DALLAS COUNTY
MISSOURI
2023 Multi-Jurisdictional
Natural Hazard Mitigation Plan

Approved March 28, 2023

Prepared by:

SMCOG
Southwest Missouri
COUNCIL OF GOVERNMENTS

U.S. Department of Homeland Security
FEMA Region 7
11224 Holmes Road
Kansas City, MO 64131

FEMA

April 4, 2023

Director Remillard
State Emergency Management Agency
P. O. Box 116
Jefferson City, Missouri 65102

Subject: Approval of the Dallas County Hazard Mitigation Plan

Director Remillard:

In accordance with applicable[1] laws, regulations and policy, the Risk Analysis Branch of the Federal Emergency Management Agency (FEMA) Region 7 has approved the Dallas County Hazard Mitigation Plan. The attached Local Mitigation Plan Review Tool lists participants receiving approval that have submitted required adoption documentation.

The approval period for this plan is from March 28, 2023, through March 27, 2028. The same official plan expiration date applies to all participating jurisdictions, regardless of adoption date.

An approved mitigation plan is one of the conditions for applying for and receiving FEMA mitigation grants from the following programs:

- Hazard Mitigation Grant Program
- Building Resilient Infrastructure and Communities
- Flood Mitigation Assistance

Having an approved mitigation plan does not mean that mitigation grant funding will be awarded. Specific application and eligibility requirements for the programs listed above can be found in each FEMA grant program's respective policies and annual Notice of Funding Opportunities, as applicable.

To avoid a lapsed plan, the next plan update must be approved before the end of the approval period, including adoption by the participating jurisdictions. Before the end of the approval period, please allow sufficient time to secure funding for the update, including the review and approval process. Please include time for any revisions, if needed, and for the jurisdiction to formally adopt the plan after the review, if not adopted prior to submission. This will enable them to remain eligible to apply for and receive funding from FEMA's mitigation grant programs with a mitigation plan requirement. Local governments, including special districts, with a plan status of "Approvable Pending Adoption" are not eligible for FEMA's mitigation grant programs with a mitigation plan requirement.

[1] Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and National Dam Safety Program Act, as amended; 44 CFR Part 201, Mitigation Planning; and Local Mitigation Plan Review Guide.

We look forward to discussing options for implementing this mitigation plan. If you should have any questions or concerns, please contact Joe Chandler, Planning Team Lead, at (816) 808-9016 or joe.chandler@fema.dhs.gov.

Sincerely,

LAURIE L BESTGEN Digitally signed by LAURIE L BESTGEN
Date: 2023.04.04 14:52:32 -05'00'

For Catherine R. Sanders, Director
Mitigation Division

Attachment: Local Mitigation Plan Review Tool

CONTRIBUTORS

Dallas County Hazard Mitigation Planning Committee

Jurisdictional Representatives

Name	Title	Organization
April Garrett	Emergency Management Deputy Director	Dallas County
Tara Swanigan	Emergency Management Staff	Dallas County
Terry Lane	Emergency Management Director	Dallas County
Brandon Kennall	Mayor	City of Buffalo
Greg Cunningham	Fire Chief	City of Buffalo
Dawn Sutton	Utility Clerk	City of Urbana
Sandra Simmons	Mayor	City of Urbana
Buck Schockley	Assistant Superintendent	Dallas County R-I School District
Duane Hamilton	Executive Director	Dallas County 911
Beth McGregor	Resident	Urbana Rural Fire Department
Bud Glanville	Board Member	Urbana Rural Fire Department
Heather Stidham	Board Member	Urbana Rural Fire Department
Hiram Jones	Board Member	Urbana Rural Fire Department
James Chatham	Board Member	Urbana Rural Fire Department
Jason Crawford	Board Member	Urbana Rural Fire Department
Larry Senyard	Fire Chief	Urbana Rural Fire Department
Linda Senyard	Firefighter/First Responder	Urbana Rural Fire Department

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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. Dallas County and the participating municipalities/schools/special districts developed this multi-jurisdictional local hazard mitigation plan update to reduce future losses from hazard events to the county and its communities. This plan is an update of the previous plan that was approved on August 6, 2018. 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:

- Dallas County
- City of Buffalo
- City of Urbana
- Dallas County R-I School District
- Dallas County 911
- Urbana Rural Fire Department

Local jurisdictions that were invited to participate but did not include:

- Village of Louisburg
- Buffalo Rural Fire District
- Dallas County Health Department
- Long Lane Rural Fire District
- Southern Dallas County Fire Protection District
- Windyville Volunteer Fire Department

When the future five-year update is developed for this plan, these jurisdictions will be invited again to participate.

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 Dallas County and the participating jurisdictions. The MPC updated the risk assessment that identified and profiled hazards that pose a risk to the 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, 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. Protect the lives and livelihoods of all citizens.
2. Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
3. Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.

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	Goal Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Prevention								
2.4	Storm Water impact	City of Buffalo	41	Goal 2	Flooding, Severe Thunderstorm	X	X	X
2.6	NFIP	City of Buffalo	35	Goal 2	Flooding	X	X	X
3.3	Redundancy Plans	City of Buffalo	36	Goal 3	All			
2.1	NFIP	City of Urbana	35	Goal 2	Flooding	X	X	X
2.3	Storm Water Impact	Dallas County	29	Goal 2	Flooding, Severe Thunderstorm	X	X	X
2.4	Building Codes	Dallas County	30	Goal 2	All	X	X	-
2.7	NFIP	Dallas County	35	Goal 2	Flooding	X	X	X
Structure and Infrastructure Projects								
1.3	Storm Sirens	City of Buffalo	43	Goal 1	Severe thunderstorm, tornado	X		X
1.7	Safe Environments during Severe Weather	City of Buffalo	44	Goal 1	Flooding, Severe Thunderstorm, Severe Winter Weather	X		X
2.1	Back-up Generators	City of Buffalo	40	Goal 2	All		X	-
2.2	Low Water Crossing Upgrades	City of Buffalo	47	Goal 2	Flooding, Severe Thunderstorm	X	X	X
2.3	Storm Water Impact	City of Buffalo	47	Goal 2	Flooding, Severe Thunderstorm	X	X	X
3.5	Saferoom/Shelter	City of Buffalo	41	Goal 3	Lack of Safe Facility during Severe Weather		X	-
1.1	Oak Street Low Water Bridge	City of Urbana	34	Goal 1	Flooding	X		X
1.2	Mill Street Low Water Bridge	City of Urbana	34	Goal 1	Flooding	X		X
1.3	Urbana City Hall and Safe Room	City of Urbana	34	Goal 1	Tornada, Severe Thunderstorm, Severe Winter Weather		X	X

#	Action	Jurisdiction	Priority	Goal Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.5	Safe Environments during Severe Weather	Dallas County	30	Goal 1	Flooding, Severe Thunderstorm, Severe Winter Weather	X		X
2.1	Back-up Generators	Dallas County	31	Goal 2	All	X	X	
2.2	Low Water Crossing Upgrades	Dallas County	31	Goal 2	Flooding, Severe Thunderstorms	X		X
3.1	Hardened Emergency 911 Communications Center	Dallas 911	44	Goal 3	Tornado, Flooding, Severe Thunderstorm		X	X
1.5	Safe Environment during Severe Weather	Dallas County R-I School District	36	Goal 1	Flooding, Severe Thunderstorm, Severe Winter Weather		X	X
Natural Systems Protection								
2.6	Stream and River Clean Up	Dallas County	26	Goal 2	Flooding	X	X	X
Emergency Services								
3.1	Communications Equipment	City of Buffalo	36	Goal 3	All			
3.2	Communications Equipment	Dallas County	29	Goal 3	All			
3.1	Communication Equipment	Urbana Rural Fire Department	33	Goal 3	All			
Education and Outreach								
1.1	Public Awareness	City of Buffalo	15	Goal 1	All			
1.2	Natural Hazard Awareness	City of Buffalo	47	Goal 1	All			
1.4	Alert Systems	City of Buffalo	44	Goal 1	All			
1.5	Citizen Preparedness	City of Buffalo	42	Goal 1	All			
1.6	Procedure for Flooded Roadways	City of Buffalo	39	Goal 1	Flood, Severe Thunderstorm			X
2.5	Construction Technique Awareness	City of Buffalo	47	Goal 2	All		X	
3.2	Data Backup	City of Buffalo	31	Goal 3	All			
3.4	Communication Cooperation	City of Buffalo	45	Goal 3	All			
1.1	Public Awareness	Dallas County	28	Goal 1	All			
1.2	Alert Systems	Dallas County	35	Goal 1	All			
1.3	Citizen Preparedness	Dallas County	31	Goal 1	All			

#	Action	Jurisdiction	Priority	Goal Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.4	Procedure for Flooded Roadways	Dallas County	37	Goal 1	Flooding Severe Thunderstorm			X
2.5	Construction Technique Awareness	Dallas County	29	Goal 2	All		X	
3.1	Database Resources	Dallas County	28	Goal 3	All			
3.3	Data Backup	Dallas County	26	Goal 3	All			
3.4	County GIS	Dallas County	31	Goal 3	All			
3.5	Communications Cooperation	Dallas County	33	Goal 3	All			
1.1	Public Awareness	Dallas County R-I School District	40	Goal 1	All			
1.2	Natural Hazard Awareness	Dallas County R-I School District	38	Goal 1	All			
1.3	Alert Systems	Dallas County R-I School District	36	Goal 1	All			
1.4	Citizen Preparedness	Dallas County R-I School District	42	Goal 1	All			
3.1	Database Resources	Dallas County R-I School District	42	Goal 3	All			
3.3	Communication Cooperation	Dallas County R-I School District	44	Goal 3	All			
1.1	Public Awareness	Urbana Rural Fire Department	25	Goal 1	All			
1.2	Natural Hazard Awareness	Urbana Rural Fire Department	26	Goal 1	All			
1.3	Citizen Preparedness	Urbana Rural Fire Department	25	Goal 1	All			
3.2	Communications Cooperation	Urbana Rural Fire Department	36	Goal 3	All			

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

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

Model Resolution

(*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

1.1 PURPOSE

Hazard Mitigation is the process of preparing for and taking action in order to reduce the long-term risk of natural disasters to financial and human consequences. Mitigation actions may be implemented prior to, during, or after a hazard event. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs (https://www.fema.gov/grants/mitigation).

By participating in the planning process and meeting the necessary requirements to do so, communities, school districts, and other special districts become eligible to apply for mitigation grant funding. FEMA has implemented the various hazard mitigation provisions through the Code of Federal Regulations (CFR) at 44 CFR Part 201. The CFR provisions set forth the mitigation plan requirements for local and tribal governments as a condition of receiving FEMA hazard mitigation assistance. Local governments, schools, or other publicly funded districts that do not participate or adopt a hazard mitigation plan will not be eligible to apply for grants as stated under 44 CFR §201.6. Section 322 of the Robert T. Stafford Relief and Emergency Assistance Act (P.L. 93-288), as amended by the Disaster Mitigation Act of 2000 (DMA) (P.L. 106-390), provides for States, Tribes, and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning.

1.2 BACKGROUND AND SCOPE

As required by 44 CFR §201.6(d)(3), a local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts and changes in priorities, and resubmit it for approval every five (5) years in order to continue to be eligible for mitigation project grant funding. The 2023 Dallas County Multi-Jurisdictional Natural Hazard Mitigation Plan, from here on referred to as the Plan, is a revision of the previous five-year update approved on August 6, 2018.

The 2023 Plan is a major rewrite of the previous plan and reflects changes in priorities and development, and the continued commitment of local governments to mitigate the impact of natural hazards in Dallas County. Local participating jurisdictions include:

- Dallas County
- City of Buffalo
- City of Urbana
- Dallas County R-I School District

- Dallas County 911
- Urbana Rural Fire Department

All jurisdictions received email and phone communications notifying representatives of upcoming meetings and participation requirements.

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

1.3 PLAN ORGANIZATION

The Plan is organized into five chapters. The format of the Plan was changed to conform to the 1.3 local hazard mitigation plan outline template released by the Missouri State Emergency Management Agency (SEMA). The Plan chapters include:

- Chapter 0: Executive Summary
- Chapter 1: Introduction and Planning Process
- Chapter 2: Planning Area Profile and Capabilities
- Chapter 3: Risk Assessment
- Chapter 4: Mitigation Strategy
- Chapter 5: Plan Implementation and Maintenance
- Appendices

Table 1.1 summarizes the changes made in the Plan by chapter.

Table 1.1. Changes Made in Plan Update

Plan Section	Summary of Updates
Chapter 1 - Introduction and Planning Process	• Updated list of participating jurisdictions and stakeholders • Updated list of mitigation planning committee members • Removed Department column from Table 1.2 • Added Table 1.3 – MPC Capability with Six Mitigation Categories • An online community survey was conducted regarding hazard threats and mitigation activities in the community • Reworked the goals
Chapter 2 - Planning Area Profile and Capabilities	• Updated demographics information • Incorporated revisions to community profiles as draft sections were reviewed by local officials • Added table 2.5 – Total and Per Farm Overview • Added a table for FEMA PA Grants • Added a summary table for Special District Mitigation Capabilities

Chapter 3 - Risk Assessment	• Changed the order of the hazards • Extreme heat and extreme cold were combined into extreme temperatures • Remove Table 3.2 – Disaster Declarations Federal Share Obligated • Added school and special district development since previous update • Added maps for every dam • Added community comments section for every hazard
Chapter 4 - Mitigation Strategy	• Slightly reworded the goals • Reformatted the STAPLEE and action worksheets • Action/project number was reworked to reflect the change in goal numbering • Added Mitigation Action Matrix table
Chapter 5 - Plan Implementation and Maintenance	• No significant changes were made

1.4 PLANNING PROCESS

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

The Southwest Missouri Council of Governments (SMCOG) was contracted to facilitate the plan development process. SMCOG staff met with the Dallas County EMD during an initial scoping meeting to develop contact information for area stakeholders and local jurisdiction representatives to establish the Mitigation Planning Committee (MPC). Meeting locations and schedules were discussed, and the most effective way to inform and include the public was determined. Also discussed was previous plan maintenance and any updates made over the past five years. It was determined that the document had not been officially updated.

The planning process included the kick-off meeting and four subsequent MPC meetings. SMCOG staff were responsible for producing the draft and final plan update in a FEMA-approvable document, as well as coordinating with SEMA and FEMA plan reviewers. Specific information about agenda items for the MPC meetings are presented in **Section 1.4.2**. SMCOG also assisted in soliciting public involvement in the planning process by creating a community survey. Notification of the MPC meetings on July 29, August 26, September 23, October 28, and December 2, 2022, were sent via mail and email to all jurisdictions within the county. Meeting dates were posted on the SMCOG website in advance. Appendix B provides documentation of the planning process including public involvement solicitations and meeting notices.

Input from jurisdiction officials was solicited through distribution of drafts of plan elements for discussion and review at scheduled meetings and other communications with individual community representatives and elected officials.

A complete listing of agencies invited to participate in the planning process and what meetings they were invited to attend is included in Appendix B.

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

Table 1.2. Jurisdictional Representatives of the Dallas County Mitigation Planning Committee

Name	Title	Organization
April Garrett	Emergency Management Deputy Director	Dallas County
Tara Swanigan	Emergency Management Staff	Dallas County
Terry Lane	Emergency Management Director	Dallas County
Brandon Kennall	Mayor	City of Buffalo
Greg Cunningham	Fire Chief	City of Buffalo
Dawn Sutton	Utility Clerk	City of Urbana
Sandra Simmons	Mayor	City of Urbana
Buck Schockley	Assistant Superintendent	Dallas County R-I School District
Duane Hamilton	Executive Director	Dallas County 911
Beth McGregor	Resident	Urbana Rural Fire Department
Bud Glanville	Board Member	Urbana Rural Fire Department
Heather Stidham	Board Member	Urbana Rural Fire Department
Hiram Jones	Board Member	Urbana Rural Fire Department
James Chatham	Board Member	Urbana Rural Fire Department
Jason Crawford	Board Member	Urbana Rural Fire Department
Larry Senyard	Fire Chief	Urbana Rural Fire Department
Linda Senyard	Firefighter/first responder	Urbana Rural Fire Department

Table 1.3. MPC Capability with Six Mitigation Categories

Community Department/Office	Preventive Measures	Structure and Infrastructure Projects		Natural Resource Protection	Public Information	Emergency Services
		Property Protection	Structural Flood Control Projects			
Dallas County Emergency Management	X	X	X	X	X	X
City of Buffalo Administration	X	X			X	
City of Buffalo Fire Department	X	X		X	X	X
City of Urbana Administration	X	X			X	
Dallas County R-I Administration					X	
Dallas County 911 Administration	X				X	X
Urbana Rural Fire Department Board	X	X		X	X	X
Urbana Rural Fire Department Fire Chief	X	X	X	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.

The Plan serves as a written document of the planning process. Active participation of local jurisdiction representatives and stakeholders in the hazard mitigation planning process is essential if the Plan is to have value. To be eligible for mitigation funding, local governments must adopt the FEMA-approved update of the Plan. The participation of the local government stakeholders in the planning process is considered critical to successful implementation of this plan. Each jurisdiction that is seeking approval for the Plan must have its governing body adopt the updated plan, regardless of the degree of modifications. SMCOG collaborated with the local governments in Dallas County to ensure participation in the planning process and the development of a plan that represents the needs and interests of the county and its local jurisdictions. Appendix D contains resolutions for jurisdictions adopting the Plan.

County Commissioners, incorporated communities, public schools, special districts, and various other stakeholders in mitigation planning were invited to a kick-off meeting for the Plan update on July 29, 2022, in Buffalo. At this meeting it was explained that the Disaster Mitigation Act (DMA) requires each jurisdiction participating in the planning process officially adopt the plan. The criteria for participation that each jurisdiction must meet in order to be considered a “participant” in the Plan was established at this meeting and includes the following:

- Participation in at least two MPC meetings, by either direct participation or authorized representation
- Each participating jurisdiction must provide to the MPC sufficient information to support plan development by completion and return of Data Collection Questionnaires
- Provide documentation to show time donated to the planning effort
- All participants should formally adopt the mitigation plan

In order to be included in the plan as a participating jurisdiction, each jurisdiction was required to send a representative to two meetings, complete the data collection questionnaire, complete in-kind time documentation (if applicable), and formally adopt the plan as minimum requirements. Some jurisdictions were able to adopt the plan before it received final SEMA/FEMA approval, while others had to wait for SEMA/FEMA to first approve the plan before they could formally adopt it. Jurisdictions that met the minimum requirements are considered to have satisfactorily participated in the planning process. In addition to public outreach solicited through SMCOG, each participating jurisdiction was strongly encouraged to seek public input at an open public meeting or through various forms of input solicitation.

