Collection Questionnaire

For Local Governments

County: Knox
Jurisdiction: City of Edina
Return by: _____

Please complete this data collection questionnaire as accurately and completely as possible as this information will appear in the mitigation plan. A data collection questionnaire must be completed for each "jurisdiction" that wishes to be included in the plan. According to FEMA's definition a jurisdiction is any local government, including counties, municipalities, cities, towns, school districts, special districts, councils of government, and tribal organizations. Any of these entities as well as publicly funded colleges and universities that do not participate in the planning process **will not** be eligible applicants for FEMA mitigation funding programs. Please note: School Districts and other Educational Institutions should complete the Data Collection Questionnaire indicated "For School Districts and Educational Institutions".

Prepared by: Margaret Gibson
Phone: 660-397-3251
Email: edina.cty@marktwain.net
Date: _____

Please return questionnaires by mail, email, or fax to:

Name: _____

Address: _____

Email: _____

Fax: _____

CAPABILITY ASSESSMENT & INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The purpose of this section is to collect information to document existing capabilities as well as determine existing plans, studies, reports, and technical information that may need to be incorporated in the mitigation plan. Although some of this information may have been captured in your previous mitigation plan, it is important to ensure this information is current in the plan update.

Please indicate which of the following your jurisdiction has in place. For elements that do not pertain to your type of public entity, please indicate with "N/A". If applicable, please provide a completion date for the element. If your jurisdiction does not have a particular element, and a higher level of government has the authority pertaining to your jurisdiction, please indicate this in the comments column. If your jurisdiction has any of the underlined and bolded elements, please provide a copy of the document to the contact listed on the front and indicate method in the comments column (i.e. available on the web, will email or mail).

Element	Yes, No, N/A	Comments and/or Weblink
Planning Capabilities		
<u>Comprehensive Plan</u>	Date: <i>NO</i>	
Builder's Plan	Date: <i>NO</i>	
Capital Improvement Plan	Date: <i>NO</i>	
City Emergency Operations Plan	Date: <i>April</i>	
County Emergency Operations Plan	Date: <i>April 2015?</i>	
Local Recovery Plan	Date: <i>NO</i>	
County Recovery Plan	Date: <i>NO</i>	
City Mitigation Plan	Date:	
County Mitigation Plan	Date: <i>April 2015</i>	
Debris Management Plan	Date: <i>NO</i>	
<u>Economic Development Plan</u>	Date: <i>NO</i>	

Transportation Plan	Date: NO	
Land-use Plan	Date: NO	
Flood Mitigation Assistance (FMA) Plan	Date:	
<u>Watershed Plan</u>	Date: NO	
Firewise or other fire mitigation plan	Date: NO	
Critical Facilities Plan (Mitigation/Response/Recovery)	Date: NO	
Policies/Ordinance		
Zoning Ordinance	NO	
Building Code	Version: NO	
Floodplain Ordinance	Date: 10/7/19	
Subdivision Ordinance	NO	
Tree Trimming Ordinance	NO	
Nuisance Ordinance	Yes	
Stormwater Ordinance	NO	
Drainage Ordinance	NO	
Site Plan Review Requirements	NO	
Historic Preservation Ordinance	NO	
Landscape Ordinance	NO	
Program		
Zoning/Land Use Restrictions	NA	
Codes Building Site/Design	NA	
Hazard Awareness Program		
National Flood Insurance Program (NFIP)	Yes	
NFIP Community Rating System (CRS) program		If so, what is your current level ra
National Weather Service (NWS) Storm Ready Certification		
Firewise Community Certification		
Building Code Effectiveness Grading (BCEGs)		
ISO Fire Rating	Rating: 6	

Economic Development Program	NO	
Land Use Program	NA	
Public Education/Awareness	NO	
Property Acquisition	NO	
Planning/Zoning Boards	NO	
Stream Maintenance Program	NA	
Tree Trimming Program	NA	Ameren MO does
<u>Engineering Studies for Streams (Local/County/Regional)</u>		
Mutual Aid Agreements	NA	
Studies/Reports/Maps		
<u>Hazard Analysis/Risk Assessment (City)</u>	NA	
<u>Hazard Analysis/Risk Assessment (County)</u>	NA	
Evacuation Route Map	NA	
<u>Critical Facilities Inventory</u>	NA	
<u>Vulnerable Population Inventory</u>	NA	
<u>Land Use Map</u>	NA	
Staff/Department		Full Time or Part Time?
Building Code Official	NO	
Building Inspector	NO	
Mapping Specialist (GIS)	NO	
Engineer	Klinger + Assoc. as needed	
Development Planner	NO	
Public Works Official	Yes	Full time
Emergency Management Coordinator	Yes	Part-time
NFIP Floodplain Administrator	Yes	
Emergency Response Team	NO	
Hazardous Materials Expert	NO	
Local Emergency Planning Committee Director	Yes	Part-time
County Emergency Management Commission	Yes	Part-time

Sanitation Department	Yes	
Transportation Department	No	
Economic Development Department	No	
Housing Department	No	
Historic Preservation	Yes	Knox County Historical Society
Non-Governmental Organizations (NGOs)	Is there a local chapter? Yes or No	
American Red Cross	Yes	
Salvation Army	Yes	
Veterans Groups	Yes	
Local Environmental Organization	No	
Homeowner Associations	No	
Neighborhood Associations	No	
Chamber of Commerce	Yes	
Community Organizations (Lions, Kiwanis, etc.)	Yes	
Financial Resources		Is your jurisdiction able to Yes or No
Apply for Community Development Block Grants		Yes
Fund projects thru Capital Improvements funding		Yes
Authority to levy taxes for specific purposes		Yes - with voter approval
Fees for water, sewer, gas, or electric services		Yes
Impact fees for new development		No
Incur debt through general obligation bonds		Yes - with voter approval
Incur debt through special tax bonds		Yes - with voter approval
Incur debt through private activities		No
Withhold spending in hazard prone areas		No

For plan updates, the plan maintenance process outlined in your previous plan requires all participating jurisdictions to incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate. A key element of effective implementation of mitigation is for the mitigation plan to be incorporated in existing authorities, policies, programs, and resources. Next to each applicable planning mechanism, indicate how your jurisdiction incorporated the previous mitigation plan. If no incorporation has occurred, please explain, including background information detailing any challenges preventing incorporation.

Planning Capabilities	Method of Incorporation Since Previous Plan or Challenges Preventing Incorporation
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Recovery Plan	
County Recovery Plan	
Debris Management Plan	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Watershed Plan	

Firewise or other Fire Mitigation Plan such as Community Wildfire Protection Plan	
--	--

Additional Questions

- How is your government structure organized? (Commission, Mayor/City Council, how many members)

Mayor/City Council — 6 Board members

- List any past or ongoing public education or information programs, such as for responsible water use, fire safety, household preparedness, or environmental education.

NA

- List any other past or ongoing projects or programs designed to reduce disaster losses; these may include projects to protect critical facilities. Be sure to include pending or approved projects submitted for FEMA mitigation grants.

NA

- Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

NA

- How many outdoor warning sirens are in your community? two

How are they activated (indicate responsible department/personnel)?

Activated by Fire Department, Ambulance District
or 911 @ Macon MO

- Does your community utilize any other warning systems such as Cable Override, Reverse 911, etc? If so, please describe.

NO

- Does your community have designated public tornado shelters/saferooms? If so, are they constructed in accordance with FEMA standards?

Please provide address locations:

200 S. Main St — No

- List residential, commercial and industrial development in your jurisdiction since last plan update.

- Describe development trends and expected growth areas. Is any new development expected to occur in the 100-year floodplain? Is any new development expected to occur in any other known hazard areas? If possible, please provide a map indicating potential/planned growth areas.

No growth expected in the 100-year floodplain.

- Are any new facilities or infrastructure planned for construction during the next five years? If so, please provide facility name and purpose along with proposed locations, if known.

No

- Please list major employers in your jurisdiction with an estimated number of employees.

Blessing Center 16-20

C&R Market 26

Hawkins Harrison Insurance - 17

- Please list Mitigation Planning Committee members who served during the development of the previously approved plan. Was the process set forth for monitoring the implementation of the previously approved mitigation plan adhered to? Did the Committee meet as was specified in the previously

approved plan? Why or why not?

- Describe your jurisdiction's participation in the NFIP. Include information about how compliance with the NFIP is enforced locally.

Multi-Jurisdictional Hazard Mitigation Plan
Data Collection Questionnaire
For Local Governments

County: Knox County

Jurisdiction: City of Baring

Return by: _____

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Prepared by: Keli Luthenauer _____

Phone: 660-342-4411 _____

Email: _____

Date: 11/10/2020 _____

Please return questionnaires by mail, email, or fax to:

Name: Derek Weber

Address: 121 S. Cecil St. Memphis, MO 63555

Email: derekweber@nemorpc.org

Fax: 660-465-7163

CAPABILITY ASSESSMENT & INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The purpose of this section is to collect information to document existing capabilities as well as determine existing plans, studies, reports, and technical information that may need to be incorporated in the mitigation plan. Although some of this information may have been captured in your previous mitigation plan, it is important to ensure this information is current in the plan update

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Element	Yes, No, N/A	Comments and/or Weblink
Planning Capabilities		
<u>Comprehensive Plan</u>	No	
Builder's Plan	No	
Capital Improvement Plan	No	
City Emergency Operations Plan	No	
County Emergency Operations Plan	Yes	
Local Recovery Plan	No	
County Recovery Plan	No	
City Mitigation Plan	No	
County Mitigation Plan	Yes	
Debris Management Plan	No	
<u>Economic Development Plan</u>	No	
Transportation Plan	No	
Land-use Plan	No	
Flood Mitigation Assistance (FMA) Plan	No	
<u>Watershed Plan</u>	No	
Firewise or other fire mitigation plan	No	
Critical Facilities Plan (Mitigation/Response/Recovery)	No	

Element	Yes, No, N/A	Comments and/or Weblink
Policies/Ordinance		
Zoning Ordinance	No	
Building Code	No	
Floodplain Ordinance	No	
Subdivision Ordinance	No	
Tree Trimming Ordinance	No	
Nuisance Ordinance	Yes	
Stormwater Ordinance	No	
Drainage Ordinance	No	
Site Plan Review Requirements	No	
Historic Preservation Ordinance	No	
Landscape Ordinance	No	
Program		
Zoning/Land Use Restrictions	No	
Codes Building Site/Design	No	
Hazard Awareness Program	No	
National Flood Insurance Program (NFIP)	No	
NFIP Community Rating System (CRS) program		If so, what is your current level rating?
National Weather Service (NWS) Storm Ready Certification	No	
Firewise Community Certification	No	
Building Code Effectiveness Grading (BCEGs)	No	
ISO Fire Rating	Rating:6	
Economic Development Program	No	
Land Use Program	No	
Public Education/Awareness	No	
Property Acquisition	No	
Planning/Zoning Boards	No	
Stream Maintenance Program	No	
Tree Trimming Program	No	
Engineering Studies for Streams (Local/County/Regional)	No	

Element	Yes, No, N/A	Comments and/or Weblink
Mutual Aid Agreements	Yes	
Studies/Reports/Maps		
<u>Hazard Analysis/Risk Assessment (City)</u>	No	
<u>Hazard Analysis/Risk Assessment (County)</u>	No	
Evacuation Route Map	No	
<u>Critical Facilities Inventory</u>	No	
<u>Vulnerable Population Inventory</u>	No	
<u>Land Use Map</u>	No	
Staff/Department		Full Time or Part Time?
Building Code Official	No	
Building Inspector	No	
Mapping Specialist (GIS)	No	
Engineer	No	
Development Planner	No	
Public Works Official	No	
Emergency Management Coordinator	No	
NFIP Floodplain Administrator	No	
Emergency Response Team	No	
Hazardous Materials Expert	No	
Local Emergency Planning Committee	Yes	
County Emergency Management Commission	No	
Sanitation Department	No	
Transportation Department	No	
Economic Development Department	No	
Housing Department	No	
Historic Preservation	No	
Non-Governmental Organizations (NGOs)	Is there a local chapter? Yes or No	
American Red Cross	No	
Salvation Army	No	
Veterans Groups	Yes	

Element	Yes, No, N/A	Comments and/or Weblink
Local Environmental Organization	No	
Homeowner Associations	No	
Neighborhood Associations	No	
Chamber of Commerce	Yes	
Community Organizations (Lions, Kiwanis, etc.	Yes	
Financial Resources		Is your jurisdiction able to? Yes or No
Apply for Community Development Block Grants		Yes
Fund projects thru Capital Improvements funding		Yes
Authority to levy taxes for specific purposes		Yes
Fees for water, sewer, gas, or electric services		Yes
Impact fees for new development		No
Incur debt through general obligation bonds		No
Incur debt through special tax bonds		Yes
Incur debt through private activities		No
Withhold spending in hazard prone areas		No

For plan updates, the plan maintenance process outlined in your previous plan requires all participating jurisdictions to incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate. A key element of effective implementation of mitigation is for the mitigation plan to be incorporated in existing authorities, policies, programs, and resources. Next to each applicable planning mechanism, indicate how your jurisdiction incorporated the previous mitigation plan. If no incorporation has occurred, please explain, including background information detailing any challenges preventing incorporation.

Planning Capabilities	Method of Incorporation Since Previous Plan or Challenges Preventing Incorporation
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Recovery Plan	
County Recovery Plan	
Debris Management Plan	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Watershed Plan	
Firewise or other Fire Mitigation Plan such as Community Wildfire Protection Plan	

Additional Questions

1. How is your government structure organized? (Commission, Mayor/City Council, how many members)

Mayor/Council 4 Members

2. List any past or ongoing public education or information programs, such as for responsible water use, fire safety, household preparedness, or environmental education.

NA

3. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities. Be sure to include pending or approved projects submitted for FEMA mitigation grants.

NA

4. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

None

5. How many outdoor warning sirens are in your community?

1

How are they activated (indicate responsible department/personnel)?

Fire Department

6. Does your community utilize any other warning systems such as Cable Override, Reverse 911, etc? If so, please describe.

No

7. Does your community have designated public tornado shelters/saferooms? If so, are they constructed in accordance with FEMA standards?

No

Please provide address locations:

8. List residential, commercial and industrial development in your jurisdiction since last plan update.

None

9. Describe development trends and expected growth areas. Is any new development expected to occur in the 100-year floodplain? Is any new development expected to occur in any other known hazard areas? If possible, please provide a map indicating potential/planned growth areas.

None

10. Are any new facilities or infrastructure planned for construction during the next five years? If so, please provide facility name and purpose along with proposed locations, if known.

None

11. Please list major employers in your jurisdiction with an estimated number of employees.

Baring Farm Services 10
Baring Elevator 15

12. Please list Mitigation Planning Committee members who served during the development of the previously approved plan. Was the process set forth for monitoring the implementation of the previously approved mitigation plan adhered to? Did the Committee meet as was specified in the previously approved plan? Why or why not?

City administration turnover.

13. Describe your jurisdiction's participation in the NFIP. Include information about how compliance with the NFIP is enforced locally.