Table 1.4 shows the representation of each participating jurisdiction at the planning meetings and the provision of responses to the data collection questionnaire. All jurisdictions participating in the Plan either reviewed or commented on the draft Plan, participated in the update and development of mitigation actions, documented the donation of time, and passed an adoption resolution either before or after final SEMA/FEMA approval. Meeting sign-in sheets are located in Appendix B.

Table 1.4. Jurisdictional Participation in the Planning Process

Jurisdiction	Mtg #1	Mtg #2	Mtg #3	Mtg #4	Mtg #5	Data Collection Questionnaire Response	Documented Donated Time	Adoption Resolution	
								Before Approval	After Approval
Dallas County	X	X	X	X	X	X	X	X	
City of Buffalo	X	X				X	X	X	
City of Urbana		X	X	X	X	X	X	X	
Dallas County R-I School District	X	X		X	X	X	X	X	
Dallas County 911	X	X		X		X	X	X	
Urbana Rural Fire Department	X	X	X	X	X	X	X	X	

1.4.2 The Planning Steps

FEMA's Local Mitigation Planning Handbook (March 1, 2013), Local Mitigation Plan Review Guide (October 1, 2011), and Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials (March 1, 2013) were used as the sources for developing the Plan update process. The development of the plan followed the 10-step planning process adapted from FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. The 10-step process allows the Plan to meet funding eligibility requirements of the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, Community Rating System, and Flood Mitigation Assistance Program.

Table 1.5 is a summary of how SMCOG staff used the Nine Task Process to develop the update to the Plan.

Table 1.5. 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

Step 7. Review possible activities	44 CFR 201.6(c)(3)(i); 44 CFR 201.6(c)(3)(ii); and 44 CFR 201.6(c)(3)(iii)
Step 8. Draft an action plan	
Step 9. Adopt the plan	Task 8: Review and Adopt the Plan
Step 10. Implement, evaluate, revise	Task 7: Keep the Plan Current
	Task 9: Create a Safe and Resilient Community 44 CFR 201.6(c)(4)

Step 1: Organize the Planning Team

In February 2022, SMCOG entered into cooperative agreements with SEMA and Dallas County to prepare this multi-jurisdictional plan for public entities in Dallas County. Discussions on the development of the Dallas County Multi-Jurisdictional Natural Hazard Mitigation Plan began in early 2022 with an introductory scoping meeting attended by SMCOG staff and the County Emergency Management Director. This meeting was conducted to discuss the timeline for developing the hazard mitigation plan, the planning process, identification of stakeholders and community organizations to include in the planning process, and dates for five planning committee meetings, beginning with a kick-off meeting on July 25, 2022 to initiate participation of jurisdictions and public entities in the planning process. The Emergency Management Director (EMD) and SMCOG staff identified prospective participant representatives and stakeholders and a contact list was prepared for the kick-off meeting. The list of invitees included local elected officials, municipal government staff, county government staff, emergency services personnel, public school administrators, members from health and social services organizations, and utility providers. A complete list of invitees is in Appendix B.

The MPC met on several occasions from July through November 2022 to collaborate on the development of the Plan update. Participants assisted in data collection; reviewed and revised the Plan's goals and mitigation strategies; and provided reviews and comments on the Plan throughout the update process. Communication with MPC members occurred throughout the planning process through phone conversations, letters, and email correspondence in addition to committee meetings. **Table 1.6** shows the meeting schedule and items discussed for MPC meetings.

Table 1.6. Schedule of MPC Meetings

Meeting	Topic	Date
Kick-off Meeting	Introduction to hazard mitigation planning, participation requirements, and the planning process	07/29/2022
Planning Meeting #2	Participation overview, process recap, and risk assessment	08/26/2022
Planning Meeting #3	Mitigation goals and actions	09/23/2022
Planning Meeting #4	Mitigation goals and actions	10/28/2022
Planning Meeting #5	Funding and implementation mechanisms, plan adoption, and maintenance	12/02/2022

Step 2: Plan for Public Involvement

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

Options for soliciting public input on the Plan were discussed with the MPC at the kick-off meeting. SMCOG staff explained the importance of public involvement during the planning process. Meeting invitations were sent to all committee members around a month before each meeting took place. It was also discussed at the kick-off meeting that solicitation of public input would be sought by members of the MPC through announcements at gatherings and other public meetings, such as board of aldermen, county commission meetings, board of education meetings, and local emergency planning committee meetings. Progress on the plan was shared at each meeting in order to keep the committee involved in the update process.

The MPC also decided that SMCOG staff would assist in developing an online community survey. The survey was posted on the SMCOG website and SMCOG staff encouraged jurisdictions to post it on their social media pages. 14 responses were received in the two-month timeframe the survey was open. A summary of responses to the survey can be found in chapter 3 in each hazard profile.

Step 3: Coordinate with Other Departments and Agencies and Incorporate Existing Information

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.

As stated in **Section 1.4**, neighboring communities, businesses, academia, and other non-profit interests were notified via email, letters, and/or phone calls. A notification was sent to adjacent county Emergency Management Directors and local and regional agencies such as OACAC, Health Departments, and special districts. A complete listing of agencies invited to participate in the planning process and what meetings they were invited to attend is included in Appendix B.

Integration of Other Data, Reports, Studies, and Plans

A significant amount of information presented in the Plan has been updated and revised based on the review and incorporation of existing plans, studies, reports, and technical information. Appendix A contains a list of references to plans, studies, reports, and technical information to incorporate into hazard profiles, risk assessment, and profile and capability sections. Plan participants and stakeholders were asked to provide any relevant information and data for

inclusion in the document. A few examples of information incorporated from the review of existing plans, etc. include:

- 2018 Missouri State Hazard Mitigation Plan
- The National Inventory of Dams (NID)
- Missouri Department of Conservation (MDC) wildfires statistics
- Wildland/Urban Interface and Intermix areas from the SILVIS Lab
- Previous Dallas County Hazard Mitigation Plan

Step 4: Assess the Hazard: Identify and Profile Hazards

At the second MPC meeting, profiles of identified hazards from the previous Hazard Mitigation Plan were presented. Storm event data from the National Centers for Environmental Information for the five-year period since the adoption of the previous Dallas County Plan were included in the hazard profiles. The presentation incorporated data from studies, reports, and technical information available through internet research. During the process of identifying hazards the MPC reviewed:

- Previous disaster declarations in the county
- Hazards in the most recent State Hazard Mitigation Plan
- Hazards identified in the previously approved hazard mitigation plan

The MPC was asked to prioritize the identified hazards based on probability of occurrence, human impact, and property impact. Additional information about the conclusions drawn can be found in the Risk Assessment chapter of the Plan.

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

Identified assets in the planning area include population, structures, critical facilities and infrastructure, and other important assets that may be at risk to hazards. The inventory of assets for each jurisdiction was derived from parcel data from the County Assessor, the Dallas County Structures GIS dataset from MSDIS, local jurisdiction data collection questionnaires, and the U.S. Census. Potential losses to existing development were estimated based on hazard event scenarios. In most cases the assessor values were used to estimate structure losses in impacted areas for structure occupancy types. The methodology for estimating losses varies by hazard. Loss estimates are included in each hazard profile of the Risk Assessment chapter.

Most jurisdictions estimated local capabilities and assets based on the best available data and staff knowledge. In some cases, MPC members were not able to fully complete questionnaires due to limited local information being available.

Step 6: Set Goals

The MPC conducted a discussion session during the third meeting to review the Plan goals. It was determined that the goals from the previous would be used.

The Plan update goals are as follows:

Goal 1: Protect the lives and livelihood of all citizens.
Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local

economy.
Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.

These goals and the identified mitigation actions are discussed in more detail in Chapter 4.

Step 7: Review Possible Mitigation Actions and Activities

In addition to discussing the overall goals at the third and fourth meetings, the MPC also reviewed mitigation actions from the previous plan and any potential new actions. For a comprehensive range of mitigation actions to consider, the MPC reviewed the following information during the meeting:

- A list of actions proposed in the previous mitigation plan
- Input during meetings
- Responses to Data Collection Questionnaires where jurisdictions had reported progress made on previous actions
- FEMA publications *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013)* and *Hazard Mitigation Assistance Guidance (2015)*

Jurisdiction representatives on the MPC were encouraged to review the details of the risk assessment vulnerability analysis specific to their jurisdiction, as well as the previously identified mitigation actions prior to the meeting. Representatives were provided a link to the FEMA's publication, *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013)* prior to the meeting. 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. Additionally, survey responses which identified community support for specific mitigation actions were reviewed and discussed.

During these meetings, a few new actions were proposed by the committee and numerous actions were reworded. Much of the discussion surrounded making actions SMART: Specific, Measurable, Achievable, Relevant, and Time-bound.

Step 8: Draft an Action Plan

At the fourth MPC meeting, representatives were provided with blank STAPLEE scoring sheets. Those who could not attend the meeting were emailed the sheets. The method was used to develop a priority score for proposed actions. During the meeting, SMCOG staff provided an overview of scoring criteria and example scoring for an action. MPC members were encouraged to use the STAPLEE scoring to determine which actions applied to their jurisdiction. Some actions were eliminated due to non-applicability or low feasibility scores.

MPC members were also given action sheets that corresponded to the STAPLEE sheets. SMCOG staff reviewed the action sheets in detail and discussed what department or position would be responsible for implementing the action, potential funding sources, timeline for completion, and local planning mechanisms for implementation. The action plans are listed for each jurisdiction in the Mitigation Strategy chapter.

Step 9: Adopt the Plan

The final meeting provided a wrap-up and opportunity to answer any questions pertaining to plan adoption. The final plan must be approved by the governing body of each jurisdiction by resolution to be eligible for hazard mitigation assistance. Adoption resolutions are included in Appendix D.

Step 10: Implement, Evaluate, and Revise the Plan

At the final meeting, MPC members briefly reviewed potential funding sources for mitigation projects and the process for reviewing and monitoring the plan. It was determined that Dallas County Emergency Management will be charged with scheduling and staffing annual meetings and keeping the plan updated. The overall strategy has been updated and is presented in the Plan Maintenance chapter.

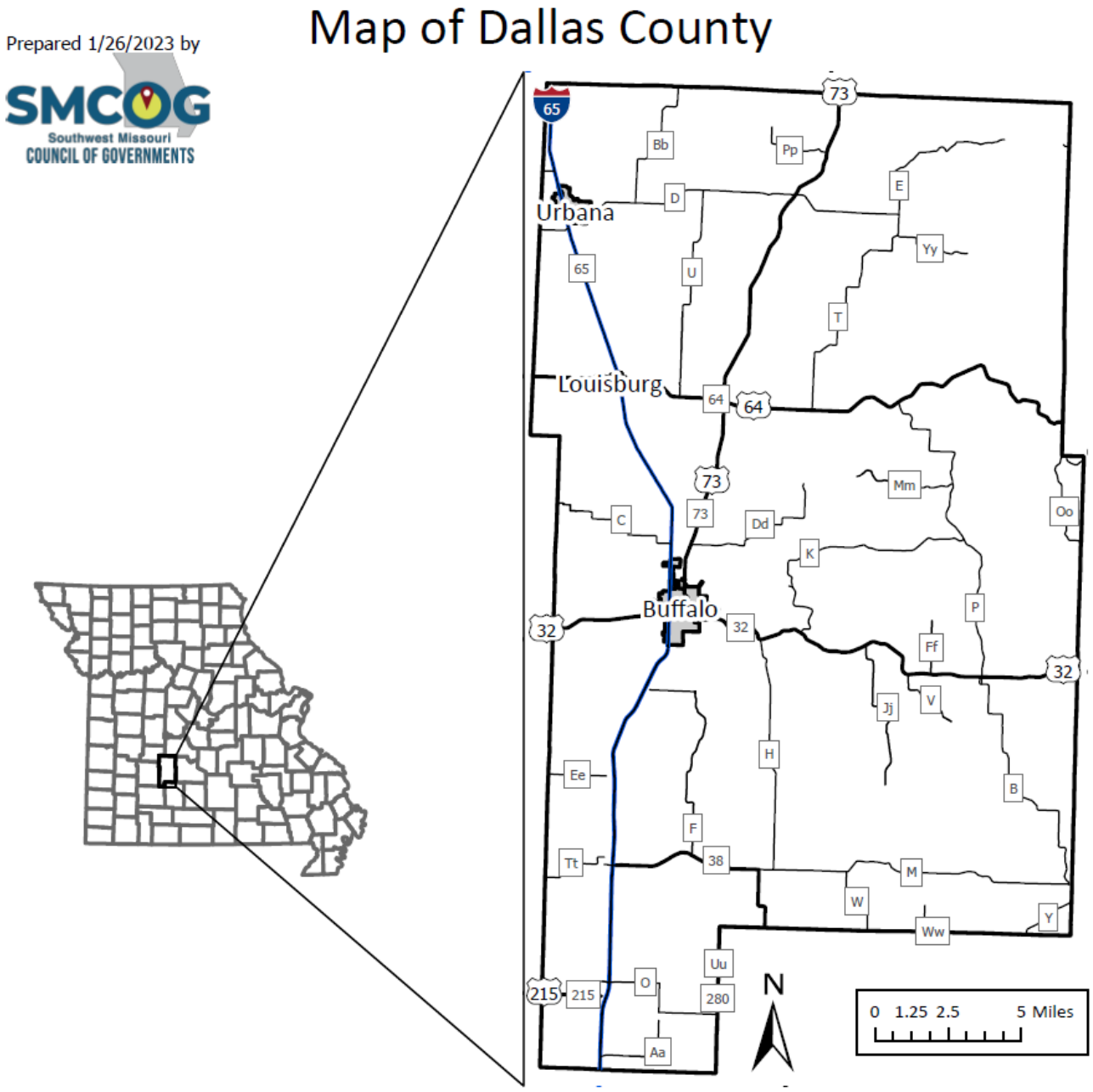
2 PLANNING AREA PROFILE AND CAPABILITIES

2.1 DALLAS COUNTY PLANNING AREA PROFILE

Dallas County is located in Southwest Missouri, northeast of Springfield. It is bordered by Camden, Hickory, Polk, Laclede, Greene, and Webster Counties. Incorporated municipalities include the Cities of Buffalo and Urbana, as well as the Village of Louisburg.

Figure 2.1 is a map of Dallas County showing the cities, village, and overall location of the county within the state.

Figure 2.1. Map of Dallas County



The American Community Survey estimates the 2020 population of Dallas County at 16,841. This is a 0.2% increase compared to 2010, which was estimated at 16,813. During this timeframe, the State of Missouri saw an increase of 3.1% and the nation saw an increase of 6.8%.

From 2010 to 2019, the median household income (MHI) rose from $38,101 to $43,542, an increase of 14.3%. During this time, median household income increased 19.9% statewide and 21.05% nationwide. The median household value (MHV) for Dallas County increased 19.3% from $96,800 to $115,500 - higher than nationwide increase of 15.45%, but less than the state increase of 22%.

2.1.1 Geography, Geology and Topography

Dallas County covers 543 square miles, including 542 square miles of land and 1 square mile of surface water. Incorporated communities include the cities of Buffalo and Urbana and the Village of Louisburg. There are also several unincorporated areas in the county, including Tunas, Plad and Windyville in the northern section of the county and Long Lane, Charity, Foose and March in the southern section. The City of Buffalo is the county seat.

Dallas County is located on the Ozarks Plateau of the Interior Highlands physiographic province. The entire county lies on the Salem Plateau division of the Ozarks Plateau (McBee, 1991). The Salem Plateau is characterized by rolling uplands and rugged hills with steep ridges and bluffs bordering rivers, streams, and deep drainage channels. Elevations range from 1,000 to 1,400 feet.

The topographic landscape varies as a result of uplift, erosion, and deposition. The western part of the county has streams that flow many more miles before discharge in the Pomme de Terre and Osage Rivers, and therefore, the landscape consists of smoother slopes. By contrast, the Niangua River converges with the Osage River a short distance to the north of Dallas County. Thus, the eastern part of the county has steeper slopes, and greater relief (McBee, 1991). The county is underlain by sedimentary rocks ranging from Ordovician age, from the Gasconade, Roubidoux, and Jefferson City Formations. There are also rocks of the Mississippian age in areas of isolated monadnocks in the west central part of the county. These are the Compton, the Northview, and Pierson Formations and Burlington Keokuk Limestone.

The county has several structural features, including faults and grabens (wide rift valleys), resulting from tectonic forces. The few faults and grabens, however, have relatively little impact on soil patterns. Geologic formations, listed from oldest to youngest, Gasconade, Roubidoux, and Jefferson City and Cotter Dolomite formations. The soils in the county formed in unconsolidated superficial deposits include residuum, loess, colluvium and alluvium. Most areas of the county have residuum and colluvium, except for relatively small areas that have a thin mantle of loess or alluvium. The consolidated bedrock exposed in the county is conspicuous and locally significant in areas of rock outcrops and shallow soils (McBee, 1991).