Not Participating

VULNERABILITY ASSESSMENT

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets. In the natural hazard column of the asset inventory table, indicate (by assigned abbreviation) which of the following hazards the asset is vulnerable to:

Natural Hazards	
Flooding (Major & Flash) - RF	Drought - D
Levee Failure - LF	Extreme Temperature - ET
Dam Failure - DF	Severe Thunderstorm (incl. winds, hail, lightning) - ST
Earthquake - EQ	Severe Winter Weather (incl. snow, ice, severe cold) - SWW
Land Subsidence / Sinkholes - LSS	Tornadoes - T
	Wildfire - WF

Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 'Essential facilities' are those that if damaged would have devastating impacts on disaster response and/or recovery. 'High potential loss facilities' are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

Essential Facilities

Hospitals and other
medical facilities
Police stations
Fire station
Emergency Operations
Centers

High Potential Loss Facilities

Power plants
Dams/levees
Military installations
Hazardous material sites
Schools
Shelters
Day care centers
Nursing homes
Main government buildings

Transportation and Lifeline

Highways, bridges, and tunnels
Railroads and facilities
Bus facilities
Airports
Water treatment facilities
Natural gas facilities and
pipelines
Oil facilities and pipelines
Communications facilities

Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster.

Please list critical facilities and other community assets, the square feet, values, and occupancy/capacity. If not applicable, enter "N/A"). In the last column, use the codes from the previous page to indicate hazards to which the asset is vulnerable. Add as many rows as needed. If this information is available in GIS format, please provide.

[illegible]

Name of Asset	Address	Area (sq.ft.)	Replacement Value (Insured) (\$)	Contents Value (\$)	Occupancy/ Capacity (#)	Natural Hazards
<u>High Potential Loss Facilities</u> such as power plants, dams/levees, military installations, hazardous materials sites, shelters, day care centers, nursing homes, main government buildings (Do not include schools—they will be reported by the school districts)						
NONE						
<u>Transportation and Lifelines</u> such as highways, bridges, and tunnels, railroads and facilities, bus facilities, airports, water treatment facilities, natural gas facilities and pipelines, oil facilities, oil facilities and pipelines, communications facilities						
BNSF East Baring Rail						
Hwy 15						

*If replacement cost data is not available, use the best available data (assessed valuation or other method for estimating cost) and explain any data deficiencies.

Economic Assets (Major Employers, etc)

Asset	Address	Product/ Service	Value (if known)	Number of Employees	Hazards
NONE					

Multi-Jurisdictional Hazard Mitigation Plan
Data Collection Questionnaire
For Local Governments

County: Knox County

Jurisdiction: City of Hurdland

Return by: _____

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Prepared by: Tara Schrage _____

Phone: 660-423-5272 _____

Email: _____

Date: 12/10/2020 _____

Please return questionnaires by mail, email, or fax to:

Name: Derek Weber

Address: 121 S. Cecil St. Memphis, MO 63555

Email: derekweber@nemorpc.org

Fax: 660-465-7163

CAPABILITY ASSESSMENT & INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

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Please indicate which of the following your jurisdiction has in place. For elements that do not pertain to your type of public entity, please indicate with "N/A". If applicable, please provide a completion date for the element. If your jurisdiction does not have a particular element, and a higher level of government has the authority pertaining to your jurisdiction, please indicate this in the comments column. If your jurisdiction has any of the **underlined and bolded** elements, please provide a copy of the document to the contact listed on the front and indicate method in the comments column (i.e. available on the web, will email or mail).

Element	Yes, No, N/A	Comments and/or Weblink
Planning Capabilities		
<u>Comprehensive Plan</u>	No	
Builder's Plan	No	
Capital Improvement Plan	No	
City Emergency Operations Plan	No	
County Emergency Operations Plan	Yes	
Local Recovery Plan	No	
County Recovery Plan	No	
City Mitigation Plan	No	
County Mitigation Plan	Yes	
Debris Management Plan	No	
<u>Economic Development Plan</u>	No	
Transportation Plan	No	
Land-use Plan	No	
Flood Mitigation Assistance (FMA) Plan	No	
<u>Watershed Plan</u>	No	
Firewise or other fire mitigation plan	No	
Critical Facilities Plan (Mitigation/Response/Recovery)	No	

Element	Yes, No, N/A	Comments and/or Weblink
Policies/Ordinance		
Zoning Ordinance	No	
Building Code	No	
Floodplain Ordinance	No	
Subdivision Ordinance	No	
Tree Trimming Ordinance	No	
Nuisance Ordinance	Yes	
Stormwater Ordinance	No	
Drainage Ordinance	No	
Site Plan Review Requirements	No	
Historic Preservation Ordinance	No	
Landscape Ordinance	No	
Program		
Zoning/Land Use Restrictions	No	
Codes Building Site/Design	No	
Hazard Awareness Program	No	
National Flood Insurance Program (NFIP)	No	
NFIP Community Rating System (CRS) program		If so, what is your current level rating?
National Weather Service (NWS) Storm Ready Certification	No	
Firewise Community Certification	No	
Building Code Effectiveness Grading (BCEGs)	No	
ISO Fire Rating	Rating:6	
Economic Development Program	No	
Land Use Program	No	
Public Education/Awareness	No	
Property Acquisition	No	
Planning/Zoning Boards	No	
Stream Maintenance Program	No	
Tree Trimming Program	No	
<u>Engineering Studies for Streams (Local/County/Regional)</u>	No	

Element	Yes, No, N/A	Comments and/or Weblink
Mutual Aid Agreements	Yes	
Studies/Reports/Maps		
<u>Hazard Analysis/Risk Assessment (City)</u>	No	
<u>Hazard Analysis/Risk Assessment (County)</u>	No	
Evacuation Route Map	No	
<u>Critical Facilities Inventory</u>	No	
<u>Vulnerable Population Inventory</u>	No	
<u>Land Use Map</u>	No	
Staff/Department		Full Time or Part Time?
Building Code Official	No	
Building Inspector	No	
Mapping Specialist (GIS)	No	
Engineer	No	
Development Planner	No	
Public Works Official	No	
Emergency Management Coordinator	No	
NFIP Floodplain Administrator	No	
Emergency Response Team	No	
Hazardous Materials Expert	No	
Local Emergency Planning Committee	Yes	
County Emergency Management Commission	No	
Sanitation Department	No	
Transportation Department	No	
Economic Development Department	No	
Housing Department	No	
Historic Preservation	No	
Non-Governmental Organizations (NGOs)	Is there a local chapter? Yes or No	
American Red Cross	No	
Salvation Army	No	
Veterans Groups	Yes	

Element	Yes, No, N/A	Comments and/or Weblink
Local Environmental Organization	No	
Homeowner Associations	No	
Neighborhood Associations	No	
Chamber of Commerce	No	
Community Organizations (Lions, Kiwanis, etc.	Yes	
Financial Resources		Is your jurisdiction able to? Yes or No
Apply for Community Development Block Grants		Yes
Fund projects thru Capital Improvements funding		Yes
Authority to levy taxes for specific purposes		Yes
Fees for water, sewer, gas, or electric services		Yes
Impact fees for new development		No
Incur debt through general obligation bonds		No
Incur debt through special tax bonds		Yes
Incur debt through private activities		No
Withhold spending in hazard prone areas		No

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Land-use Plan	
Watershed Plan	
Firewise or other Fire Mitigation Plan such as Community Wildfire Protection Plan	

Additional Questions

1. How is your government structure organized? (Commission, Mayor/City Council, how many members)

Mayor/Council 4 Alderman

2. List any past or ongoing public education or information programs, such as for responsible water use, fire safety, household preparedness, or environmental education.

No

3. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities. Be sure to include pending or approved projects submitted for FEMA mitigation grants.