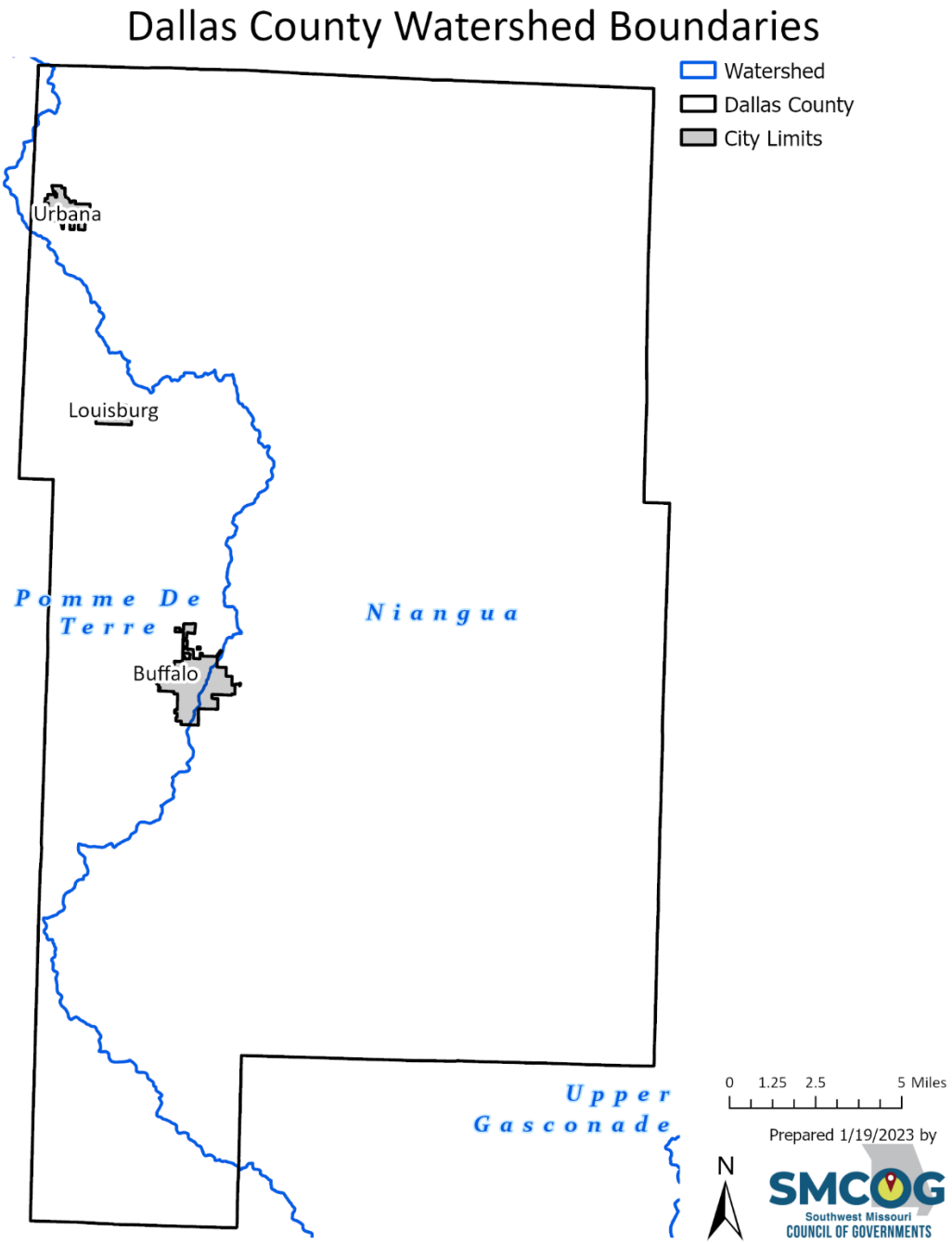
Dallas County lies within watersheds of the Osage River Basin: the Niangua River, the Lindley Creek, and the Pomme de Terre River watersheds. The Niangua River watershed encompasses 279,000 acres within Dallas County. The Little Niangua River is the major tributary of the Niangua River, as well as Greasy Creek, Dousinbury Creek, Fourmile Creek, and Durington Creek. It originates in central Dallas County and drains the northeastern part of the county. Pomme de Terre River and its tributaries drain the southwestern part of the county. Lindley Creek, one of the main tributaries of this river, drains the west central part of the county, and it receives discharges of the City of Buffalo’s wastewater treatment plant.

The City of Buffalo is located near Greasy Creek, but only Little Lindley Creek runs through the city. East Branch flows along the eastern boundary of the Village of Urbana. The Little Niangua River runs through the unincorporated settlement of Tunas in northern Dallas County. Fourmile Creek runs

through Long Lane in southeastern Dallas County. The headwaters of several small tributary streams also flow through parts of communities in Dallas County, including the Village of Louisburg. The county is well drained as a whole, and has abundant springs such as Bennett, Big Sweet, Big Black, and Walnut Springs (McBee, 1991; Schulz, 2003). Bennett Spring is the fourth largest spring in the state of Missouri. It has a daily output of over 100 million gallons of water. This spring is located within Bennett Spring State Park in eastern Dallas County and western Laclede County (www.lebanonmo.org).

Figure 2.2 is a map of the watershed boundaries.

Figure 2.2. Dallas County Watersheds



2.1.2 Climate

Dallas County is hot in the summer and moderately cold in the winter. In summer, the average temperature is 76° F and the average daily maximum temperature is 87° F. During the winter, the average temperature is 35° F and the average daily minimum temperature is 24° F. Snow usually falls every winter, but the snow cover typically lasts only a few days. The average seasonal snowfall is about 15 inches. Rainfall is fairly heavy and is well distributed throughout the year. The total annual precipitation is 40.32 inches, of which 22 inches, or 55 percent, usually falls from April through September. Thunderstorms occur on about 57 days each year. The prevailing wind is from the south-southwest. The average wind speed is highest, 13 miles per hour, in spring.

2.1.3 Population/Demographics

Table 2.1 provides the total population for the county and each participating city for 2000, 2010, and 20120, as well as the number and percent change from 2010 to 2020. During this time, the City of Urbana and Dallas County as a whole saw a slight increase, while the City of Buffalo saw a slight decrease.

Table 2.1. Dallas County Population 2000-2020

Jurisdiction	2000 Population	2010 Population	2020 Population	# Change (2010-2020)	% Change (2010-2020)
Dallas County	15,661	16,813	16,841	+1,180	+0.2%
City of Buffalo	2,781	3,178	3,101	+320	-2.4%
City of Urbana	408	424	442	+34	+4.2%

Source: US Census Bureau American Community Survey 2000/2020 5 Year Estimates https://data.census.gov/

Table 2.2 provides a full breakdown of the age composition for Dallas County, the State of Missouri, and the United States.

Table 2.2. Dallas County, Missouri, and United States Population Age Composition

Age Group	Dallas County Number	Dallas County Percent	Missouri Percent	United States Percent
Under 5	1,098	6.5%	6.1%	6.1%
5 to 9	1,341	8.0%	6.2%	6.2%
10 to 14	887	5.3%	6.4%	6.4%
15 to 19	1,094	6.5%	6.5%	6.5%
20 to 24	736	4.4%	6.8%	6.8%
25 to 29	990	5.9%	6.8%	7.1%
30 to 34	908	5.4%	6.5%	6.8%
35 to 39	791	4.7%	6.3%	6.5%
40 to 44	959	5.7%	5.7%	6.1%
45 to 49	901	5.4%	6.1%	6.4%
50 to 54	1,083	6.4%	6.5%	6.6%
55 to 59	996	5.9%	7.0%	6.7%
60 to 64	1,526	9.1%	6.5%	6.2%
65 to 69	1,172	7.0%	5.3%	5.2%
70 to 74	807	4.8%	4.1%	3.9%
75 to 79	653	3.9%	3.0%	2.7%
80 to 84	491	2.9%	2.0%	1.9%
85 and over	408	2.4%	2.0%	1.9%

Source: US Census Bureau American Community Survey 2020 5 Year Estimates https://data.census.gov/

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.

The index is a comparative metric that facilitates the examination of the differences in social vulnerability among counties. SoVI® is a valuable tool for policy makers and practitioners. It graphically illustrates the geographic variation in social vulnerability. It shows where there is uneven capacity for preparedness and response and where resources might be used most effectively to reduce the pre-existing vulnerability. SoVI® also is useful as an indicator in determining the differential recovery from disasters.

Dallas County's SoVI® score is 0.629999995, placing it in the 61.1 percentile when compared to the rest of the nation. This score means that 61.1% of the nation is more resilient to hazards and disasters than Dallas County. The main determinants of the score are qualities of the population based on race and class, wealth, elderly residents, Hispanic ethnicity, special needs individuals, Native American ethnicity, and the service industry employment.

Table 2.3 shows employment statistics for Dallas County and the participating municipalities.

Table 2.3. Dallas County Unemployment, Poverty, Education, and Language Percentage Demographics

Jurisdiction	Total in labor force	Unemployment rate	Families below the poverty level	High school graduate (age 18-24)	Bachelor's degree or higher (age 25 and over)	Spoken language other than English
Dallas County	6444	4.1%	15.4%	43.2%	11.4%	4.4%
City of Buffalo	962	4.2%	41.1%	26.1%	11.0%	1.6%
City of Urbana	183	3.3%	10.0%	80.0%	7.9%	1.4%
Missouri	3,090,25	4.5%	8.9%	32.5%	29.9%	6.3%
United States	167,902,	5.4%	9.1%	32.1%	32.9%	21.5%

Source: US Census Bureau American Community Survey 2020 5 Year Estimates https://data.census.gov/

2.1.4 History

The Ozarks region, including Dallas County, was claimed by France until purchased by the United States in the Louisiana Purchase in 1803. The Dallas County area was first inhabited by the Osage Indians who ceded the territory in 1808. Mark Reynolds is credited as the first white settler in Dallas County circa 1832. Permanent settlers began arriving from Tennessee, Kentucky, Indiana, and Ohio in the early 1830s. Dallas County officially became a county on January 29, 1841, formed from Polk County. Buffalo was established as the county seat. The county was first called Niangua, but because of difficulty in spelling and pronouncing the name, it was renamed to Dallas in December of 1844. It was named after George M. Dallas, the then Vice President-elect of the United States (http://www.sos.mo.gov/archives/history/counties.asp).

Nearly two-thirds of the Dallas County citizens supported the Union during the Civil War. No companies were organized in the county for Confederate service, but some of the sympathizers left to join commands in the South. Dallas County did not experience a large amount of devastation from the war; however, the residents were subjected to violence and killings by scouting parties from both sides

as well as Bushwhackers. Other communities in Dallas County were established after the Civil War (McBee, 1991).

In the second half of 1800s, part of the economy of the county was based on zinc, lead and fuller's earth mining. Fuller's earth was used for cleaning wool of its grease, and one of the first veins discovered in the United States was discovered in Dallas County in 1882. However, attempts to get a railroad through the county failed, which seriously affected its economy (McBee, 1991). By 1900, agriculture was the main economic factor of Dallas County. The number of farms jumped from 1,414 in 1880 to 2,371 in 1900. Total acreage increased from 193,366 acres to 257,765. Wheat, corn, and hog production were predominant until 1920. After 1920, commercial dairy production dominated farming in Dallas County. The total number of farms began to decrease after 1950 as farms consolidated. Farm numbers dropped from 2,151 in 1950 to 1,369 in 2007, but average farm size had increased from 136 to 163 acres. During this time, beef and poultry production greatly increased. Hay replaced wheat and corn as the major crop.

2.1.5 Occupations

Occupation information for the Dallas County labor force comes from the 2020 American Community Survey 5-year Estimates. Management, Business, Science, and Arts Occupations includes education and healthcare practitioner and technician occupations among others. Service Occupation includes healthcare support and protective services, such as firefighters and law enforcement in addition to food preparation and personal care services. The other occupation classifications are well defined. **Table 2.4** contains occupation statistics for the incorporated cities and county, as well as a comparison for Missouri and the United States.

Table 2.4. Dallas County Occupation Statistics

Jurisdiction	Management, Business, Science, and Arts Occupations	Service Occupations	Sales and Office Occupations	Natural Resources, Construction, and Maintenance Occupations	Production, Transportation, and Material Moving Occupations
Dallas County	27.6%	19.3%	19.4%	12.1%	21.6%
City of Buffalo	28.9%	36.0%	18.8%	1.6%	14.8%
City of Urbana	18.1%	23.2%	13.0%	13.6%	32.2%
Missouri	40.8%	15.2%	20.7%	8.4%	14.9%
United States	42.2%	16.1%	20.0%	8.5%	13.1%

Source: US Census Bureau American Community Survey 2020 5 Year Estimates https://data.census.gov/

2.1.6 Agriculture

According to the United States Department of Agriculture 2017 Agricultural Census, there were 1,176 farms covering 206,814 acres across Dallas County. The average farm size was 176 acres, which was a 4% decrease since 2012. **Table 2.5** provides further agriculture information.

Table 2.5. Total and Per Farm Overview, 2012 and 2017

	2017	Percent change since 2012
Number of farms	1,176	-1
Land in farms (acres)	206,814	-5
Average size of farm (acres)	176	-4
Total		
Market value of products sold	$51,330,000	+8
Government payments	$425,000	-31
Fam-related income	$1,371,000	-30
Total farm production expenses	$48,886,000	+2
Net cash farm income	$4,240,000	+78
Per farm average		
Market value of products sold	$43,648	+9
Government payments (average per farm receiving)	$6,635	+22
Fam-related income	$3,265	-33
Total farm production expenses	$41,570	+3
Net cash farm income	$3,605	+80

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

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

Since 2000, jurisdictions within Dallas County have received 2 FEMA HMA Grants totaling $$2,059,944. **Table 2.6** provides a full breakdown for each project.

Table 2.6. FEMA HMA Grants in Dallas County, 2000-2022

Disaster Declaration	Program Area	Project Type	Sub-Grantee	Date Approved	Project Total
Dr-1676-0014-R	HMGP	206.2: Safe Room (Tornado and Severe Wind Shelter) – Public Structures	Buffalo	9-04-2008	$1,451,544
PDMC-PJ-07-MO-2009-002	PDM	206.2: Safe Room (Tornado and Severe Wind Shelter) – Public Structures	Buffalo	9-24-2009	$608,400
Total					**$2,059,944**

Source: Federal Emergency Management Agency

2.1.8 FEMA Public Assistance (PA) Grants in Planning Area

Since 2002, jurisdictions in Dallas County have received $4,762,686.91 in public assistance due to natural hazard damages. **Table 2.7** shows a full breakdown of the payments, as well as the applicant, project type, and matching disaster declaration. Data was retrieved from the FEMA public assistance dataset.

Table 2.7. FEMA PA Grants in Dallas County 2002-2022

Disaster Number	Declaration Date	Project Title	Applicant	Project Amount
4490	3/26/2020	170669 - Vaccination 90-day increment starting 1-21-202	Dallas County Health Department	$50,766.40
4451	7/9/2019	112486 - Countywide Road Damages	Dallas County	$66,536.37
4451	7/9/2019	112494 - Cachoochie Road Culvert	Dallas County	$13,302.50
4451	7/9/2019	115743 - Management Costs	Dallas County	$2,534.02
4317	6/2/2017	CP01224 - Dallas County Wide Gravel Roads Grader Areas	Dallas County	$100,722.62

4317	6/2/2017	CP01417 - Dallas Countywide Emergency Protective Measure	Dallas County	$6,515.47
4250	1/21/2016	059DM56 Gravel Road Damage Grader 1 District	Dallas County	$31,582.50
4250	1/21/2016	059DM62 - Dallas County Grader District 4	Dallas County	$64,184.81
4250	1/21/2016	059DM54A - PAAP-Dallas County - Debris Removal	Dallas County	$11,870.19
4250	1/21/2016	059DM63 - District - 5 - Gravel Road Damages	Dallas County	$36,954.40
4250	1/21/2016	059DM60 - Gravel Road Damages - Grader Area No. 3	Dallas County	$52,247.68
4250	1/21/2016	059DM66-Gravel Roads Grader District 6	Dallas County	$69,814.23
4250	1/21/2016	059DM58C - District - 2 - Gravel Road Damages	Dallas County	$53,126.08
4238	8/7/2015	WWS016C - Dallas Co Road Dist 1	Dallas County	$23,556.17
4238	8/7/2015	WWS015C - Dallas County Bridge Approaches	Dallas County	$13,532.71
4238	8/7/2015	WWS019C - Dallas Co Road Dist 2 - Part 2	Dallas County	$27,180.74
4238	8/7/2015	WWS017C- Road Asphalt failure	Dallas County	$173,369.80
4238	8/7/2015	WWS018C - Dallas Co Road Dist 2 - Part 1	Dallas County	$15,502.37
4238	8/7/2015	WWS024C - Dallas Co Culverts	Dallas County	$7,333.44
4238	8/7/2015	WWS022C - Roads	Dallas County	$17,943.66
4238	8/7/2015	WWS021C - Dallas Co Road Dist 4	Dallas County	$40,824.52
4238	8/7/2015	WWS023C - Roads	Dallas County	$63,337.02
4238	8/7/2015	WWS020C - Dallas Co Road Dist 3	Dallas County	$16,608.32
4144	9/6/2013	DCDC03C-Roads	Dallas County	$37,198.89
4144	9/6/2013	DCDC08C Dallas County Culverts	Dallas County	$10,698.43
4144	9/6/2013	DCDC02C Dallas County Roads	Dallas County	$21,571.16
4144	9/6/2013	DCDC07C - Dallas County Roads	Dallas County	$9,502.21
4144	9/6/2013	DCDC04C Dallas County Roads	Dallas County	$26,662.43
4144	9/6/2013	DCDC10C - Dallas County Roads	Dallas County	$13,445.99
4144	9/6/2013	Dallas County Culverts DCDC06C	Dallas County	$19,534.34
4144	9/6/2013	DCDC05C - Dallas County	Dallas County	$14,461.77
4144	9/6/2013	DCDC09C Dallas County Roads	Dallas County	$17,040.24
1961	3/23/2011	DLFB-B3-72-hour Snow Emergency	City of Buffalo	$16,452.06
1961	3/23/2011	DLFB-E1 - Mayor Office & Obannon Hall	City of Buffalo	$1,000.00
1961	3/23/2011	DLFB-B4- Donated Resources	City of Buffalo	$9,021.66
1961	3/23/2011	DLFB-B2 - 72 Hour Snow Emergency	City of Urbana	$1,428.50
1961	3/23/2011	DLFB-B1 - Emergency Protective Measures-72 Hr. Snow Rem	Dallas County	$32,099.22
1961	3/23/2011	DLMB-08 - Emergency Snow Removal	Dallas County R-I School District	$3,408.50
1847	6/19/2009	JAT-012 / Emergency Protective Measures	City of Buffalo	$1,364.95
1847	6/19/2009	JAT-008-Road Surface	City of Urbana	$6,788.64
1847	6/19/2009	JAT-007 / Emergency Protective Measures	City of Urbana	$1,059.66
1847	6/19/2009	JAT-010 / Access Bridge & Fence	City of Urbana	$4,410.00
1847	6/19/2009	DWD9B01-Dallas County 911 - EPM	Dallas County	$2,778.46
1847	6/19/2009	DWDCA15 -Vegetative Debris	Dallas County	$2,096.00

1847	6/19/2009	DWDCC05 / Roads and Drainage ditches	Dallas County	$25,014.55
1847	6/19/2009	DWDCE04 / Roads and Bridge North Shop, Mill St, Urbana	Dallas County	$10,607.03
1847	6/19/2009	DWDCC07 / County roads and drainage	Dallas County	$60,714.11
1847	6/19/2009	DWDCC03 / Cross Pipe	Dallas County	$9,626.04
1847	6/19/2009	DWDCB09 / Donated Resources	Dallas County	$1,477.30
1847	6/19/2009	DWDCC11 - Road Surface, Drainage, Cross Pipes...Areas	Dallas County	$34,393.37
1847	6/19/2009	DWDCC08 - Road Washouts	Dallas County	$23,261.41
1847	6/19/2009	DWDCC06 / County roads and drainage system	Dallas County	$47,491.81
1847	6/19/2009	DWDCC02 / Dallas County Roads and Bridges - 57 sites	Dallas County	$22,406.87
1749	3/19/2008	ROAD / LOW WATER CROSSING WASHOUT	Dallas County	$5,794.70
1749	3/19/2008	ROAD AND CULVERT WASHOUT	Dallas County	$2,147.11
1749	3/19/2008	ROAD EROSION	Dallas County	$12,846.25
1749	3/19/2008	ROAD WASHOUT	Dallas County	$3,389.40
1749	3/19/2008	ROAD WASHOUTS	Dallas County	$6,979.75
1749	3/19/2008	ROAD WASHOUT	Dallas County	$5,056.00
1749	3/19/2008	ROAD EROSION	Dallas County	$5,774.49
1749	3/19/2008	ROAD WASHOUT	Dallas County	$6,178.98
1749	3/19/2008	ROAD & CULVERTS WASHOUT	Dallas County	$3,420.58
1749	3/19/2008	ROAD WASHOUT	Dallas County	$12,468.61
1749	3/19/2008	ROAD / CULVERT WASHOUT	Dallas County	$7,770.18
1749	3/19/2008	ROAD WASHOUT	Dallas County	$1,766.49
1749	3/19/2008	ROAD WASHOUT -REVISED 08/18/08	Dallas County	$5,547.40
1749	3/19/2008	ROAD WASHOUT	Dallas County	$2,883.22
1749	3/19/2008	ROAD WASHOUT	Dallas County	$2,091.01
1749	3/19/2008	CULVERT / LOW WATER CROSSING WASHOUT	Dallas County	$1,391.55
1742	2/5/2008	ROAD WASHOUT/RUTTING	Dallas County	$4,346.95
1742	2/5/2008	ROAD WASHOUT/RUTTING	Dallas County	$5,236.05
1728	9/21/2007	ROADWAY SURFACES	Dallas County	$42,145.60
1728	9/21/2007	ROAD WASHOUT	Dallas County	$13,898.83
1728	9/21/2007	ROAD WASHOUTS	Dallas County	$30,457.70
1728	9/21/2007	ROAD DAMAGE	Dallas County	$22,157.28
1728	9/21/2007	ROAD WASHOUT	Dallas County	$14,771.52
1728	9/21/2007	ROAD WASHOUT	Dallas County	$33,995.91
1728	9/21/2007	ROAD WASHOUT	Dallas County	$5,996.00
1728	9/21/2007	ROAD WASHOUT	Dallas County	$16,691.86
1728	9/21/2007	ROAD / SHOULDER WASHOUT	Dallas County	$27,411.93
1728	9/21/2007	EMERGENCY PROTECTIVE MEASURES	Dallas County	$2,268.00
1728	9/21/2007	DEBRIS REMOVAL	Dallas County	$7,236.80
1728	9/21/2007	ROAD EROSION	Dallas County	$16,608.10
1728	9/21/2007	ROAD WASHOUT	Dallas County	$23,495.94
1728	9/21/2007	ROAD DAMAGES	Dallas County	$27,696.00

1728	9/21/2007	ROAD/CULVERT WASHOUT	Dallas County	$17,141.84
1728	9/21/2007	ROAD WASHOUT	Dallas County	$56,317.80
1728	9/21/2007	CULVERT DAMAGES	Dallas County	$18,632.80
1728	9/21/2007	ROAD DAMAGES	Dallas County	$10,261.46
1728	9/21/2007	ROAD DAMAGES	Dallas County	$32,198.14
1728	9/21/2007	ROAD DAMAGES	Dallas County	$18,378.76
1728	9/21/2007	ROAD EROSION	Dallas County	$4,628.00
1728	9/21/2007	DEBRIS REMOVAL	Dallas County	$4,040.00
1728	9/21/2007	ROAD WASHOUT	Dallas County	$59,378.40
1728	9/21/2007	ROAD DAMAGES	Dallas County	$8,804.32
1728	9/21/2007	ROAD WASHOUT	Dallas County	$22,625.72
1728	9/21/2007	CULVERT REPAIR	Dallas County	$3,301.31
1728	9/21/2007	ROAD EROSION	Dallas County	$22,560.48
1728	9/21/2007	ROAD/SHOULDER EROSION & WATER BOILS	Dallas County	$23,188.58
1728	9/21/2007	BRIDGE REPAIR	Dallas County	$9,194.02
1728	9/21/2007	ROAD WASHOUT	Dallas County	$73,530.30
1728	9/21/2007	ROAD WASHOUT	Dallas County	$17,978.31
1728	9/21/2007	ROAD WASHOUT	Dallas County	$28,266.95
1728	9/21/2007	ROADWAY DAMAGES	Dallas County	$1,707.38
1728	9/21/2007	ROAD DAMAGE	Dallas County	$15,694.74
1728	9/21/2007	ROAD DAMAGES	Dallas County	$36,928.80
1728	9/21/2007	ROAD WASHOUT	Dallas County	$17,446.18
1728	9/21/2007	ROAD DAMAGES	Dallas County	$22,157.28
1728	9/21/2007	ROAD WASHOUTS	Dallas County	$31,389.48
1728	9/21/2007	ROAD WASHOUTS	Dallas County	$6,766.88
1728	9/21/2007	LOW WATER CROSSING EROSION	Dallas County	$6,191.28
1728	9/21/2007	ROAD EROSION	Dallas County	$9,869.56
1728	9/21/2007	ROAD EROSION	Dallas County	$3,391.44
1463	5/6/2003	DEBRIS REMOVAL	City of Urbana	$1,148.28
1463	5/6/2003	EMERGENCY PROTECTIVE MEASURES	Dallas County	$7,461.88
1463	5/6/2003	DEBRIS REMOVAL	Dallas County	$15,643.93
1463	5/6/2003	DONATED RESOURCES	Dallas County	$7,818.59
1463	5/6/2003	4.2 BRIDGE APPROACH & AGGREGATE SURFACE REPAIR	Dallas County	$20,229.10
1412	5/6/2002	DEBRIS REMOVAL	City of Buffalo	$1,547.00
1412	5/6/2002	PEDESTRIAN BRIDGE WASHOUT	City of Buffalo	$6,220.00
1412	5/6/2002	DONATED RESOURCES	City of Buffalo	$112.50
1412	5/6/2002	FLOOD GENERATED ROAD WASHOUTS	City of Urbana	$1,450.87
1412	5/6/2002	CONCRETE LOW CROSSING	City of Urbana	$37,838.50
1412	5/6/2002	FLOOD GENERATED ROAD DAMAGES	Dallas County	$39,769.56
1412	5/6/2002	FLOOD GENERATED ROAD/DITCH DAMAGES	Dallas County	$5,839.21
1412	5/6/2002	FLOOD GENERATED ROAD DAMAGES	Dallas County	$1,612.26
1412	5/6/2002	FLOOD GENERATED ROAD DAMAGES	Dallas County	$105,798.04

1412	5/6/2002	ROAD DAMAGE	Dallas County	$49,711.86
1412	5/6/2002	ROAD DAMAGE	Dallas County	$53,743.71
1412	5/6/2002	LOW WATER CROSSING	Dallas County	$39,393.28
1412	5/6/2002	ROAD DAMAGE	Dallas County	$45,625.48
1412	5/6/2002	ROAD DAMAGE	Dallas County	$46,091.98
1412	5/6/2002	ROAD DAMAGE	Dallas County	$49,455.06
1412	5/6/2002	ROAD DAMAGE	Dallas County	$61,487.43
1412	5/6/2002	ROAD DAMAGE	Dallas County	$82,417.93
1412	5/6/2002	ROAD DAMAGE	Dallas County	$49,890.72
1412	5/6/2002	ROAD DAMAGE	Dallas County	$70,280.52
1412	5/6/2002	ROAD DAMAGE	Dallas County	$64,248.58
1412	5/6/2002	Not Provided	Dallas County	$82,191.01
1412	5/6/2002	COUNTY ROAD REPAIR	Dallas County	$88,834.23
1412	5/6/2002	ROAD DAMAGE	Dallas County	$282,086.82
1412	5/6/2002	ROAD WASHOUTS	Dallas County	$717,422.47
1412	5/6/2002	ROAD REPAIR	Dallas County	$65,444.91
1412	5/6/2002	REPAIR LOW WATER CROSSING	Dallas County	$51,671.00
1412	5/6/2002	ROAD REPAIR	Dallas County	$2,173.60
1412	5/6/2002	LOW WATER CROSSING REPAIR	Dallas County	$6,611.10
1412	5/6/2002	ROAD DAMAGE	Dallas County	$8,054.72
1412	5/6/2002	LOW WATER CROSSING DAMAGES	Dallas County	$32,687.80
1412	5/6/2002	LOW WATER CROSSING REPAIR	Dallas County	$77,102.70
1412	5/6/2002	ROAD DAMAGE	Dallas County	$15,785.96
1412	5/6/2002	ROAD REPAIR	Dallas County	$2,215.86
1412	5/6/2002	LOW WATER CROSSING	Dallas County	$40,800.92
1412	5/6/2002	ROAD DAMAGE	Dallas County	$14,207.82
1412	5/6/2002	BRIDGE WASHOUTS	Dallas County	$1,065.00
1412	5/6/2002	FLOOD GENERATED ROAD DAMAGES	Village of Louisburg	$1,242.70
Total				**$4,762,686.91**

Source: Federal Emergency Management Agency

2.2 JURISDICTIONAL PROFILES AND MITIGATION CAPABILITIES

2.2.1 County, City, and Village Jurisdictions

Unincorporated Dallas County

Dallas County is a third-class county and is governed by a three-member Commission. Under the provisions of RSMo §49.010, counties are divided into two districts of nearly equal population (in Dallas County, the northern district and the southern district). Each district elects one commissioner, and the presiding commissioner is elected by the county as a whole. Commissioners serve four-year terms. The Commission sets broad operating policies, enacts ordinances, and establishes budgets as mandated by State law. The County enters into contracts with other public agencies to ensure the smooth flow of services including law enforcement, construction and maintenance of public roads and bridges, and the operations of county offices, equipment, and services. The 2020 population of Dallas County was 16,841.

There are four outdoor warning sirens within the county, two in Buffalo and two in Urbana, that are activated by the EMD through Dallas County 911. The county also utilizes the RAVE notification system. There is one safe room located at Buffalo High School. The county participates in the NFIP.

Table 2.8 provides a full summary of the county's planning and mitigation capabilities.

Table 2.8. Unincorporated Dallas County Mitigation Capabilities

Element	Yes, No, N/A	Comments and/or Weblink
Planning Capabilities		
Comprehensive Plan	In progress	
Builder's Plan	Date: since 2010	International codes (2018)
Capital Improvement Plan	Date: 2018	
City Emergency Operations Plan	Date: 2017	Using county all hazard plan
County Emergency Operations Plan	Date: under revision	Switching to esf format
Local Recovery Plan	No	
County Recovery Plan	No	
City Mitigation Plan	No	Using county hazard mitigation plan
County Mitigation Plan	Yes	Last update – 2017
Debris Management Plan	No	
Economic Development Plan	Yes	
Transportation Plan	No	
Land-use Plan	No	No bldg. Codes or p&z in county
Flood Mitigation Assistance (FMA) Plan	No	
Watershed Plan	Yes	Nfis, 2015
Firewise or other fire mitigation plan	No	
Critical Facilities Plan (Mitigation/Response/Recovery)	No	
Policies/Ordinance		
Zoning Ordinance	No	City only
Building Code	No	City of buffalo only, 2018
Floodplain Ordinance	Yes	Date: 2015
Subdivision Ordinance	N/a	
Tree Trimming Ordinance	No	
Nuisance Ordinance	No	
Stormwater Ordinance	No	

Element	Yes, No, N/A	Comments and/or Weblink
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)	Yes	County wide
NFIP Community Rating System (CRS) program	No	
National Weather Service (NWS) Storm Ready Certification	No	
Firewise Community Certification	No	
Building Code Effectiveness Grading (BCEGs)	No	
ISO Fire Rating	No	Rating: 5, in buffalo
Economic Development Program	Yes	Not a literal program
Land Use Program	No	Buffalo only
Public Education/Awareness	No	
Property Acquisition	N/a	
Planning/Zoning Boards	No	Buffalo only
Stream Maintenance Program	No	
Tree Trimming Program	No	
Engineering Studies for Streams (Local/County/Regional)	No	
Mutual Aid Agreements	No	
Studies/Reports/Maps		
Hazard Analysis/Risk Assessment (City)	No	County mitigation plan
Hazard Analysis/Risk Assessment (County)	Yes	
Evacuation Route Map	Yes	In revised county leop
Critical Facilities Inventory	No	
Vulnerable Population Inventory	No	
Land Use Map	No	Buffalo only
Staff/Department		**Full Time or Part Time?**
Building Code Official	Yes	Part-time
Building Inspector	Yes	Part-time
Mapping Specialist (GIS)	Yes	Full-time
Engineer	No	
Development Planner	No	
Public Works Official	Yes	
Emergency Management Coordinator	Yes	
NFIP Floodplain Administrator	Yes	
Emergency Response Team	No	
Hazardous Materials Expert	Yes	
Local Emergency Planning Committee	Yes	
County Emergency Management Commission	No	
Sanitation Department	No	
Transportation Department	No	
Economic Development Department	Yes	Shared – county & city
Housing Department	No	
Historic Preservation	No	
Non-Governmental Organizations (NGOs)	**Is there a local chapter? Yes or No**	
American Red Cross	Yes	
Salvation Army	No	
Veterans Groups	Yes	
Local Environmental Organization	No	

Element	Yes, No, N/A	Comments and/or Weblink
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		No
Authority to levy taxes for specific purposes		No
Fees for water, sewer, gas, or electric services		Yes
Impact fees for new development		No
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

Source: Data Collection Questionnaire

City of Buffalo

The City of Buffalo is located in central Dallas County and is the county seat. Buffalo is a fourth-class city governed by an elected Mayor and six aldermen elected from three wards. The population in 2020 was 3,101.

There are two outdoor warning sirens located within the city operated by 911, OEM, and the Police/Fire Chief. The city also utilizes the Swift 911 emergency notification system. One FEMA shelter is located at Buffalo High School. The city is an active participant in the NFIP.

Table 2.9 provides a full summary of the city's planning and mitigation capabilities.

Table 2.9. City of Buffalo Mitigation Capabilities

Element	Yes, No, N/A	Comments and/or Weblink
Planning Capabilities		
Comprehensive Plan	Yes	
Builder's Plan	Yes	City codes
Capital Improvement Plan	Yes	Equipment replacement plan
City Emergency Operations Plan	Yes	
County Emergency Operations Plan	Yes	
Local Recovery Plan	Yes	
County Recovery Plan	N/a	
City Mitigation Plan	Yes	
County Mitigation Plan	N/a	
Debris Management Plan	Yes	
Economic Development Plan	Yes	
Transportation Plan	No	
Land-use Plan	Yes	
Flood Mitigation Assistance (FMA) Plan	Yes	Chapter 415, city code book fire chief – flood plain mgr
Watershed Plan	Yes	
Firewise or other fire mitigation plan	Yes	Began working on a plan for the mdc not long ago
Critical Facilities Plan (Mitigation/Response/Recovery)	No	
Policies/Ordinance		
Zoning Ordinance	Yes	
Building Code	Yes	Version: 2018
Floodplain Ordinance	Yes	Date: 11/13/2006
Subdivision Ordinance	Yes	
Tree Trimming Ordinance	No	
Nuisance Ordinance	Yes	
Stormwater Ordinance	Yes	
Drainage Ordinance	Yes	
Site Plan Review Requirements	Yes	
Historic Preservation Ordinance	No	
Landscape Ordinance	Yes	
Program		
Zoning/Land Use Restrictions	Yes	
Codes Building Site/Design	Yes	
Hazard Awareness Program	Yes	
National Flood Insurance Program (NFIP)	Yes	
NFIP Community Rating System (CRS) program	No	
National Weather Service (NWS)	No	

Element	Yes, No, N/A	Comments and/or Weblink
Storm Ready Certification		
Firewise Community Certification	No	
Building Code Effectiveness Grading (BCEGs)	No	
ISO Fire Rating	Yes	Rating: class 5
Economic Development Program	Yes	
Land Use Program	Yes	
Public Education/Awareness	Yes	
Property Acquisition	Yes	
Planning/Zoning Boards	Yes	
Stream Maintenance Program	N/a	
Tree Trimming Program	N/a	
Engineering Studies for Streams (Local/County/Regional)	Yes	
Mutual Aid Agreements	Yes	
Studies/Reports/Maps		
Hazard Analysis/Risk Assessment (City)	Yes	
Hazard Analysis/Risk Assessment (County)	N/a	
Evacuation Route Map	No	
Critical Facilities Inventory	No	
Vulnerable Population Inventory	No	
Land Use Map	Yes	
Staff/Department		**Full Time or Part Time?**
Building Code Official	Yes	Part-time
Building Inspector	Yes	Part-time
Mapping Specialist (GIS)	Yes	Full-time
Engineer	No	
Development Planner	Yes	
Public Works Official	Yes	Full-time
Emergency Management Coordinator	Yes	Full-time
NFIP Floodplain Administrator	Yes	Full-time
Emergency Response Team	Yes	Volunteers
Hazardous Materials Expert	No	
Local Emergency Planning Committee	Yes	
County Emergency Management Commission	N/a	
Sanitation Department	No	Contract
Transportation Department	No	
Economic Development Department	Yes	
Housing Department	No	
Historic Preservation	No	
Non-Governmental Organizations (NGOs)	**Is there a local chapter? Yes or No**	
American Red Cross	Yes	
Salvation Army	No	
Veterans Groups	Yes	
Local Environmental Organization	Yes	
Homeowner Associations	Yes	
Neighborhood Associations	Yes	
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

Element	Yes, No, N/A	Comments and/or Weblink
Incur debt through special tax bonds		Yes
Incur debt through private activities		No
Withhold spending in hazard prone areas		No

Source: Data Collection Questionnaire

City of Urbana

The City of Urbana is located in the northwest part of Dallas County. Urbana has a Mayor and four City Council members. In 2020 the population of Urbana was 442.

There are two outdoor warning sirens located within the city activated by OEM. The city also utilizes the Swift 911 emergency notification system. There are no tornado shelters in the city, but they would like to see one built in the future. The city is an active participant in the NFIP.

Table 2.10 provides a full summary of the city's planning and mitigation capabilities.