No

4. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

No

5. How many outdoor warning sirens are in your community?

1

How are they activated (indicate responsible department/personnel)?

Fire Department

6. Does your community utilize any other warning systems such as Cable Override, Reverse 911, etc? If so, please describe.

No

7. Does your community have designated public tornado shelters/saferooms? If so, are they constructed in accordance with FEMA standards?

No

Please provide address locations:

8. List residential, commercial and industrial development in your jurisdiction since last plan update.

None

9. Describe development trends and expected growth areas. Is any new development expected to occur in the 100-year floodplain? Is any new development expected to occur in any other known hazard areas? If possible, please provide a map indicating potential/planned growth areas.

None

10. Are any new facilities or infrastructure planned for construction during the next five years? If so, please provide facility name and purpose along with proposed locations, if known.

None

11. Please list major employers in your jurisdiction with an estimated number of employees.

None

12. Please list Mitigation Planning Committee members who served during the development of the previously approved plan. Was the process set forth for monitoring the implementation of the previously approved mitigation plan adhered to? Did the Committee meet as was specified in the previously approved plan? Why or why not?

None

13. Describe your jurisdiction's participation in the NFIP. Include information about how compliance with the NFIP is enforced locally.

Not Participating

VULNERABILITY ASSESSMENT

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets. In the natural hazard column of the asset inventory table, indicate (by assigned abbreviation) which of the following hazards the asset is vulnerable to:

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Levee Failure - LF	Extreme Temperature - ET
Dam Failure - DF	Severe Thunderstorm (incl. winds, hail, lightning) - ST
Earthquake - EQ	Severe Winter Weather (incl. snow, ice, severe cold) - SWW
Land Subsidence / Sinkholes - LSS	Tornadoes - T
	Wildfire - WF

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Essential Facilities

Hospitals and other
medical facilities
Police stations
Fire station
Emergency Operations
Centers

High Potential Loss Facilities

Power plants
Dams/levees
Military installations
Hazardous material sites
Schools
Shelters
Day care centers
Nursing homes
Main government buildings

Transportation and Lifeline

Highways, bridges, and tunnels
Railroads and facilities
Bus facilities
Airports
Water treatment facilities
Natural gas facilities and
pipelines
Oil facilities and pipelines
Communications facilities

Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster.

Asset Inventory

Please list critical facilities and other community assets, the square feet, values, and occupancy/capacity. If not applicable, enter "N/A"). In the last column, use the codes from the previous page to indicate hazards to which the asset is vulnerable. Add as many rows as needed. If this information is available in GIS format, please provide.

Critical Facilities

[illegible]

Economic Assets (Major Employers, etc)

Asset	Address	Product/ Service	Value (if known)	Number of Employees	Hazards
NONE					

Multi-Jurisdictional Hazard Mitigation Plan
Data Collection Questionnaire
For Local Governments

County: Knox County

Jurisdiction: City of Knox City _____

Return by: _____

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Prepared by: Amanda Frost _____

Phone: 660-434-5366 _____

Email: _____

Date: 11/2/2020 _____

Please return questionnaires by mail, email, or fax to:

Name: Derek Weber

Address: 121 S. Cecil St. Memphis, MO 63555

Email: derekweber@nemorpc.org

Fax: 660-465-7163

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<u>Economic Development Plan</u>	No	
Transportation Plan	No	
Land-use Plan	No	
Flood Mitigation Assistance (FMA) Plan	No	
<u>Watershed Plan</u>	No	
Firewise or other fire mitigation plan	No	
Critical Facilities Plan (Mitigation/Response/Recovery)	No	

Element	Yes, No, N/A	Comments and/or Weblink
Policies/Ordinance		
Zoning Ordinance	No	
Building Code	No	
Floodplain Ordinance	No	
Subdivision Ordinance	No	
Tree Trimming Ordinance	No	
Nuisance Ordinance	Yes	
Stormwater Ordinance	No	
Drainage Ordinance	No	
Site Plan Review Requirements	No	
Historic Preservation Ordinance	No	
Landscape Ordinance	No	
Program		
Zoning/Land Use Restrictions	No	
Codes Building Site/Design	No	
Hazard Awareness Program	No	
National Flood Insurance Program (NFIP)	No	
NFIP Community Rating System (CRS) program		If so, what is your current level rating?
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Property Acquisition	No	
Planning/Zoning Boards	No	
Stream Maintenance Program	No	
Tree Trimming Program	No	
<u>Engineering Studies for Streams (Local/County/Regional)</u>	No	

Element	Yes, No, N/A	Comments and/or Weblink
Mutual Aid Agreements	Yes	
Studies/Reports/Maps		
<u>Hazard Analysis/Risk Assessment (City)</u>	No	
<u>Hazard Analysis/Risk Assessment (County)</u>	No	
Evacuation Route Map	No	
<u>Critical Facilities Inventory</u>	No	
<u>Vulnerable Population Inventory</u>	No	
<u>Land Use Map</u>	No	
Staff/Department		Full Time or Part Time?
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Building Inspector	No	
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Engineer	No	
Development Planner	No	
Public Works Official	No	
Emergency Management Coordinator	No	
NFIP Floodplain Administrator	No	
Emergency Response Team	No	
Hazardous Materials Expert	No	
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Transportation Department	No	
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Housing Department	No	
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Non-Governmental Organizations (NGOs)	Is there a local chapter? Yes or No	
American Red Cross	No	
Salvation Army	No	
Veterans Groups	Yes	

Element	Yes, No, N/A	Comments and/or Weblink
Local Environmental Organization	No	
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Financial Resources		Is your jurisdiction able to? Yes or No
Apply for Community Development Block Grants		Yes
Fund projects thru Capital Improvements funding		Yes
Authority to levy taxes for specific purposes		Yes
Fees for water, sewer, gas, or electric services		Yes
Impact fees for new development		No
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Incur debt through private activities		No
Withhold spending in hazard prone areas		No

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Firewise or other Fire Mitigation Plan such as Community Wildfire Protection Plan	

Additional Questions

1. How is your government structure organized? (Commission, Mayor/City Council, how many members)

Mayor and 4 Aldermen

2. List any past or ongoing public education or information programs, such as for responsible water use, fire safety, household preparedness, or environmental education.

None

3. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities. Be sure to include pending or approved projects submitted for FEMA mitigation grants.

None

4. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

None

5. How many outdoor warning sirens are in your community?

1

How are they activated (indicate responsible department/personnel)?

Fire Department

6. Does your community utilize any other warning systems such as Cable Override, Reverse 911, etc? If so, please describe.

No

7. Does your community have designated public tornado shelters/saferooms? If so, are they constructed in accordance with FEMA standards?

NO

Please provide address locations:

8. List residential, commercial and industrial development in your jurisdiction since last plan update.

None

9. Describe development trends and expected growth areas. Is any new development expected to occur in the 100-year floodplain? Is any new development expected to occur in any other known hazard areas? If possible, please provide a map indicating potential/planned growth areas.

None

10. Are any new facilities or infrastructure planned for construction during the next five years? If so, please provide facility name and purpose along with proposed locations, if known.

None that the City knows of.

11. Please list major employers in your jurisdiction with an estimated number of employees.

Herzog Lumber Company 15

12. Please list Mitigation Planning Committee members who served during the development of the previously approved plan. Was the process set forth for monitoring the implementation of the previously approved mitigation plan adhered to? Did the Committee meet as was specified in the previously approved plan? Why or why not?

Members no longer serve on City Council.

13. Describe your jurisdiction's participation in the NFIP. Include information about how compliance with the NFIP is enforced locally.