Table 2.10. City of Urbana Mitigation Capabilities

Element	Yes, No, N/A	Comments and/or Weblink
Planning Capabilities		
Comprehensive Plan	No	
Builder's Plan	No	
Capital Improvement Plan	No	
City Emergency Operations Plan	Yes	
County Emergency Operations Plan	Yes	
Local Recovery Plan	No	
County Recovery Plan	Yes	
City Mitigation Plan	No	
County Mitigation Plan	Yes	
Debris Management Plan	Yes	Ordinance
Economic Development Plan	No	
Transportation Plan	No	
Land-use Plan	No	
Flood Mitigation Assistance (FMA) Plan	Yes	
Watershed Plan	No	
Firewise or other fire mitigation plan	No	
Critical Facilities Plan (Mitigation/Response/Recovery)	No	
Policies/Ordinance		
Zoning Ordinance	No	
Building Code	No	
Floodplain Ordinance	Yes	12/8/21
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)	Yes	
NFIP Community Rating System (CRS) program	No	
National Weather Service (NWS) Storm Ready Certification	No	
Firewise Community Certification	No	
Building Code Effectiveness Grading (BCEGs)	No	
ISO Fire Rating	No	

Element	Yes, No, N/A	Comments and/or Weblink
Economic Development Program	No	
Land Use Program	No	
Public Education/Awareness	No	
Property Acquisition	No	
Planning/Zoning Boards	No	
Stream Maintenance Program	No	
Tree Trimming Program	No	
Engineering Studies for Streams (Local/County/Regional)	No	
Mutual Aid Agreements	Yes	
Studies/Reports/Maps		
Hazard Analysis/Risk Assessment (City)	No	
Hazard Analysis/Risk Assessment (County)	No	
Evacuation Route Map	No	
Critical Facilities Inventory	No	
Vulnerable Population Inventory	No	
Land Use Map	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	Yes	Full time
Emergency Management Coordinator	Yes	Part time
NFIP Floodplain Administrator	Yes	Part time
Emergency Response Team	Yes	From URFD
Hazardous Materials Expert	No	From URFD
Local Emergency Planning Committee	No	
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	No	
Local Environmental Organization	No	
Homeowner Associations	No	
Neighborhood Associations	No	
Chamber of Commerce	No	Coordinate with county
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		No
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		Yes
Incur debt through special tax bonds		Yes
Incur debt through private activities		No
Withhold spending in hazard prone areas		No

Source: Data Collection Questionnaire

Summary of County, City, and Village Jurisdictional Capabilities

Table 2.11. Mitigation Capabilities Summary Table

CAPABILITIES	Dallas County	City of Buffalo	City of Urbana
Comprehensive Plan	In progress	Yes	No
Builder's Plan	Yes	Yes	No
Capital Improvement Plan	Yes	Yes	No
City Emergency Plan	Yes	Yes	Yes
County Emergency Plan	Under revision	Yes	Yes
City Recovery Plan	No	Yes	No
County Recovery Plan	No	N/a	Yes
Local Mitigation Plan	No	Yes	No
County Mitigation Plan	Yes	N/a	Yes
Debris Management Plan	No	Yes	Yes
Economic Development Plan	Yes	Yes	No
Transportation Plan	No	No	No
Land-use Plan	No	Yes	No
Flood Mitigation Assistance (FMA) Plan	No	Yes	Yes
Watershed Plan	Yes	Yes	No
Firewise or other fire mitigation plan	No	Yes	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No	No	No
Zoning Ordinance	No	Yes	No
Building Code	No	Yes	No
Floodplain Ordinance	Yes	Yes	Yes
Subdivision Ordinance	No	Yes	No
Tree Trimming Ordinance	No	No	No
Nuisance Ordinance	No	Yes	Yes
Storm Water Ordinance	No	Yes	No
Drainage Ordinance	No	Yes	No
Site Plan Review Requirements	No	Yes	No
Historic Preservation Ordinance	No	No	No
Landscape Ordinance	No	Yes	No
Zoning/Land Use Restrictions	No	Yes	No
Codes Building Site/Design	No	Yes	No
Hazard Awareness Program	No	Yes	No
National Flood Insurance Program (NFIP)	Yes	Yes	Yes
NFIP Community Rating System (CRS) Participating Community	No	No	No
National Weather Service (NWS) Storm Ready	No	No	No
Firewise Community Certification	No	No	No
Building Code Effectiveness Grading (BCEGs)	No	No	No
ISO Fire Rating	No	Yes	No
Economic Development Program	Yes	Yes	No
Land Use Program	No	Yes	No
Public Education/Awareness	No	Yes	No
Property Acquisition	N/a	Yes	No
Planning/Zoning Boards	No	Yes	No
Stream Maintenance Program	No	N/a	No
Tree Trimming Program	No	N/a	No
Engineering Studies for Streams (Local/County/Regional)	No	Yes	No
Mutual Aid Agreements	No	Yes	Yes
Hazard Analysis/Risk Assessment (Local)	No	Yes	No
Hazard Analysis/Risk Assessment (County)	Yes	N/a	No
Evacuation Route Map	Yes	No	No
Critical Facilities Inventory	No	No	No

CAPABILITIES	Dallas County	City of Buffalo	City of Urbana
Vulnerable Population Inventory	No	No	No
Land Use Map	No	Yes	No
Building Code Official	Yes	Yes	No
Building Inspector	Yes	Yes	No
Mapping Specialist (GIS)	Yes	Yes	No
Engineer	No	No	No
Development Planner	No	Yes	No
Public Works Official	Yes	Yes	Yes
Emergency Management Coordinator	Yes	Yes	Yes
NFIP Floodplain Administrator	Yes	Yes	Yes
Emergency Response Team	No	Yes	Yes
Hazardous Materials Expert	Yes	No	No
Local Emergency Planning Committee	Yes	Yes	No
County Emergency Management Commission	No	N/a	No
Sanitation Department	No	No	No
Transportation Department	No	No	No
Economic Development Department	Yes	Yes	No
Housing Department	No	No	No
Historic Preservation	No	No	No
American Red Cross	Yes	Yes	No
Salvation Army	No	No	No
Veterans Groups	Yes	Yes	No
Local Environmental Organization	No	Yes	No
Homeowner Associations	No	Yes	No
Neighborhood Associations	No	Yes	No
Chamber of Commerce	Yes	Yes	No
Community Organizations (Lions, Kiwanis, etc.	Yes	Yes	No
Apply for Community Development Block Grants	Yes	Yes	Yes
Fund projects through Capital Improvements funding	No	Yes	No
Authority to levy taxes for specific purposes	No	Yes	Yes
Fees for water, sewer, gas, or electric services	Yes	Yes	Yes
Impact fees for new development	No	No	No
Incur debt through general obligation bonds	Yes	No	Yes
Incur debt through special tax bonds	Yes	Yes	Yes
Incur debt through private activities	No	No	No
Withhold spending in hazard prone areas	No	No	No

Source: Data Collection Questionnaires

2.2.2 Public School District Profiles and Mitigation Capabilities

This section provides general information about the participating school district in the plan. There are four school districts in Dallas County. While two of those districts have facilities located within the county, only Dallas County R-I participated in this plan update. Hickory County R-I participates in the Hickory County Hazard Mitigation Planning process. **Figure 2.3** is a map of school district boundaries in Dallas County.

Figure 2.3. Dallas County School Districts

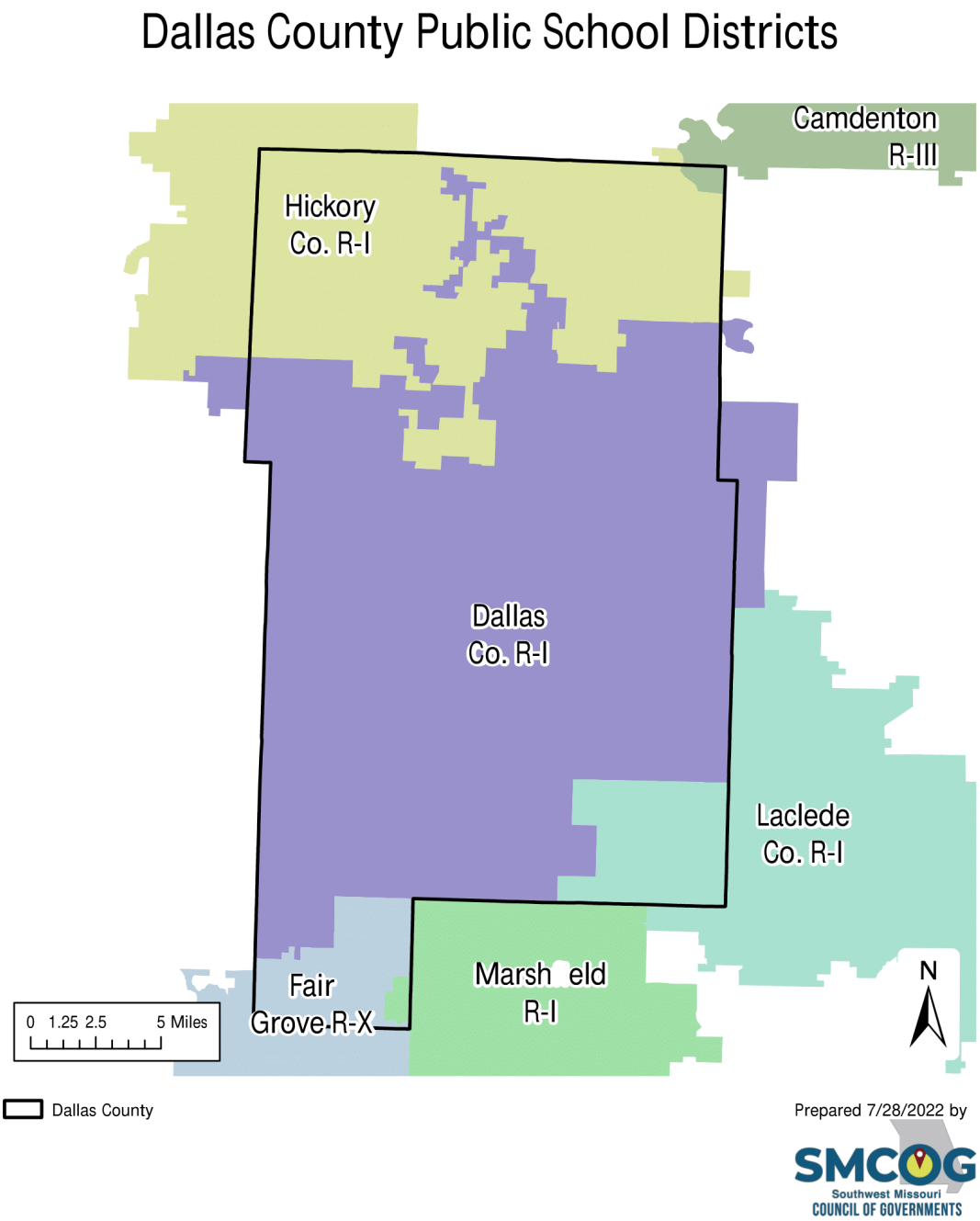


Table 2.12 shows the total enrollment numbers for each district.

Table 2.12. Dallas County School District Enrollment

District Name	District Enrollment
Dallas County R-I	1,613

Source: https://apps.dese.mo.gov/MCDS/Visualizations.aspx?id=22

Dallas County R-I

The Dallas County R-I School District covers much of central and southern Dallas County and serves 1,613 students. All buildings are equipped with PA systems and NOAA weather radios. The district recently updated several security systems at all campuses. Most entry doors have been updated with mag locks that are set to timers to keep the doors securely shut during operating hours. There are two FEMA constructed tornado shelters for students, staff, and faculty to use – the one at the high school is also open to the community. The old brick exterior at the high school was replaced recently. There are plans to construct a new intermediate school for students in grade 3-5. A 5-10% increase in enrollment is expected over the next five years.

Table 2.13 provides a summary of the district's mitigation capabilities.

Summary of Public School District Capabilities

Table 2.13. Summary of Public School District Mitigation Capabilities

Capability	Dallas County R-I
Planning Elements	
Master Plan/ Date	Yes, 2/20/22
Capital Improvement Plan/Date	Yes, Spring of 2022
School Emergency Plan / Date	Yes, Beginning of each school year
Weapons Policy/Date	Yes
Personnel Resources	
Full-Time Building Official (Principal)	Yes
Emergency Manager	Yes
Grant Writer	No
Public Information Officer	Yes
Financial Resources	
Capital Improvements Project Funding	Yes
Local Funds	Yes
General Obligation Bonds	No
Special Tax Bonds	No
Private Activities/Donations	Yes
State and Federal Funds/Grants	Yes
Other	
Public Education Programs	
Privately or Self- Insured?	
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	Yes
Campus Police	Yes

Source: Data Collection Questionnaire

2.2.3 Special Districts

Dallas County 911

Dallas County 911 is an independent political subdivision with seven elected members on the board. The district utilizes the Text-to-911 system as well as Swift 911/RAVE. The long-term budget plan includes a project designed to construct a hardened 911 communications center with reinforced infrastructure to maintain continuation of emergency communications.

Refer to **Table 2.14** for a complete summary of the district's mitigation capabilities.

Urbana Rural Fire Department

The Urbana Rural Fire Department is governed by seven members on the board of directors. The department provides fire suppression and basic medical response services. There is one fire station located in the City of Urbana. The district conducts fire safety drills at local schools and has mutual aid agreements with the state and surrounding fire departments.

Refer to **Table 2.14** for a complete summary of the district's mitigation capabilities.

Summary of Special District Mitigation Capabilities

Table 2.14. Summary of Special District Mitigation Capabilities

Element	Dallas County 911	Urbana Rural Fire Department
Planning Capabilities		
Capital Improvement Plan	Yes	N/A
Emergency Operations Plan	N/A	N/A
Continuity of Operations Plan	N/A	N/A
Community Wildfire Protection Plan	N/A	N/A
Programs		
Cross-Connection Program	No	N/A
Hydrant Flushing Program	No	N/A
Public Education/Awareness	Yes	N/A
Tree Trimming Program	N/A	N/A
Mutual Aid Agreements	N/A	Yes
Studies/Reports/Maps		
Evacuation Route Map	N/A	N/A
Critical Facilities Inventory	N/A	N/A
Financial Resources		
Fund projects through Capital Improvement funding	No	No
Fees for water, sewer, gas, or electric services	No	No
Incur debt through general obligation bonds	No	No
Incur debt through special tax bonds	Yes	No
Incur debt through private activities	No	Yes
Withhold spending in hazard prone areas	No	No

Source: Data Collection Questionnaire

3 RISK ASSESSMENT

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

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

This is an update of the previous Dallas County Hazard Mitigation Plan approved on August 6, 2018.

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 Plan profiles all natural hazards that can affect Dallas County. These hazards were previously identified in the 2018 Dallas County Plan and the 2018 Missouri State Plan. Natural hazards are naturally occurring climatological, hydrological, or geologic events that have a negative effect on people and the built environment. Natural hazards identified include:

- Riverine and Flash Flood
- Dam Failure
- Earthquake
- Land Subsidence/ Sinkholes
- Drought
- Extreme Temperatures
- Severe Thunderstorm/ High Winds/ Lightning/ Hail
- Severe Winter Weather
- Tornado
- Wildfire

3.1.1 Review of Existing Mitigation Plans

The State Plan also includes levee failure. 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 Dallas County.

Human-caused and technological hazards identified in the State Plan include:

- CBRNE Attack
- Civil Disorder
- Cyber Disruption
- Structural and Urban Fires
- Hazardous Materials
- Mass Transportation Accidents
- Nuclear Power Plants
- Public Health Emergencies/Environmental Issues
- Special Events
- Terrorism
- Utility Interruptions and System Failures

In Missouri, local plans customarily include only natural hazards, as only natural hazards are required by federal regulations to be included. The MPC agreed that human-caused and technological hazards are addressed in a Regional Homeland Security Oversight Committee (RHSOC) Threat and Hazard Identification Risk Assessment (THIRA) and that including only natural hazards would meet the needs of local entities participating in the plan update.

3.1.2 Review Disaster Declaration History

From 1993 to present, Dallas County has experienced several severe thunderstorms, severe ice storms, tornados, and floods. Federal and/or state declarations may be granted when the severity and magnitude of an event surpasses the ability of a 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.

The Robert T. Stafford Disaster Relief and Emergency Assistance Act, (PL 100-707) requires that all requests for a declaration by the president must be made by the governor of the affected state. State and federal officials conduct a Preliminary Damage Assessment (PDA) to show that the disaster is of such severity and magnitude that effective response is beyond state and local capabilities. Based on the governor's request, the president may declare that a major disaster or emergency exists, thus activating federal programs to assist in the response and recovery effort. Not all programs are activated for every disaster. Some declarations will provide only individual assistance or public assistance, while others provide both.

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 damage and institutions or industrial sectors affected.

Since 1993, Dallas County has been included in 23 federal declarations. The most recent occurred on July 9, 2020. **Table 3.1** provides the details.

Table 3.1. FEMA Disaster Declarations that included Dallas County, Missouri, 1993-Present

Disaster Number	Description	Declaration Date	Incident Period	Individual Assistance (IA) Public Assistance (PA)
995	Flooding, Severe Storm	Jul 9th, 1993	Jun 10 – Oct 25, 1993	IA and PA
1054	Severe Storm, Tornadoes, Hail, Flooding	Jun 2nd, 1995	May 13 – Jun 23, 1995	IA and PA
1412	Severe Storms, Tornadoes, and Flooding	May 6th, 2002	Apr 24 – Jun 10, 2002	IA and PA
1463	Severe Storms, Tornadoes, and Flooding	May 6th, 2003	May 4 – May 30, 2003	IA and PA
3232	Hurricane Katrina Evacuation	Sep 10th, 2005	Aug 29 – Oct 1, 2005	PA
1728	Severe Storms and Flooding	Sep 21st, 2007	Aug 19 – Aug 21, 2007	PA
3281	Severe Winter Storms	Dec 12th, 2007	Dec 8 – Dec 15, 2007	PA
1676	Severe Winter Storms and Flooding	Jan 15, 2007	Jan 12 – Jan 22, 2007	PA
1749	Severe Storms and Flooding	Mar 19, 2008	Mar 17 – May 9, 2008	PA
1742	Severe Storms, Tornadoes, and Flooding	Feb 5, 2008	Jan 7 – Jan 10, 2008	PA

1847	Severe Storms, Tornadoes, and Flooding	Jun 19, 2009	May 8 – May 16, 2009	IA and PA
3303	Severe Winter Storm	Jan 30, 2009	Jan 26 – Jan 28, 2009	PA
3317	Severe Winter Storm	Feb 3, 2011	Jan 31 – Feb 5, 2011	PA
1961	Severe Winter Storm and Snowstorm	Mar 23, 2011	Jan 31 – Feb 5, 2011	PA
4144	Severe Storms, Straight-Line Winds, and Flooding	Sep 6, 2014	Aug 2 – Aug 14, 2013	PA
4238	Severe Storms, Tornadoes, Straight-Line Winds, Flooding	Aug 7, 2015	May 15 – Jul 27, 2015	PA
3374	Severe Storms, Tornadoes, Straight-Line Winds, Flooding	Jan 2, 2016	Dec 22, 2015 – Jan 9, 2016	PA
4250	Severe Storms, Tornadoes, Straight-Line Winds, Flooding	Jan 21, 2016	Dec 23, 2015 – Jan 9, 2016	PA
4317	Severe Storms, Tornadoes, Straight-Line Winds, Flooding	Jun 2, 2017	Apr 28 – May 11, 2017	PA
4451	Severe Storms, Tornadoes, and Flooding	Jul 9, 2019	Apr 29 – Jul 6, 2019	PA
3482	COVID-19	Mar 13, 2020	Jan 20, 2020 – Continuing	PA
4490	COVID-19 Pandemic	Mar 26, 2020	Jan 20, 2020 – Continuing	PA
4552	Severe Storms, Tornadoes, Straight-Line Winds, Flooding	Jul 9, 2020	Mar 3 – May 4, 2020	PA

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

3.1.3 Research Additional Sources

A variety of sources were researched for data on natural hazards. Primary sources included FEMA, State Emergency Management Agency (SEMA), National Centers for Environmental Information (NCEI) and National Oceanic and Atmospheric Administration (NOAA). The U.S. Geological Survey (USGS) and the Center for Earthquake Research and Information (CERI) were major sources for earthquake information. The Missouri Department of Natural Resources (MDNR) Dam Safety Division provided information concerning dams and the Missouri Department of Conservation (MDC). Other information sources included county officials; existing city, county, regional and state plans; and information from local officials. The additional sources of data on locations and past impacts of hazards in Dallas County include:

- Missouri Hazard Mitigation Plans (2018)
- Previously approved County Hazard Mitigation Plan
- 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 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)

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 as far back as January 1950, 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.

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

3.1.4 Hazards Identified

The natural hazards that may impact or have affected Dallas County are profiled below. All hazards do not necessarily affect every jurisdiction participating in the same way. **Table 3.2** provides a summary of the jurisdictions that may be affected by each hazard. An "X" in the table indicates that jurisdiction is affected by the hazard, and a "-" indicates the hazard is not applicable to that jurisdiction.

Table 3.2. Hazards Identified for Each Jurisdiction

Jurisdiction	Dam Failure	Drought	Earthquake	Extreme Temperatures	Flooding (River and Flash)	Land Subsidence/Sinkholes	Severe Winter Weather	Thunderstorm/Lightning/ Hail/High Wind	Tornado	Wildfire
Dallas County	X	X	X	X	X	X	X	X	X	X
City of Buffalo	-	X	X	X	X	-	X	X	X	X
City of Urbana	-	X	X	X	X	-	X	X	X	X
Dallas County R-I School District	-	-	X	X	X	-	X	X	X	X
Dallas County 911	X	-	X	X	X	-	X	X	X	X
Urbana Rural Fire Department	-	X	X	X	X	-	X	X	X	X

3.1.5 Multi-Jurisdictional Risk Assessment

The risk assessment analyzes each participating jurisdiction's vulnerability to each hazard they may be impacted by. Many of these hazards have the same probability of occurrence throughout the county, while others (dam failure, flooding, wildfire, and sinkholes/land subsidence) can sometimes vary drastically. These differences are detailed in each hazard profile under geographic location and vulnerability.

3.2 ASSETS AT RISK

This section assesses Dallas County's population, structures, critical facilities and infrastructure, and other important assets that may be at risk to hazards. The inventory of assets for each jurisdiction were derived from parcel data from the Dallas County Assessor, the structures dataset downloaded from Missouri Spatial Data Information Service (MSDIS), and local jurisdiction data collection questionnaires. The Missouri Mitigation Viewer was also referenced to ensure that total counts looked accurate.

3.2.1 Total Exposure of Population and Structures

Missouri Spatial Data Information Service (MISDIS) data was used for structure points and paired with Dallas County Assessors data for values.

Unincorporated County and Incorporated Cities

In the following three tables, population data is based on 2020 ACS data. Building counts and building exposure values are based on parcel data provided by the State of Missouri Geographic Information Systems (GIS) database and the Dallas County Assessor.

Contents exposure values were calculated by factoring a multiplier to the building exposure values based on usage type. The multipliers were derived from 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 participating jurisdiction. **Table 3.4** 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 participating jurisdiction in the planning area broken out by building usage types (residential, commercial, industrial, and agricultural).

Table 3.3. Maximum Population and Building Exposure by Jurisdiction

Jurisdiction	2020 Annual Population Estimate	Building Count	Building Exposure ($)	Contents Exposure ($)	Total Exposure ($)
Unincorporated Dallas County	13,217	5,898	$498,987,000	$915,882,000	$1,414,869,000
City of Buffalo	3,101	1550	$223,617,000	$347,583,000	$571,200,000
City of Urbana	442	236	$36,589,000	$50,328,000	$86,917,000
Totals	**16,813**	**7,763**	**$759,193,000**	**$1,313,793,000**	**$2,072,986,000**

Source: Population estimates from the US Census Bureau 2020 American Community Survey Estimate. Building count, building exposure, and contents exposure from Hazus.

Table 3.4. Building Values/Exposure by Usage Type

Jurisdiction	Residential	Commercial	Industrial	Agricultural
Unincorporated Dallas County	$1,274,243,000	$97,043,000	$38,263,000	$5,320,000
City of Buffalo	$389,748,000	$125,021,000	$42,371,000	$14,060,000
City of Urbana	$14,372,000	$0	$0	$0
Totals	**$1,678,363,000**	**$222,064,000**	**$80,634,000**	**$19,380,000**

Source: Hazus

Table 3.5. Building Counts by Usage Type

Jurisdiction	Residential	Commercial	Industrial	Agricultural
Unincorporated Dallas County	5,802	68	20	8
City of Buffalo	1,405	104	24	17
City of Urbana	190	30	10	6
Totals	**7,397**	**202**	**54**	**31**

Source: Hazus

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).

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

Public School District	Enrolment	Building Count	Building Exposure ($)	Contents Exposure ($)	Total Exposure ($)
Dallas County R-1	1,613	16	$38,235,824	$4,303,760	$42,539,584

Source: Missouri Department of Education https://apps.dese.mo.gov/MCDS/Visualizations.aspx?id=22. Building exposure and contents exposure comes from the Data Collection Questionnaire.

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.

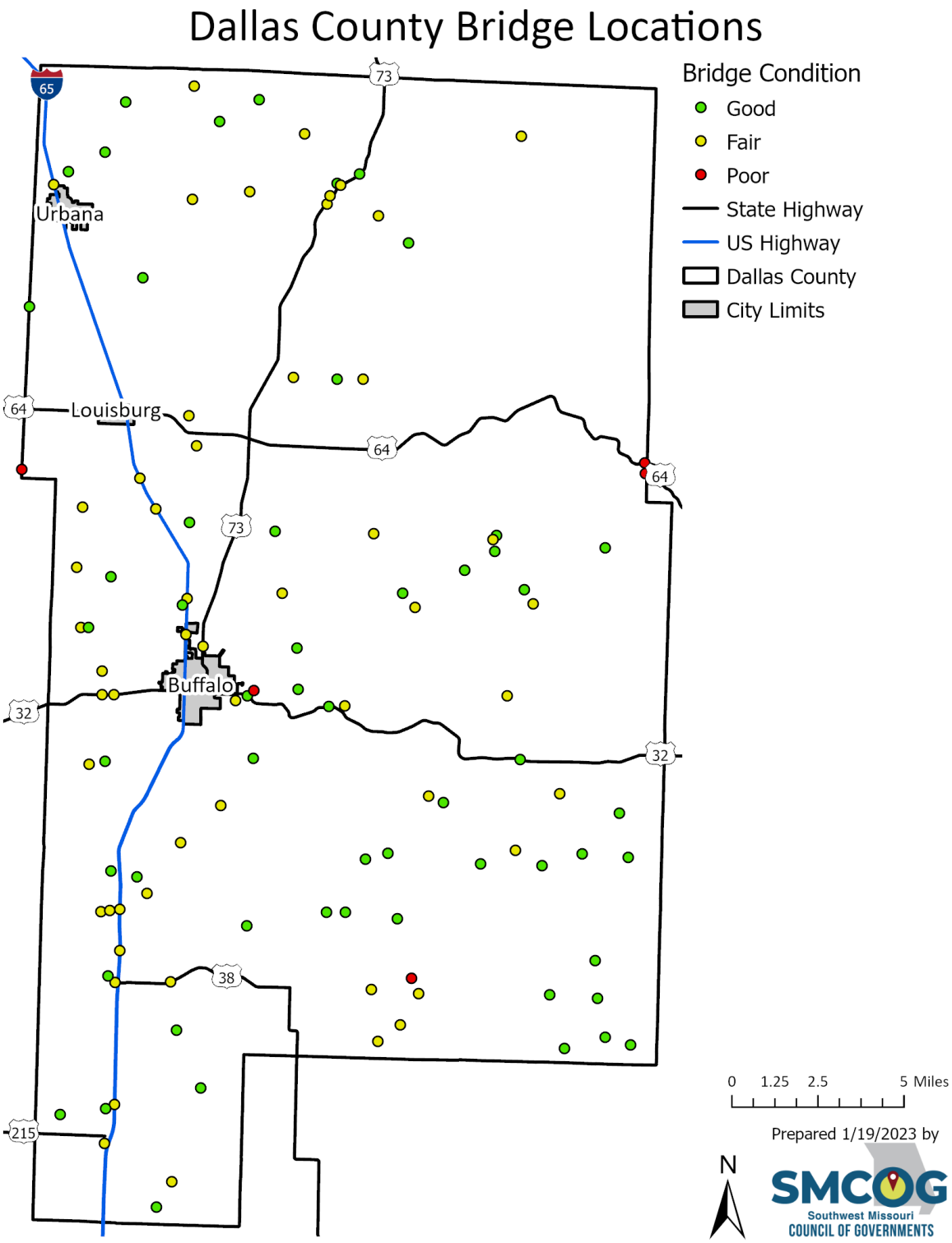
Table 3.7. Inventory of Critical/Essential Facilities and Infrastructure by Jurisdiction

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
Unincorporated Dallas County	-	-	-	7	-	-	6	1	5,876	-	109	-	-	1	-	-	-	-	-	1	-	-	-	6,001
City of Buffalo	3	-	5	1		1	2	5	1,527	2	2	7	2	-	4	1	5	-	-	6	-	-	1	1,575
City of Urbana	-	-	-	-	-	-	1	-	219	-	2	-	-	-	1	1	1	-	-	-	-	-	1	226
Totals	**3**	**0**	**5**	**8**	**0**	**1**	**9**	**6**	**7,622**	**0**	**113**	**7**	**2**	**1**	**5**	**2**	**6**	**0**	**0**	**7**	**0**	**0**	**2**	**7,802**

Source: Hazus

Figure 3.1 is a map that shows the locations of bridges in Dallas County included in the National Bridge Inventory (NBI) data set. The map shows the NBI's classification of each bridge based on structure status. There are 51 in good condition, 57 in fair condition, and 7 in poor condition.

Figure 3.1. Dallas County Bridges



3.2.2 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 damage is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- The presence of natural resources can reduce the impacts of future natural hazards, such as wetlands and riparian habitats which help absorb floodwaters.
- Losses to economic assets like these (e.g., major employers or primary economic sectors) could have severe impacts on a community and its ability to recover from disaster.

Threatened and Endangered Species: **Table 3.8** displays Federally Threatened, Endangered, Proposed and Candidate Species in the county.

Table 3.8. Threatened and Endangered Species in Dallas County

Common Name	Scientific Name	Status
Monarch Butterfly	*Danaus plexippus*	Endangered
Eastern Hellbender	*Crytobranchus alleganiensis alleganiensis*	Endangered
Gray Bat	*Myotis grisescens*	Endangered
Northern Long-eared Bat	*Myotis septentrionalis*	Endangered
Indiana Bat	*Myotis sodalis*	Endangered
Little Brown Bat	*Myotis lucifugus*	Endangered
Tricolored Bat	Perimyotis subflavus	Endangered
Scaleshell	*Leptodea leptodon*	Endangered
Regal Fritillary	*Speyeria idalia*	Threatened
Niangua Darter	*Etheostoma nianguae*	Threatened

Source: U.S. Fish and Wildlife Service, https://ecos.fws.gov/ipac/

Natural Resources: The Missouri Department of Conservation (MDC) maintains a database of lands the MDC owns, leases, or manages for public use. **Table 3.9** provides the names and locations of parks and conservation areas in Dallas County.

Table 3.9. Conservation Areas in Dallas County

Park / Conservation Area	Location
Alfred Newton Gossett Conservation Area	From Buffalo take highway 32 east 11 miles to Long Lane. Turn North on Highway P for approximately 4 miles to Pelican Drive on the right.
Barclay Conservation Area	From Bennett Spring State Park, take Highway 64 west 3.70 miles, then Corkery Road north 3 miles, then Barclay Springs Road east.
Bennett Spring Access	From Lebanon, take Highway 64 west 12 miles, access is just across the Niangua River Bridge.
Bennett Spring Fish Hatchery	Inside Bennett Spring State Park 12 miles west of Lebanon on Highway 64.
Big John Access	From Buffalo, take Highway 32 east 2 miles, then Engle Lane north 1 mile, then Steelman Road east 0.25 mile to the Niangua River.
Charity Access	From Buffalo, take Highway 32 east 2 miles, then Route H south 8 miles, and Route M east 2.75 miles to the Niangua River.

Goose Creek Conservation Area	Goose Creek Conservation Area consists of five tracts within eight miles of the I-44 Conway exit.
Lead Mine Conservation Area	Southwest entrance: From Plad, take Highway 64 west, then Route T north, then Route YY east 0.50 mile. Northeast entrance: From Lebanon, take Highway 5 north to Route E, which will become Bluff Trail at the end of pavement. Follow Bluff Trail 0.25 mile to area.
Moon Valley Access	From Bennett Spring State Park, take Route OO south 1.50 miles, then Moon Valley Road west 1.50 miles just across a low-water bridge.
Williams Ford Access	From Windyville, take Route MM west 2 miles, then Indian Creek Loop south, then Benton Branch Road south to area signs.

Source: Missouri Department of Conservation https://mdc.mo.gov/discover-nature/places

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.

There is one registered historic property in Dallas County. **Table 3.10** provides the details.

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

Property	Address	City	Date Listed
Bennett Spring State Park Shelter House and Water Gauge Station	Off MO A64	Bennett Spring	02/28/1985

Source: National Park Service Register of Historic Places https://www.nps.gov/subjects/nationalregister/index.htm

Agriculture: **Table 3.11** provides a summary of the agriculture-related jobs in Dallas County.

Table 3.11. Agriculture-Related Jobs in Dallas County

	2017	% change since 2012
Number of farms	1,176	-1
Land in farms (acres)	206,814	-5
Average size of farm (acres)	176	-4
Totals		
Market value of products sold	$51,330,000	+8
Government payments	$425,000	-31
Farm-related income	$1,371,000	-30
Total farm production expenses	$48,886,000	+2
Net cash farm income	$4,240,000	+78
Per farm average		
Market value of products sold	$43,648	+9
Government payments	$6,635	+22
Farm-related income	$3,265	-33
Total farm production expenses	$41,570	+3
Net cash farm income	$3,605	+80

Source: 2017 Census of Agriculture
https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Missouri/index.php

3.3 LAND USE AND DEVELOPMENT

3.3.1 Development Since Previous Plan Update

Table 3.12 provides population growth statistics for participating cities in Dallas County as well as the county as a whole.

Table 3.12. Dallas County Population Growth, 2010-2020

Jurisdiction	Total Population 2010	Total Population 2020	2010-2020 # Change	2000-2020 % Change
Dallas County	13,045	13,245	200	1.5%
City of Buffalo	3,178	3,101	-77	11.5%
City of Urbana	424	442	18	8.6%

Source: US Census Bureau American Community Survey 2020 5 Year Estimates https://data.census.gov/

Population growth or decline is generally accompanied by increases or decreases in the number of housing units. Increases in population add to the built environment and increase risk and exposure to hazard events. **Table 3.13** provides the change in numbers of housing units in Dallas County from 2010 to 2020.

Table 3.13. Change in Housing Units, 2010-2020

Jurisdiction	Housing Units 2010	Housing Units 2020	2010-2020 # Change	2000-2020 % Change
Dallas County	7597	7689	+92	+1.2%
City of Buffalo	1,420	1,527	+107	+7.5%
City of Urbana	226	219	-7	-3.1%

Source: US Census Bureau American Community Survey 2020 5 Year Estimates https://data.census.gov/

Figures 3.2 and **3.3** are population density maps for 2010 and 2020.