Not Participating

VULNERABILITY ASSESSMENT

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets. In the natural hazard column of the asset inventory table, indicate (by assigned abbreviation) which of the following hazards the asset is vulnerable to:

Natural Hazards	
Flooding (Major & Flash) - RF	Drought - D
Levee Failure - LF	Extreme Temperature - ET
Dam Failure - DF	Severe Thunderstorm (incl. winds, hail, lightning) - ST
Earthquake - EQ	Severe Winter Weather (incl. snow, ice, severe cold) - SWW
Land Subsidence / Sinkholes - LSS	Tornadoes - T
	Wildfire - WF

Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 'Essential facilities' are those that if damaged would have devastating impacts on disaster response and/or recovery. 'High potential loss facilities' are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

Essential Facilities

Hospitals and other
medical facilities
Police stations
Fire station
Emergency Operations
Centers

High Potential Loss Facilities

Power plants
Dams/levees
Military installations
Hazardous material sites
Schools
Shelters
Day care centers
Nursing homes
Main government buildings

Transportation and Lifeline

Highways, bridges, and tunnels
Railroads and facilities
Bus facilities
Airports
Water treatment facilities
Natural gas facilities and
pipelines
Oil facilities and pipelines
Communications facilities

Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster.

Asset Inventory

Please list critical facilities and other community assets, the square feet, values, and occupancy/capacity. If not applicable, enter "N/A"). In the last column, use the codes from the previous page to indicate hazards to which the asset is vulnerable. Add as many rows as needed. If this information is available in GIS format, please provide.

Critical Facilities

[illegible]

Economic Assets (Major Employers, etc)

Asset	Address	Product/Service	Value (if known)	Number of Employees	Hazards
NONE					

Multi-Jurisdictional Hazard Mitigation Plan
Data Collection Questionnaire
For Local Governments

County: Knox County

Jurisdiction: Village of Newark

Return by: _____

Please complete this data collection questionnaire as accurately and completely as possible as this information will appear in the mitigation plan. A data collection questionnaire must be completed for each "jurisdiction" that wishes to be included in the plan. According to FEMA's definition a jurisdiction is any local government, including counties, municipalities, cities, towns, school districts, special districts, councils of government, and tribal organizations. Any of these entities as well as publicly funded colleges and universities that do not participate in the planning process **will not** be eligible applicants for FEMA mitigation funding programs. Please note: School Districts and other Educational Institutions should complete the Data Collection Questionnaire indicated "For School Districts and Educational Institutions".

Prepared by: Rita Lindsey _____

Phone: 660-733-5658 _____

Email: _____

Date: 12/7/2020 _____

Please return questionnaires by mail, email, or fax to:

Name: Derek Weber

Address: 121 S. Cecil St. Memphis, MO 63555

Email: derekweber@nemorpc.org

Fax: 660-465-7163

CAPABILITY ASSESSMENT & INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The purpose of this section is to collect information to document existing capabilities as well as determine existing plans, studies, reports, and technical information that may need to be incorporated in the mitigation plan. Although some of this information may have been captured in your previous mitigation plan, it is important to ensure this information is current in the plan update

Please indicate which of the following your jurisdiction has in place. For elements that do not pertain to your type of public entity, please indicate with "N/A". If applicable, please provide a completion date for the element. If your jurisdiction does not have a particular element, and a higher level of government has the authority pertaining to your jurisdiction, please indicate this in the comments column. If your jurisdiction has any of the **underlined and bolded** elements, please provide a copy of the document to the contact listed on the front and indicate method in the comments column (i.e. available on the web, will email or mail).

Element	Yes, No, N/A	Comments and/or Weblink
Planning Capabilities		
<u>Comprehensive Plan</u>	No	
Builder's Plan	No	
Capital Improvement Plan	No	
City Emergency Operations Plan	No	
County Emergency Operations Plan	Yes	
Local Recovery Plan	No	
County Recovery Plan	No	
City Mitigation Plan	No	
County Mitigation Plan	Yes	
Debris Management Plan	No	
<u>Economic Development Plan</u>	No	
Transportation Plan	No	
Land-use Plan	No	
Flood Mitigation Assistance (FMA) Plan	No	
<u>Watershed Plan</u>	No	
Firewise or other fire mitigation plan	No	
Critical Facilities Plan (Mitigation/Response/Recovery)	No	

Element	Yes, No, N/A	Comments and/or Weblink
Policies/Ordinance		
Zoning Ordinance	No	
Building Code	No	
Floodplain Ordinance	No	
Subdivision Ordinance	No	
Tree Trimming Ordinance	No	
Nuisance Ordinance	Yes	
Stormwater Ordinance	No	
Drainage Ordinance	No	
Site Plan Review Requirements	No	
Historic Preservation Ordinance	No	
Landscape Ordinance	No	
Program		
Zoning/Land Use Restrictions	No	
Codes Building Site/Design	No	
Hazard Awareness Program	No	
National Flood Insurance Program (NFIP)	No	
NFIP Community Rating System (CRS) program		If so, what is your current level rating?
National Weather Service (NWS) Storm Ready Certification	No	
Firewise Community Certification	No	
Building Code Effectiveness Grading (BCEGs)	No	
ISO Fire Rating	Rating:6	
Economic Development Program	No	
Land Use Program	No	
Public Education/Awareness	No	
Property Acquisition	No	
Planning/Zoning Boards	No	
Stream Maintenance Program	No	
Tree Trimming Program	No	
Engineering Studies for Streams (Local/County/Regional)	No	

Element	Yes, No, N/A	Comments and/or Weblink
Mutual Aid Agreements	Yes	
Studies/Reports/Maps		
<u>Hazard Analysis/Risk Assessment (City)</u>	No	
<u>Hazard Analysis/Risk Assessment (County)</u>	No	
Evacuation Route Map	No	
<u>Critical Facilities Inventory</u>	No	
<u>Vulnerable Population Inventory</u>	No	
<u>Land Use Map</u>	No	
Staff/Department		Full Time or Part Time?
Building Code Official	No	
Building Inspector	No	
Mapping Specialist (GIS)	No	
Engineer	No	
Development Planner	No	
Public Works Official	No	
Emergency Management Coordinator	No	
NFIP Floodplain Administrator	No	
Emergency Response Team	No	
Hazardous Materials Expert	No	
Local Emergency Planning Committee	Yes	
County Emergency Management Commission	No	
Sanitation Department	No	
Transportation Department	No	
Economic Development Department	No	
Housing Department	No	
Historic Preservation	No	
Non-Governmental Organizations (NGOs)	Is there a local chapter? Yes or No	
American Red Cross	No	
Salvation Army	No	
Veterans Groups	Yes	

Element	Yes, No, N/A	Comments and/or Weblink
Local Environmental Organization	No	
Homeowner Associations	No	
Neighborhood Associations	No	
Chamber of Commerce	No	
Community Organizations (Lions, Kiwanis, etc.)	Yes	
Financial Resources		Is your jurisdiction able to? Yes or No
Apply for Community Development Block Grants		Yes
Fund projects thru Capital Improvements funding		Yes
Authority to levy taxes for specific purposes		Yes
Fees for water, sewer, gas, or electric services		Yes
Impact fees for new development		No
Incur debt through general obligation bonds		No
Incur debt through special tax bonds		Yes
Incur debt through private activities		No
Withhold spending in hazard prone areas		No

For plan updates, the plan maintenance process outlined in your previous plan requires all participating jurisdictions to incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate. A key element of effective implementation of mitigation is for the mitigation plan to be incorporated in existing authorities, policies, programs, and resources. Next to each applicable planning mechanism, indicate how your jurisdiction incorporated the previous mitigation plan. If no incorporation has occurred, please explain, including background information detailing any challenges preventing incorporation.