Figure 3.2. Dallas County Population Density (2010)

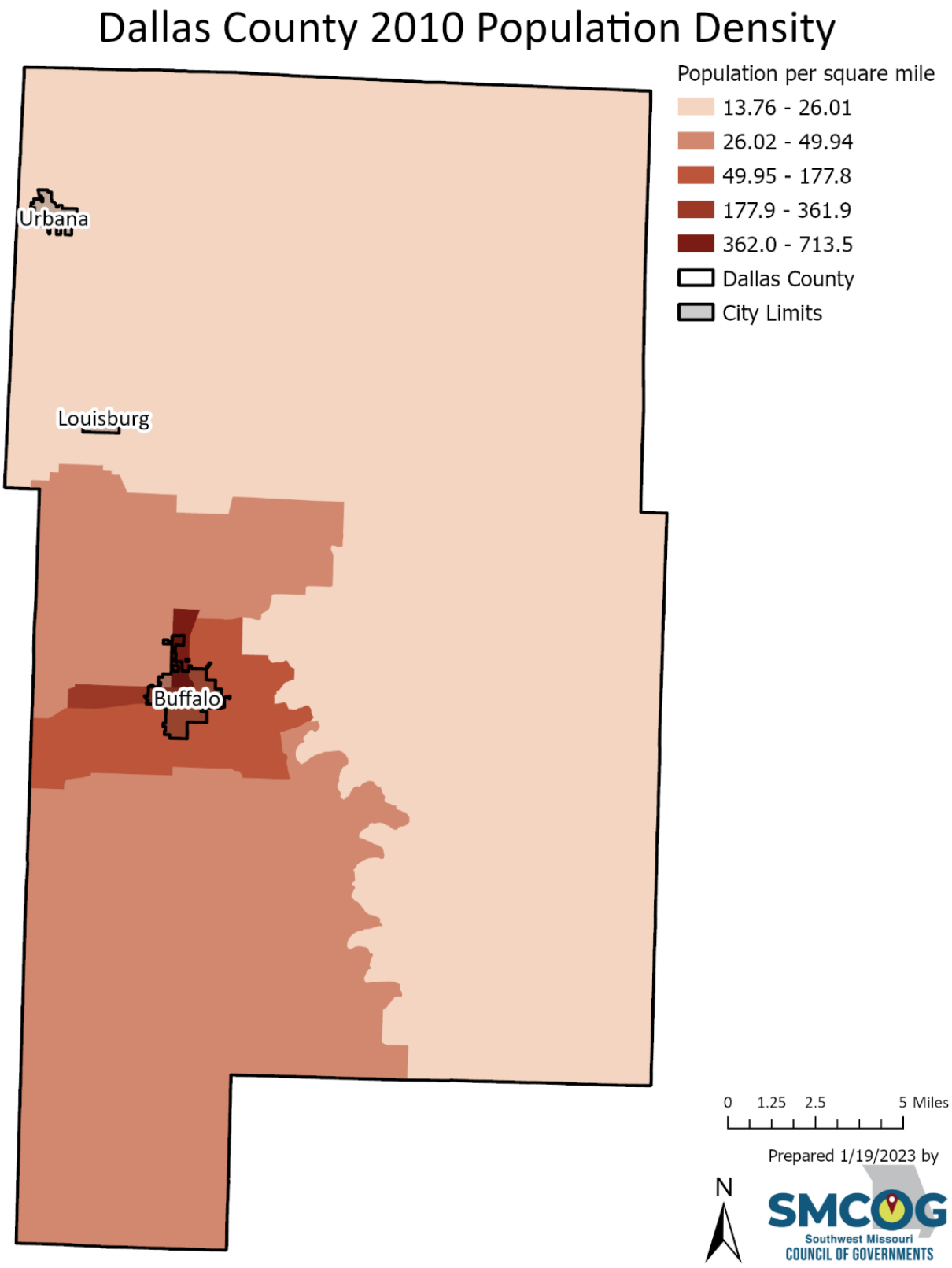
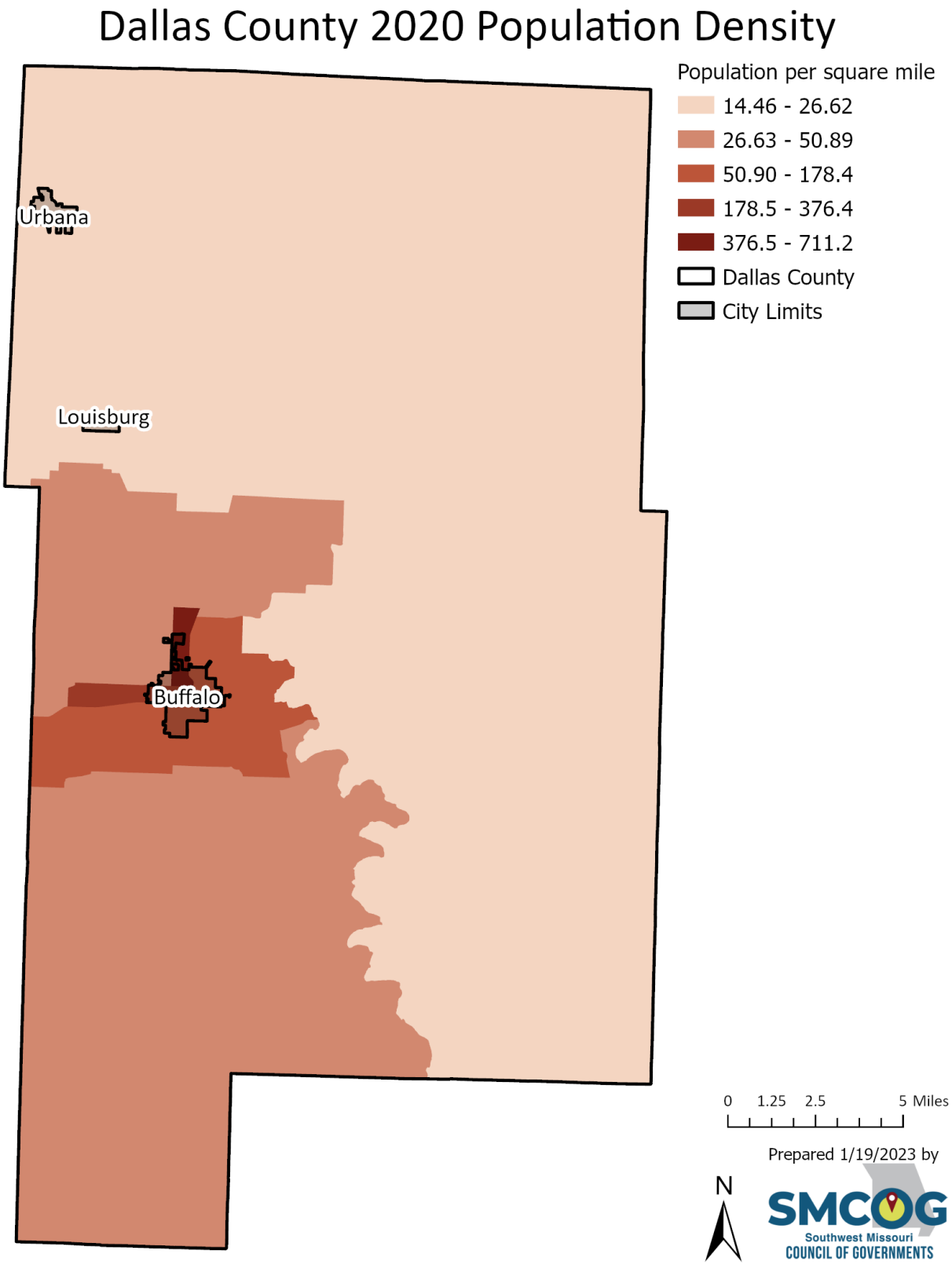


Figure 3.3. Dallas County Population Density (2020)



Dallas County

Dallas County did not indicate any significant new development since the previous plan update.

City of Buffalo

The City of Buffalo did not indicate any significant new development since the previous plan update.

City of Urbana

The City of Urbana did not indicate any significant new development since the previous plan update.

Dallas County R-I

The district indicated they had built a new DCTC (Dallas County Technical Center) attached to the high school campus. They also replaced the old exterior of the high school with new brick.

Dallas County 911

This district did not indicate any new development since the previous plan update.

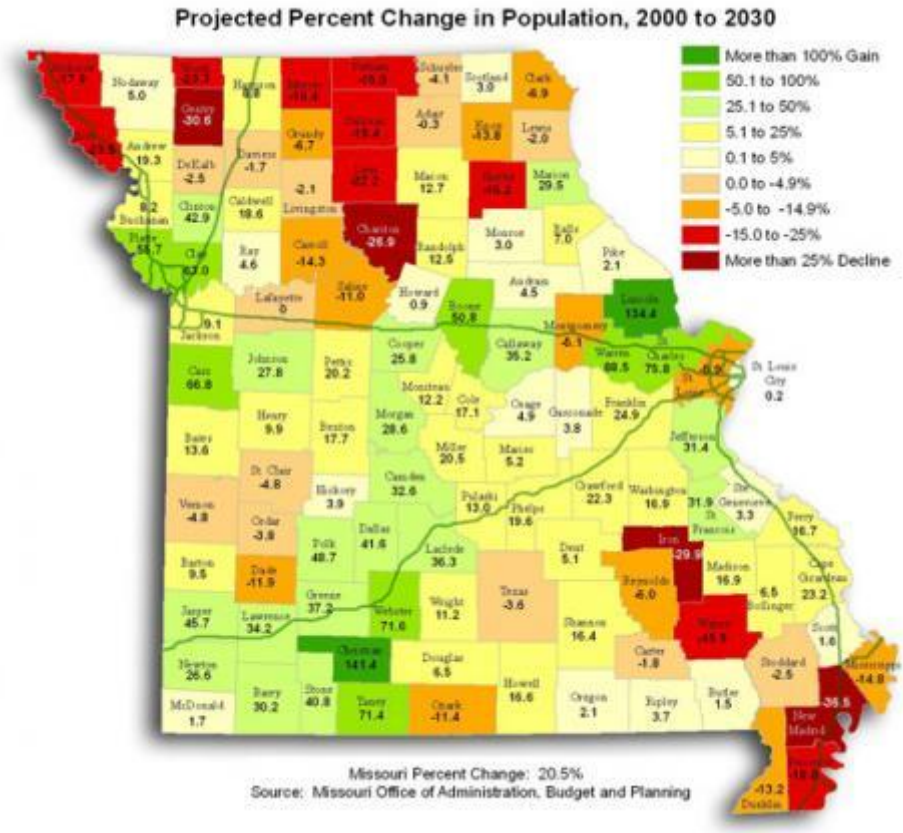
Urbana Rural Fire Department

This district did not indicate any new development since the previous plan update.

3.3.2 Future Land Use and Development

A 2008 study conducted by the Missouri Office of Administration, Budget, and Planning projects a population increase of 41% from 2000 to 2030 for Dallas County. **Figure 3.4** shows the expected population change for each county in the state of Missouri.

Figure 3.4. Projected Percent Change in Population, 2000 to 2030



The remaining discussion in this section provides future growth and development information, where available, relative to each participating jurisdiction.

Dallas County

The county did not indicate if any new development is planned for the next five years.

City of Buffalo

The City of Buffalo predicts a slight development and population increase over the next five years, some occurring in or near the floodplain. They would also like to construct a new Public Safety Building in the southwest portion of town.

City of Urbana

The City of Urbana does not expect any growth to occur in the floodplain, but they are planning for a possible clean water project in the near future.

Dallas County R-I

The school district expects enrollment to increase 5-10% over the next five years. They have plans to construct a new intermediate school for students in grades 3-5, and it will not be built in any known hazard areas.

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 this section. 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, maps are used to indicate the specific locations of the planning area that are vulnerable to the subject hazard. For some hazards, the entire planning area is at risk.
- **Strength/Magnitude/Extent**: This includes information about the strength, magnitude, and extent of a hazard. For some hazards, this is accomplished with description of a value on an established scientific scale or measurement system, such as an EF2 tornado on the Enhanced Fujita Scale. Strength, magnitude, and extent can also include the speed of onset and the duration of hazard events. Describing the strength/magnitude/extent of a hazard is not the same as describing its potential impacts on a community. Strength/magnitude/extent defines the characteristics of the hazard regardless of the people and property it affects.

- **Previous Occurrences**: This section includes available information on historic incidents and their impacts. Historic event records form a solid basis for probability calculations.
- **Probability of Future Occurrence**: The frequency of recorded past events is used to estimate the likelihood of future occurrences. Probability is 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 is 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 is 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**: Changing future conditions are also considered, including the effects of long-term changes in weather patterns and climate on 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, including data collected from the 2018 State Hazard Mitigation Plan.

The vulnerability assessments in this 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
- Other sources as cited.

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

- **Vulnerability Overview**: 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**: Includes the types and numbers of building and critical facilities
- **Previous and Future Development**: This section will include information on how changes in development have impacted the community's vulnerability to this hazard. It also includes a description of how changes in development that occurred in known hazard prone areas since the previous plan have increased or decreased the community's vulnerability, and any anticipated future development in the county, and how that would impact hazard risk in the County.
- **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. For example, a community that has adopted more recent building codes and constructed safe rooms would be less vulnerable to the impact of tornados.

Problem Statements

Each hazard analysis will conclude with a brief summary of the problems created by the hazard in Dallas County, and possible ways to resolve those problems. Jurisdiction-specific information in those cases where the risk varies across the County is included.

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. The areas adjacent to rivers and stream banks that carry excess floodwater during rapid runoff are called floodplains. A floodplain is defined as the lowland and relatively flat area adjoining a river or stream. The terms “base flood” and “100- year flood” refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Floodplains are part of a larger entity called a basin, which is defined as all the land drained by a river and its branches.

Flooding caused by dam failure is discussed in **Section 3.4.2**. It will not be addressed in this section.

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

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

In some cases, flooding may not be directly attributable to a river, stream, or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. This type of flooding, often referred to as sheet flooding, is becoming increasingly prevalent as development outstrips the ability of the drainage infrastructure to properly carry and disburse the water flow.

Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area. Flash flooding is a dangerous form of flooding which can reach full peak in only a few minutes. Rapid onset allows little or no time for protective measures. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding can result in higher loss of life, both human and animal, than slower developing river and stream flooding.

In certain areas, aging storm sewer systems are not designed to carry the capacity currently needed to handle the increased storm runoff. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns. This combined with rainfall trends and rainfall extremes all demonstrate the highly probable, yet generally unpredictable nature of flash flooding in Dallas County.

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 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) where the 100-year floodplain has been mapped.

According to NCEI storm event data from 2003-2022, there were 77 flash flood events and 40 flood events recorded in the county. These events are typically regional in nature; however, flash floods can be contained to one area, specifically portions of highways or roads. **Figure 3.5** through **Figure 3.7** are mapped SFHAs for participating jurisdictions, with critical facilities identified.