Planning Capabilities	Method of Incorporation Since Previous Plan or Challenges Preventing Incorporation
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Recovery Plan	
County Recovery Plan	
Debris Management Plan	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Watershed Plan	
Firewise or other Fire Mitigation Plan such as Community Wildfire Protection Plan	

Additional Questions

1. How is your government structure organized? (Commission, Mayor/City Council, how many members)

Mayor/Council 4 Trustees

2. List any past or ongoing public education or information programs, such as for responsible water use, fire safety, household preparedness, or environmental education.

No

3. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities. Be sure to include pending or approved projects submitted for FEMA mitigation grants.

No

4. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

No

5. How many outdoor warning sirens are in your community?

1

How are they activated (indicate responsible department/personnel)?

Fire Department

6. Does your community utilize any other warning systems such as Cable Override, Reverse 911, etc? If so, please describe.

No

7. Does your community have designated public tornado shelters/saferooms? If so, are they constructed in accordance with FEMA standards?

No

Please provide address locations:

8. List residential, commercial and industrial development in your jurisdiction since last plan update.

None

9. Describe development trends and expected growth areas. Is any new development expected to occur in the 100-year floodplain? Is any new development expected to occur in any other known hazard areas? If possible, please provide a map indicating potential/planned growth areas.

None

10. Are any new facilities or infrastructure planned for construction during the next five years? If so, please provide facility name and purpose along with proposed locations, if known.

None

11. Please list major employers in your jurisdiction with an estimated number of employees.

None

12. Please list Mitigation Planning Committee members who served during the development of the previously approved plan. Was the process set forth for monitoring the implementation of the previously approved mitigation plan adhered to? Did the Committee meet as was specified in the previously approved plan? Why or why not?

None

13. Describe your jurisdiction's participation in the NFIP. Include information about how compliance with the NFIP is enforced locally.

Not Participating

VULNERABILITY ASSESSMENT

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets. In the natural hazard column of the asset inventory table, indicate (by assigned abbreviation) which of the following hazards the asset is vulnerable to:

Natural Hazards	
Flooding (Major & Flash) - RF	Drought - D
Levee Failure - LF	Extreme Temperature - ET
Dam Failure - DF	Severe Thunderstorm (incl. winds, hail, lightning) - ST
Earthquake - EQ	Severe Winter Weather (incl. snow, ice, severe cold) - SWW
Land Subsidence / Sinkholes - LSS	Tornadoes - T
	Wildfire - WF

Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 'Essential facilities' are those that if damaged would have devastating impacts on disaster response and/or recovery. 'High potential loss facilities' are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

Essential Facilities

Hospitals and other
medical facilities
Police stations
Fire station
Emergency Operations
Centers

High Potential Loss Facilities

Power plants
Dams/levees
Military installations
Hazardous material sites
Schools
Shelters
Day care centers
Nursing homes
Main government buildings

Transportation and Lifeline

Highways, bridges, and tunnels
Railroads and facilities
Bus facilities
Airports
Water treatment facilities
Natural gas facilities and
pipelines
Oil facilities and pipelines
Communications facilities

Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster.

Asset Inventory

Please list critical facilities and other community assets, the square feet, values, and occupancy/capacity. If not applicable, enter "N/A"). In the last column, use the codes from the previous page to indicate hazards to which the asset is vulnerable. Add as many rows as needed. If this information is available in GIS format, please provide.

Critical Facilities

[illegible]

Multi-Jurisdictional Hazard Mitigation Plan
Data Collection Questionnaire
For Local Governments

County: Knox County

Jurisdiction: Village of Novelty

Return by: _____

Please complete this data collection questionnaire as accurately and completely as possible as this information will appear in the mitigation plan. A data collection questionnaire must be completed for each "jurisdiction" that wishes to be included in the plan. According to FEMA's definition a jurisdiction is any local government, including counties, municipalities, cities, towns, school districts, special districts, councils of government, and tribal organizations. Any of these entities as well as publicly funded colleges and universities that do not participate in the planning process **will not** be eligible applicants for FEMA mitigation funding programs. Please note: School Districts and other Educational Institutions should complete the Data Collection Questionnaire indicated "For School Districts and Educational Institutions".

Prepared by: Anna Applegate _____

Phone: 660-739-4511 _____

Email: _____

Date: 12/7/2020 _____

Please return questionnaires by mail, email, or fax to:

Name: Derek Weber

Address: 121 S. Cecil St. Memphis, MO 63555

Email: derekweber@nemorpc.org

Fax: 660-465-7163

CAPABILITY ASSESSMENT & INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The purpose of this section is to collect information to document existing capabilities as well as determine existing plans, studies, reports, and technical information that may need to be incorporated in the mitigation plan. Although some of this information may have been captured in your previous mitigation plan, it is important to ensure this information is current in the plan update

Please indicate which of the following your jurisdiction has in place. For elements that do not pertain to your type of public entity, please indicate with "N/A". If applicable, please provide a completion date for the element. If your jurisdiction does not have a particular element, and a higher level of government has the authority pertaining to your jurisdiction, please indicate this in the comments column. If your jurisdiction has any of the **underlined and bolded** elements, please provide a copy of the document to the contact listed on the front and indicate method in the comments column (i.e. available on the web, will email or mail).

Element	Yes, No, N/A	Comments and/or Weblink
Planning Capabilities		
<u>Comprehensive Plan</u>	No	
Builder's Plan	No	
Capital Improvement Plan	No	
City Emergency Operations Plan	No	
County Emergency Operations Plan	Yes	
Local Recovery Plan	No	
County Recovery Plan	No	
City Mitigation Plan	No	
County Mitigation Plan	Yes	
Debris Management Plan	No	
<u>Economic Development Plan</u>	No	
Transportation Plan	No	
Land-use Plan	No	
Flood Mitigation Assistance (FMA) Plan	No	
<u>Watershed Plan</u>	No	
Firewise or other fire mitigation plan	No	
Critical Facilities Plan (Mitigation/Response/Recovery)	No	

Element	Yes, No, N/A	Comments and/or Weblink
Policies/Ordinance		
Zoning Ordinance	No	
Building Code	No	
Floodplain Ordinance	No	
Subdivision Ordinance	No	
Tree Trimming Ordinance	No	
Nuisance Ordinance	Yes	
Stormwater Ordinance	No	
Drainage Ordinance	No	
Site Plan Review Requirements	No	
Historic Preservation Ordinance	No	
Landscape Ordinance	No	
Program		
Zoning/Land Use Restrictions	No	
Codes Building Site/Design	No	
Hazard Awareness Program	No	
National Flood Insurance Program (NFIP)	No	
NFIP Community Rating System (CRS) program		If so, what is your current level rating?
National Weather Service (NWS) Storm Ready Certification	No	
Firewise Community Certification	No	
Building Code Effectiveness Grading (BCEGs)	No	
ISO Fire Rating	Rating:6	
Economic Development Program	No	
Land Use Program	No	
Public Education/Awareness	No	
Property Acquisition	No	
Planning/Zoning Boards	No	
Stream Maintenance Program	No	
Tree Trimming Program	No	
Engineering Studies for Streams (Local/County/Regional)	No	

Element	Yes, No, N/A	Comments and/or Weblink
Mutual Aid Agreements	Yes	
Studies/Reports/Maps		
<u>Hazard Analysis/Risk Assessment (City)</u>	No	
<u>Hazard Analysis/Risk Assessment (County)</u>	No	
Evacuation Route Map	No	
<u>Critical Facilities Inventory</u>	No	
<u>Vulnerable Population Inventory</u>	No	
<u>Land Use Map</u>	No	
Staff/Department		Full Time or Part Time?
Building Code Official	No	
Building Inspector	No	
Mapping Specialist (GIS)	No	
Engineer	No	
Development Planner	No	
Public Works Official	No	
Emergency Management Coordinator	No	
NFIP Floodplain Administrator	No	
Emergency Response Team	No	
Hazardous Materials Expert	No	
Local Emergency Planning Committee	Yes	
County Emergency Management Commission	No	
Sanitation Department	No	
Transportation Department	No	
Economic Development Department	No	
Housing Department	No	
Historic Preservation	No	
Non-Governmental Organizations (NGOs)	Is there a local chapter? Yes or No	
American Red Cross	No	
Salvation Army	No	
Veterans Groups	Yes	

Element	Yes, No, N/A	Comments and/or Weblink
Local Environmental Organization	No	
Homeowner Associations	No	
Neighborhood Associations	No	
Chamber of Commerce	No	
Community Organizations (Lions, Kiwanis, etc.	No	
Financial Resources		Is your jurisdiction able to? Yes or No
Apply for Community Development Block Grants		Yes
Fund projects thru Capital Improvements funding		Yes
Authority to levy taxes for specific purposes		Yes
Fees for water, sewer, gas, or electric services		Yes
Impact fees for new development		No
Incur debt through general obligation bonds		No
Incur debt through special tax bonds		Yes
Incur debt through private activities		No
Withhold spending in hazard prone areas		No

For plan updates, the plan maintenance process outlined in your previous plan requires all participating jurisdictions to incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate. A key element of effective implementation of mitigation is for the mitigation plan to be incorporated in existing authorities, policies, programs, and resources. Next to each applicable planning mechanism, indicate how your jurisdiction incorporated the previous mitigation plan. If no incorporation has occurred, please explain, including background information detailing any challenges preventing incorporation.

Planning Capabilities	Method of Incorporation Since Previous Plan or Challenges Preventing Incorporation
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County Recovery Plan	
Debris Management Plan	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Watershed Plan	
Firewise or other Fire Mitigation Plan such as Community Wildfire Protection Plan	

Additional Questions

1. How is your government structure organized? (Commission, Mayor/City Council, how many members)

Mayor/Council 4 Trustees

2. List any past or ongoing public education or information programs, such as for responsible water use, fire safety, household preparedness, or environmental education.

No

3. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities. Be sure to include pending or approved projects submitted for FEMA mitigation grants.

No

4. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

No

5. How many outdoor warning sirens are in your community?

0

How are they activated (indicate responsible department/personnel)?

6. Does your community utilize any other warning systems such as Cable Override, Reverse 911, etc? If so, please describe.

No

7. Does your community have designated public tornado shelters/saferooms? If so, are they constructed in accordance with FEMA standards?

No

Please provide address locations:

8. List residential, commercial and industrial development in your jurisdiction since last plan update.

None

9. Describe development trends and expected growth areas. Is any new development expected to occur in the 100-year floodplain? Is any new development expected to occur in any other known hazard areas? If possible, please provide a map indicating potential/planned growth areas.

None

10. Are any new facilities or infrastructure planned for construction during the next five years? If so, please provide facility name and purpose along with proposed locations, if known.

None

11. Please list major employers in your jurisdiction with an estimated number of employees.

None

12. Please list Mitigation Planning Committee members who served during the development of the previously approved plan. Was the process set forth for monitoring the implementation of the previously approved mitigation plan adhered to? Did the Committee meet as was specified in the previously approved plan? Why or why not?

None Turnover of City government

13. Describe your jurisdiction's participation in the NFIP. Include information about how compliance with the NFIP is enforced locally.

Not Participating

VULNERABILITY ASSESSMENT

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets. In the natural hazard column of the asset inventory table, indicate (by assigned abbreviation) which of the following hazards the asset is vulnerable to:

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Flooding (Major & Flash) - RF	Drought - D
Levee Failure - LF	Extreme Temperature - ET
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Land Subsidence / Sinkholes - LSS	Tornadoes - T
	Wildfire - WF

Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 'Essential facilities' are those that if damaged would have devastating impacts on disaster response and/or recovery. 'High potential loss facilities' are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

Essential Facilities

Hospitals and other
medical facilities
Police stations
Fire station
Emergency Operations
Centers

High Potential Loss Facilities

Power plants
Dams/levees
Military installations
Hazardous material sites
Schools
Shelters
Day care centers
Nursing homes
Main government buildings

Transportation and Lifeline

Highways, bridges, and tunnels
Railroads and facilities
Bus facilities
Airports
Water treatment facilities
Natural gas facilities and
pipelines
Oil facilities and pipelines
Communications facilities

Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster.

Asset Inventory

Please list critical facilities and other community assets, the square feet, values, and occupancy/capacity. If not applicable, enter "N/A"). In the last column, use the codes from the previous page to indicate hazards to which the asset is vulnerable. Add as many rows as needed. If this information is available in GIS format, please provide.

Critical Facilities

[illegible]

Name of Asset	Address	Area (sq.ft.)	Replacement Value (Insured) (\$)	Contents Value (\$)	Occupancy/ Capacity (#)	Natural Hazards
High Potential Loss Facilities such as power plants, dams/levees, military installations, hazardous materials sites, shelters, day care centers, nursing homes, main government buildings (Do not include schools—they will be reported by the school districts)						
Transportation and Lifelines such as highways, bridges, and tunnels, railroads and facilities, bus facilities, airports, water treatment facilities, natural gas facilities and pipelines, oil facilities, oil facilities and pipelines, communications facilities						
Hwy 6						

*If replacement cost data is not available, use the best available data (assessed valuation or other method for estimating cost) and explain any data deficiencies.

Multi-Jurisdictional Hazard Mitigation Plan

Data Collection Questionnaire

For School Districts and Educational Institutions

County: Knox County

School District /

Educational Institution Name: Knox County R-I School District

Return by: Andy Turgeon

Please complete this data collection questionnaire as accurately and completely as possible as this information will appear in the mitigation plan. A data collection questionnaire must be completed for each "jurisdiction" that wishes to be included in the plan. According to FEMA's definition a jurisdiction is any local government, including counties, municipalities, cities, towns, school districts, special districts, councils of government, and tribal organizations. Any of these entities as well as publicly funded colleges and universities that do not participate in the planning process **will not** be eligible applicants for FEMA mitigation funding programs.

Prepared by: Andy Turgeon

Phone: (660) 397-2228

Email: aturgeon@knoxr1.us

Date: 01/20/2021

Please return questionnaires by mail, email, or fax to:

Name: Same as above

Address: _____

Email: _____

Fax: _____

CAPABILITY ASSESSMENT & INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The purpose of this section is to collect information to document existing capabilities as well as determine existing plans, studies, reports, and technical information that may need to be incorporated in the mitigation plan.

Please indicate which of the following your school district / institution has in place. For elements that do not pertain to you, please indicate with "N/A". If applicable, please provide a completion date for the element. If your school district / institution has any of the **underlined and bolded** elements, please provide a copy of the document to the contact indicated on the front of this questionnaire and indicate method in the comments column (i.e. available on the web, will email or mail).

Planning Elements	Yes/No	Date of Latest Version	Comments
Master Plan	Yes	2/16/2021	Updated Yearly
Capital Improvement Plan	Yes		Updated Yearly
<u>School Emergency Plan</u> Shelter in place protocols Evacuation protocols	Yes		Updated Yearly
Weapons Policy	Yes	7/16/2013	

Administrative/Technical

Identify the technical and personnel resources responsible for activities related to hazard mitigation/loss prevention within your school district / institution.

Personnel Resources	Yes/No	Department/Position	Comments
Full-time building official (i.e. Principal)	Yes	2 Principals	1 Elementary, 1 High School
Emergency Manager	Yes	Central Office/Safety Coordinator/School protection officer	
Grant Writer	Yes	Central Office/Federal Programs Coordinator	
Public Information Officer	Yes	Central Office/Superintendent	

Financial Resources

Identify whether your school district /institution has access to or is eligible to use the following financial resources for hazard mitigation.

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Capital improvements project funding	Approximately \$400,000	
Local funds		
General obligation bonds	\$1,732,640	
Special tax bonds		
Private activities/donations		
State and federal funds		

Additional Capabilities Questions

1. Are your buildings equipped with a public address (PA) system or other emergency alert system? Please describe.

Yes, our phone systems works as an intercom, and we have a parent notification App that sends out notification, posts on our social media sites, and to our website

2. Does your school buildings 'have NOAA Weather Radios?

We have one radio in the central office and it is a Midland brand

3. List any past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect facilities or provide education regarding hazards that could occur.

We have upgraded our Fire Alarm system 2 years ago, and have redone the basement 7 years ago which is where we go for a tornado

4. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities.

We train every year on all the drills and revise our plan as needed.

5. Do any of your buildings have designated tornado shelters or "saferooms"? If so, are they constructed in accordance with FEMA standards?

We have a basement for tornado but not sure that it meets FEMA standards.

6. Did your school district / institution make any additions to buildings or construction new buildings since the last plan update (2010)? Please list the buildings and the improvement.

No

7. Does your school district / institution plan to remodel or construct any buildings in the next 5 years? If so, please list the building or proposed building and planned improvements. Are any planned construction activities in known hazard areas?

No

8. What percentage is your projected enrollment expected to increase or decrease in the next five years?

It should remain about the same. It seems to have leveled off.

9. Do you have your own campus police? Please explain your police department or who you rely on for security needs.

We do not. Highway patrol will usually stop in once a week and walk around the building. We do have a School Protection Officer.

Name	Square Footage	Property Value	Content Value	Total Insured Value	Year Built
High School Building	69104.00	13109139.11	3164259.40	16273398.51	1964
Middle School Building	9400.00	1418546.71	202465.09	1621011.80	2001
Bus Barn	5500.00	300475.30	151187.64	451662.94	1991
Athletic Building	3675.00	552251.77	43154.71	595406.48	1971
Baseball Building	750.00	18370.69	2503.99	20874.68	1997
Playground Equipment	0.00	76459.23	10174.11	86633.34	2013
Scoreboard	0.00	44139.68	13128.53	57268.21	2014
Baseball Bathroom Facility	270.00	16999.01	0.00	16999.01	2006
Elementary School Building	48642.00	6941450.53	2268355.68	9209806.21	1989
Marque Sign	0.00	34234.72	0.00	34234.72	2014
Greenhouse	1440.00	103100.00	15375.00	118475.00	2019
Softball Bathroom and Concessions	400.00	15465.00	5125.00	20590.00	2019

Appendix C

Knox County, Missouri RESOLUTION NO. 1-11-21

A RESOLUTION OF THE KNOX COUNTY, MISSOURI ADOPTING THE KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN AND THE EFFORT TO BECOME A DISASTER RESISTANCE COMMUNITY.

WHEREAS the KNOX COUNTY recognizes the threat that natural hazards pose to people and property within the KNOX COUNTY; and

WHEREAS the KNOX COUNTY has participated in the preparation of a multi-jurisdictional local hazard mitigation plan, hereby known as the KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in KNOX COUNTY from the impacts of future hazards and disasters; and

WHEREAS KNOX COUNTY recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the KNOX COUNTY will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by KNOX COUNTY demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

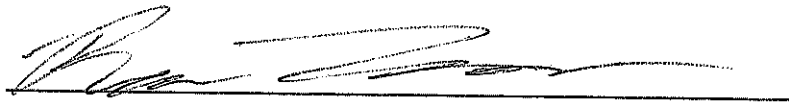
NOW THEREFORE, BE IT RESOLVED BY THE COUNTY COMMISSIONERS OF KNOX COUNTY, in the State of Missouri, THAT:

KNOX COUNTY HEREBY adopts the KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN.

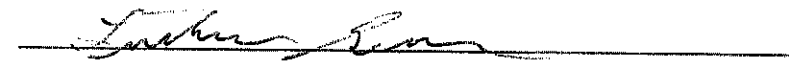
ADOPTED by KNOX COUNTY COMMISSION, this 11 day of Jan, 2021.



Evan Glasgow, Presiding Commissioner

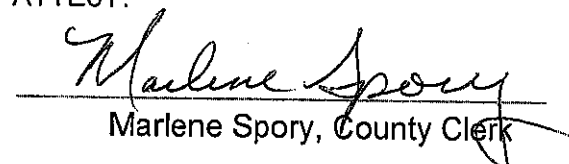


Ronnie Leckbee, Eastern District Commissioner



Luther Green, Western District Commissioner

ATTEST:



Marlene Spory, County Clerk

City of Edina County, Missouri RESOLUTION NO. 715

A RESOLUTION OF THE CITY OF EDINA, MISSOURI ADOPTING THE KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN AND THE EFFORT TO BECOME A DISASTER RESISTANCE COMMUNITY.

WHEREAS the CITY OF EDINA recognizes the threat that natural hazards pose to people and property within the CITY OF EDINA; and

WHEREAS the CITY OF EDINA has participated in the preparation of a multi-jurisdictional local hazard mitigation plan, hereby known as the KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in CITY OF EDINA from the impacts of future hazards and disasters; and

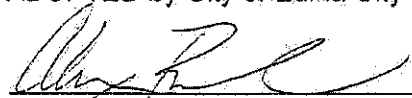
WHEREAS CITY OF EDINA recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the CITY OF EDINA will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by CITY OF EDINA demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF CITY OF EDINA, in the State of Missouri, THAT:

CITY OF EDINA HEREBY adopts the KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN.

ADOPTED by City of Edina City Council, this 11th day of January, 2021.



Alex Reel, Mayor


Margaret Gibson, City Clerk

Copy

KNOX COUNTY R-1 SCHOOL DISTRICT, Missouri RESOLUTION NO. __

A RESOLUTION OF THE KNOX COUNTY R-1 SCHOOL DISTRICT, MISSOURI ADOPTING THE KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN AND THE EFFORT TO BECOME A DISASTER RESISTANCE COMMUNITY.

WHEREAS the **KNOX COUNTY R-1 SCHOOL DISTRICT** recognizes the threat that natural hazards pose to people and property within the **KNOX COUNTY R-1 SCHOOL DISTRICT**; and

WHEREAS the **KNOX COUNTY R-1 SCHOOL DISTRICT** has participated in the preparation of a multi-jurisdictional local hazard mitigation plan, hereby known as the **KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN**, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and


WHEREAS the **KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN** identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the **KNOX COUNTY R-1 SCHOOL DISTRICT** from the impacts of future hazards and disasters; and

WHEREAS **KNOX COUNTY R-1 SCHOOL DISTRICT** recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the **KNOX COUNTY R-1 SCHOOL DISTRICT** will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by **KNOX COUNTY R-1 SCHOOL DISTRICT** demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

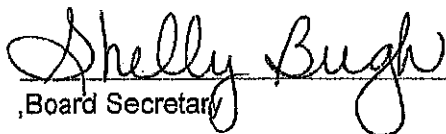
NOW THEREFORE, BE IT RESOLVED BY THE SCHOOL BOARD OF KNOX COUNTY R-1 SCHOOL DISTRICT, in the State of Missouri, THAT: In accordance with KNOX COUNTY R-1 SCHOOL DISTRICT School Board Policy, HEREBY adopts the **KNOX COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN**.

ADOPTED by a vote of 7 in favor and 0 against and 0 abstaining, this 19 day of January, 2021.



, Board President

ATTEST:



, Board Secretary