Figure 3.5. Dallas County SFHA

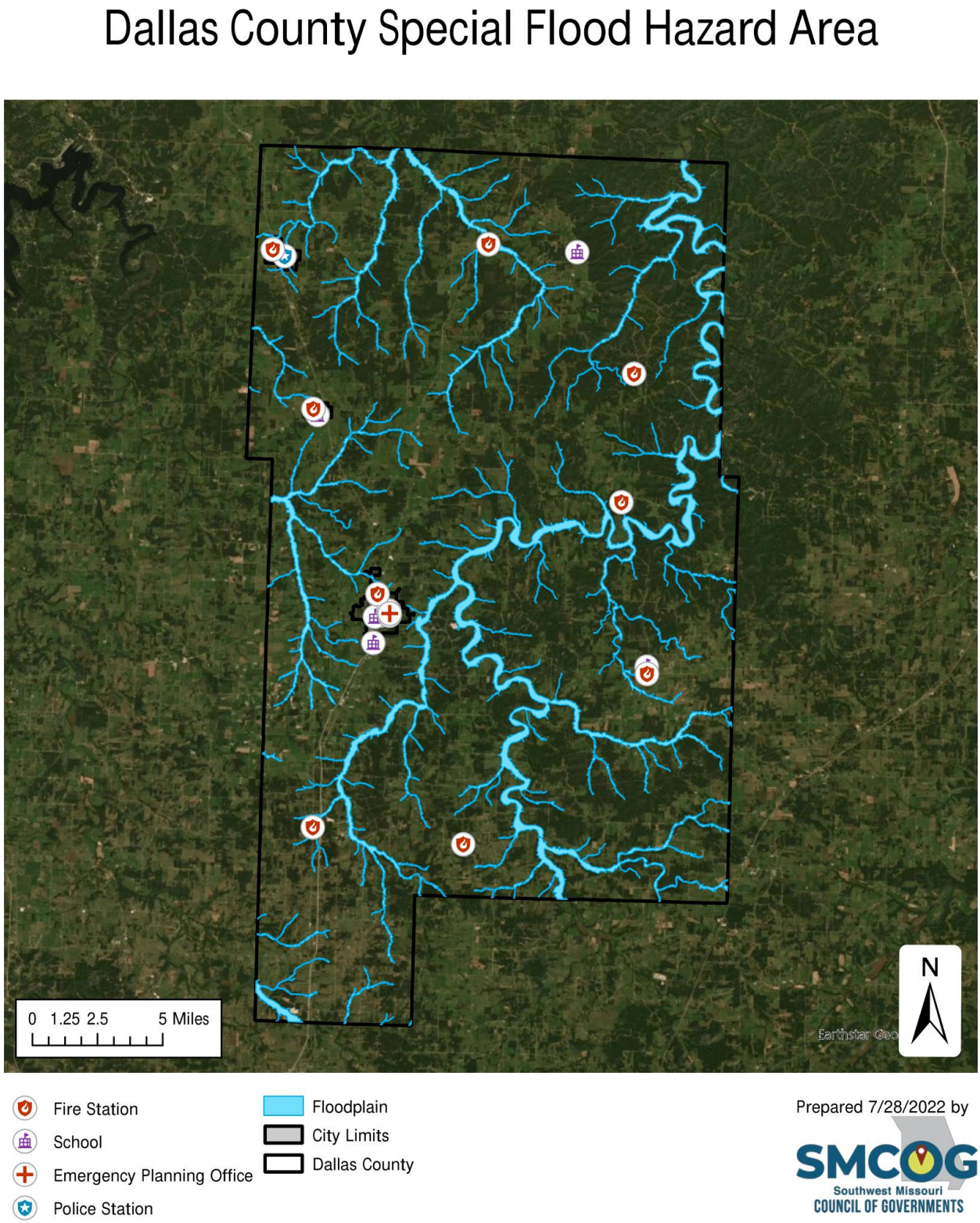


Figure 3.6. City of Buffalo SFHA

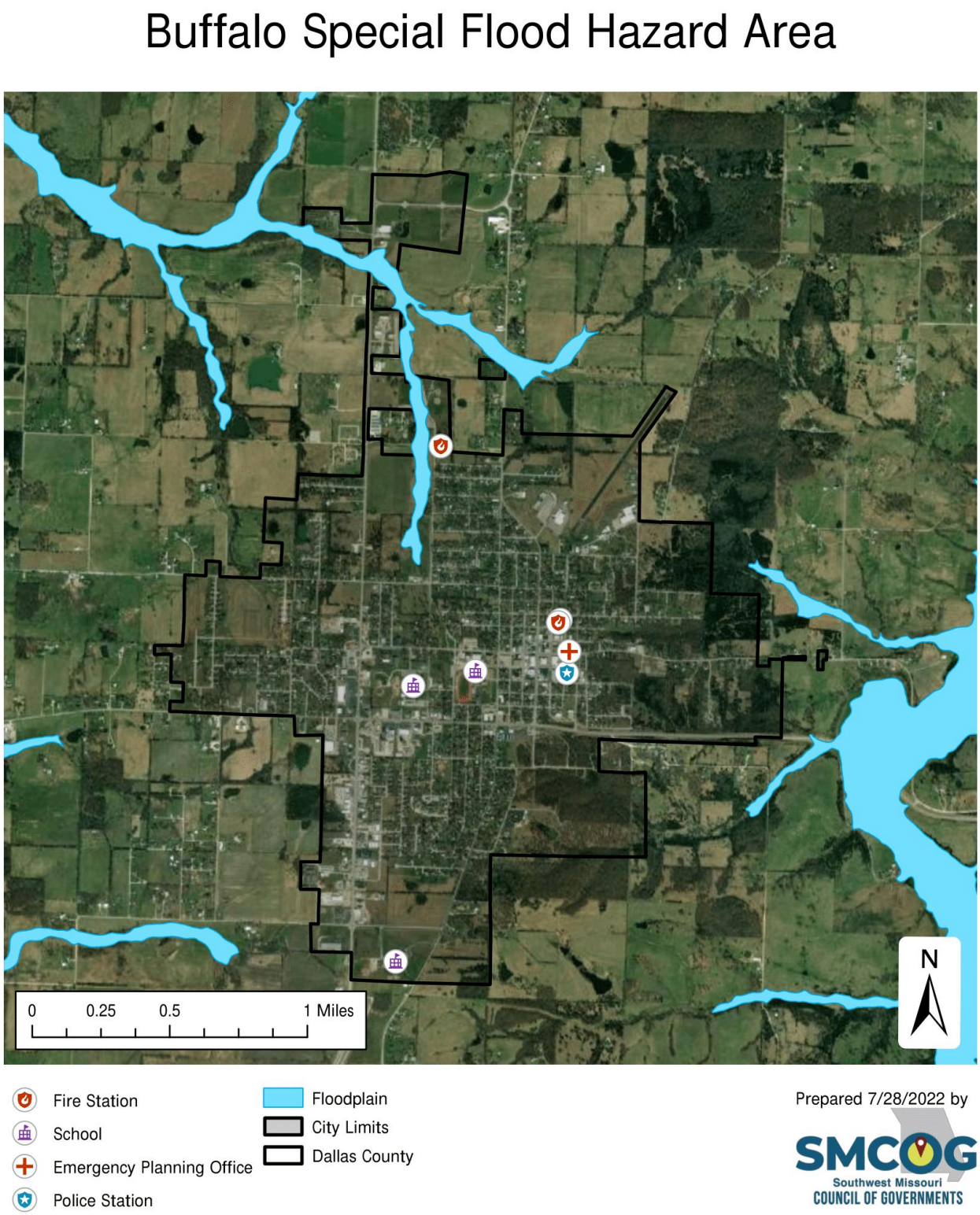
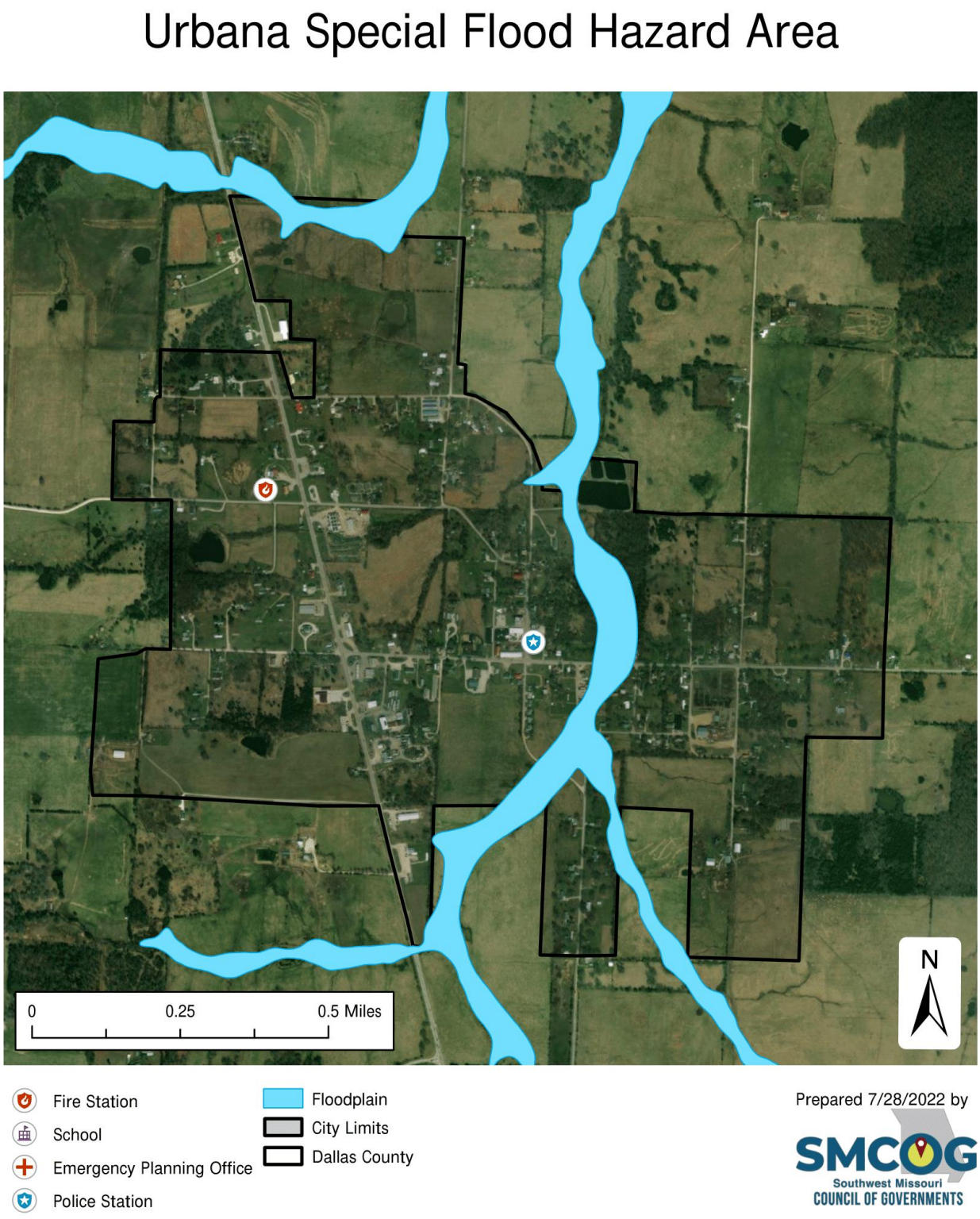


Figure 3.7. City of Urbana SFHA



Flash flooding events pose the most pervasive hazard of the two flood types in the county due to

permeability of soils, slopes, increasing urban development, and an extensive network of streams and rivers. Sustained rainfall or downpours at the rate of one inch per hour have caused street flooding in incorporated areas and made a significant number of low-water crossings impassable. Flash flooding occurs in the floodplain while low-lying areas in all jurisdictions are susceptible to flash floods outside the 100-year floodplain. They also occur in areas without adequate drainage to carry away the amount of water that falls during intense rainfall events.

Table 3.14 shows all flood and flash flood events for participating jurisdictions.

Table 3.14. Flood and Flash Flood Events by Location, 2003-2022

Location	Number of Floods	Number of Flash Floods
Unincorporated Dallas County	18	35
City of Buffalo	10	25
City of Urbana	6	11

Source: National Centers for Environmental Information https://www.ncdc.noaa.gov/stormevents/

The NCEI storm event data lists flash flood events according to the nearest community or place. Most of these events cover larger areas than the smaller geographic areas reported in the data. Although some events may not be inside the corporate limits of the community identified in the narrative, they are in such proximity that the community named would be the most affected by impassible roads. It is safe to assume that numerous low water crossings would be impacted by heavy rains that exacerbate flash flooding across the county. In addition, multiple records are related to the same event and vice versa.

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 3.15 provides details on NFIP participation for communities in Dallas County. **Table 3.16** shows the number of policies in force, amount of insurance in force, number of closed losses, and total payments, where applicable.

Table 3.15. NFIP Participation in Dallas County

Community ID #	Community Name	NFIP Participant (Y/N/Sanctioned)	Current Effective Map Date	Regular- Emergency Program Entry Date
290739#	City of Buffalo	Y	04/19/10(M)	11/14/07
290514#	City of Urbana	Y	04/19/10(M)	04/19/10
290797#	Dallas County	Y	04/19/10(M)	06/30/11

Source: NFIP Community Status Book https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book

Table 3.16. NFIP Policy and Claim Statistics as of Date

Community Name	Policies in Force	Insurance in Force	Closed Losses	Total Payments
Dallas County	7	$1,916,000.00	3	$27,937.62
City of Buffalo	0	$0	0	$0
City of Urbana	0	$0	0	$0

Source: FEMA

Repetitive Loss

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 in Dallas 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.

According to the Flood Insurance Administration, there are no Severe Repetitive Loss properties in Dallas County.

Previous Occurrences

Table 3.17 and **Table 3.18** reflect storm event data for riverine flooding and flash flood events in Dallas County from 2003-2022. In total, there were 40 riverine flood events and 77 flash flood events resulting in $1,146,000 in property damages.

Table 3.17. NCEI Dallas County Flash Flood Events Summary, 2003-2022

Year	# of Events	# of Deaths	# of Injuries	Property Damage	Crop Damage
2003	1	0	0	$0	$0
2004	1	0	0	$0	$0
2005	3	0	0	$0	$0
2006	2	0	0	$0	$0
2007	4	0	0	$50,000	$0
2008	16	0	0	$1,000	$0
2009	7	0	0	$5,000	$0
2010	4	0	0	$0	$0
2011	0	0	0	$0	$0
2012	0	0	0	$0	$0
2013	6	0	0	$275,000	$0
2014	0	0	0	$0	$0
2015	14	1	0	$525,000	$0
2016	5	0	0	$10,000	$0
2017	2	0	0	$100,000	$0
2018	1	1	0	$30,000	$0
2019	1	0	0	$0	$0
2020	8	0	0	$0	$0
2021	1	0	0	$0	$0
2022	1	0	0	$0	$0
Total	**77**	**2**	**0**	**$996,000**	**$0**

Source: National Centers for Environmental Information https://www.ncdc.noaa.gov/stormevents/

Table 3.18. NCEI Dallas County Riverine Flood Events Summary, 2003-2022

Year	# of Events	# of Deaths	# of Injuries	Property Damage	Crop Damage
2003	0	0	0	$0	$0
2004	0	0	0	$0	$0
2005	2	0	0	$0	$0
2006	0	0	0	$0	$0
2007	1	0	0	$0	$0
2008	2	0	0	$0	$0
2009	0	0	0	$0	$0
2010	9	0	0	$0	$0
2011	5	0	0	$0	$0
2012	0	0	0	$0	$0
2013	1	0	0	$130,000	$0
2014	0	0	0	$0	$0
2015	1	0	0	$0	$0
2016	3	0	0	$20,000	$0
2017	3	0	0	$0	$0
2018	4	0	0	$0	$0
2019	2	0	0	$0	$0
2020	1	0	0	$0	$0
2021	1	0	0	$0	$0
2022	5	0	0	$0	$0
Total	**40**	**0**	**0**	**$150,000**	**$0**

Source: National Centers for Environmental Information https://www.ncdc.noaa.gov/stormevents/

Probability of Future Occurrence

There was a total of 117 flood events reported in Dallas County from 2003-2022. Of the 117 total, 40 were riverine floods. In this 20-year time-period, there were 6 years without a riverine flood and 18 years without any property or crop damage. This equates to a 70% probability for a riverine flood to occur in any given year and a 10% probability that a damaging event will occur. Based on the number of events and years, the average number of riverine flood events is 2 per year and the average amount of damage caused is $$7,500.

During the same time-period, there were 77 flash floods reported in the county. These floods occurred in 17 of the 20 years, giving an 85% probability of occurrence in any given year. Damages occurred in 8 years, giving a 40% probability of occurrence in any given year. The average amount of flash floods per year was 3.85 and the average cost of damages was $49,800.

Changing Future Conditions Considerations

With changing climate conditions comes more uncertainty and less predictability for hazard events. An overall increasing global temperature is likely to lead to increased precipitation and intense rainstorms. Over the last fifty-years, the average annual precipitation in most of the Midwest has increased by 5-10%; however, rainfall during the four wettest days of the year has increased nearly 35%. The amount of water flowing in most streams during the worst flood of the year has increased by more than 20%.

The National Climate Assessment states that extreme rainfall events and flooding have increased in the last century and that those trends are expected to continue. Heavy rain events are likely to cause erosion, diminished water quality, and negative impacts on transportation, agriculture, human health, and infrastructure.

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, such as bulk propane tanks, stored in large containers could break loose or puncture as a result of flood activity. 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. Poor conditioned bridges identified in **Figure 3.1** show specific locations that might be more vulnerable to high- or fast-moving floods. Floodwaters can also cause erosion undermining roadbeds. In some instances, steep slopes that are saturated with water may cause mud or rockslides onto roadways. This damage 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.

Potential Losses to Existing Development

Flood loss estimates were developed by selecting all parcels located in a floodplain. Building counts of the selected parcels were then sorted by participating jurisdictions and type. While some areas of the selected parcels may not be immediately adjacent to a floodplain, they have been included to take into account the potential damages from flash flooding. **Table 3.19** presents the total flood exposure for buildings for each participating jurisdiction. Losses were estimated by adding a 5% damage factor to the total assessed value of structures located within a floodplain.

Table 3.19. Total Flood Exposure and Estimated Losses by Jurisdiction

Jurisdiction	Residential	Commercial	Agriculture	Other	Total
Dallas County	$16,913,000	$1,816,000	$68,000	$342,000	$19,139,000
City of Buffalo	$0	$0	$0	$0	$0
City of Urbana	$0	$0	$0	$0	$0
Total	**$16,913,000**	**$1,816,000**	**$68,000**	**$342,000**	**$19,139,000**

Source: Hazus

Low Water Crossings

Damage to low water crossings due to flooding is a significant problem for communities. In 2017/18, an inventory of all low water crossings in Dallas County was conducted. Data gathered included condition, type of structure, measurements, and flooding risk. The inventory showed that there are 214 county-maintained crossings of all types in Dallas County. At the time of the inventory, there were 56 in good condition, 130 in fair condition, and 28 in poor condition. **Figure 3.8** shows the crossing type, while **Figure 3.9** shows the conditions of all crossings in Dallas County at the time of the inventory.

The data from the inventory was used to determine the top ten priority crossings for replacement and/or upgrading in Dallas County based on several factors. **Figure 3.10** shows the location of the ten priority crossings and includes a picture of each crossing. Many of these crossings are repeatedly damaged during heavy rain events and need substantial improvements or upgrades in order to increase resiliency towards flooding.

Figure 3.8. Dallas County Low Water Crossing Type

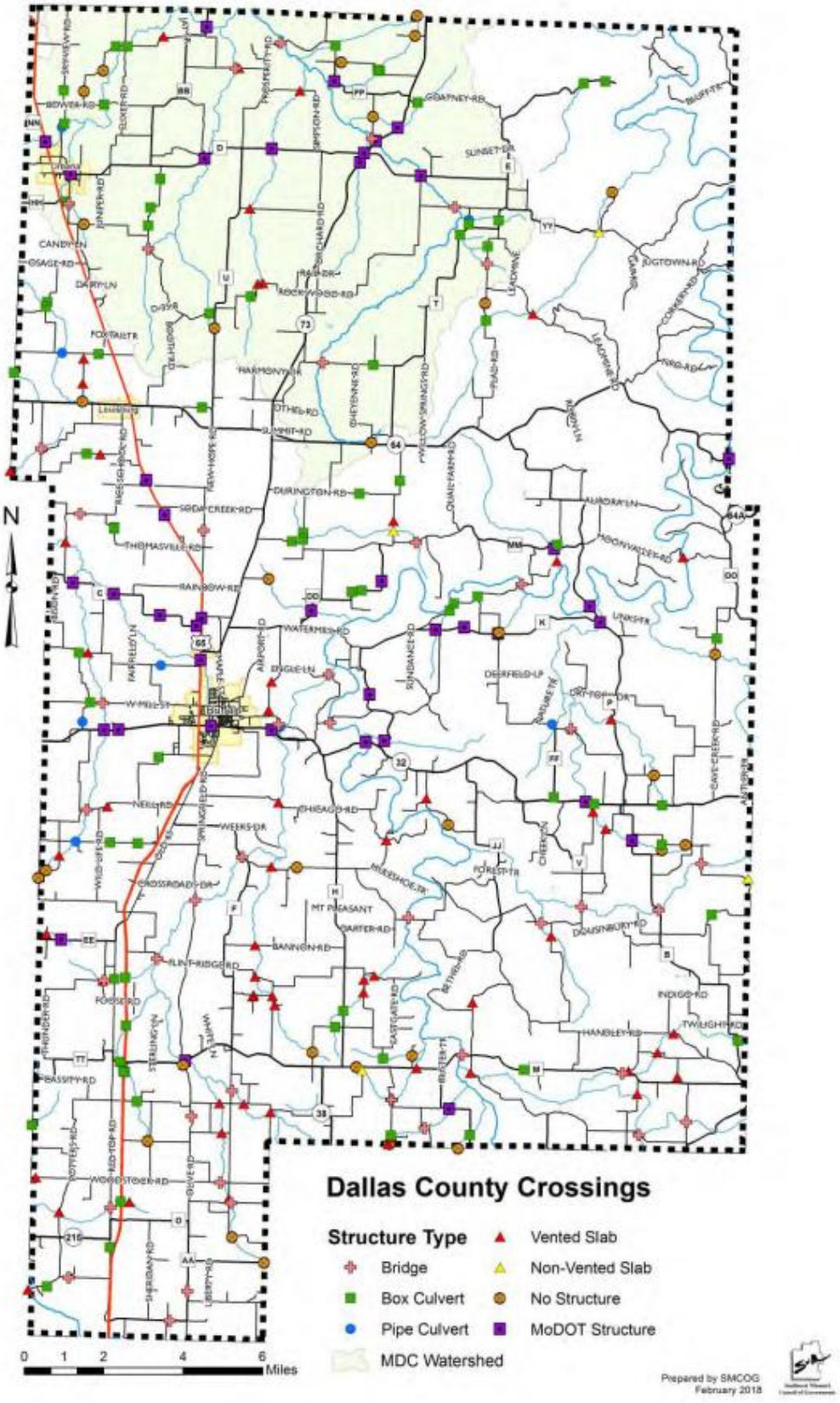


Figure 3.9. Dallas County Low Water Crossing Condition

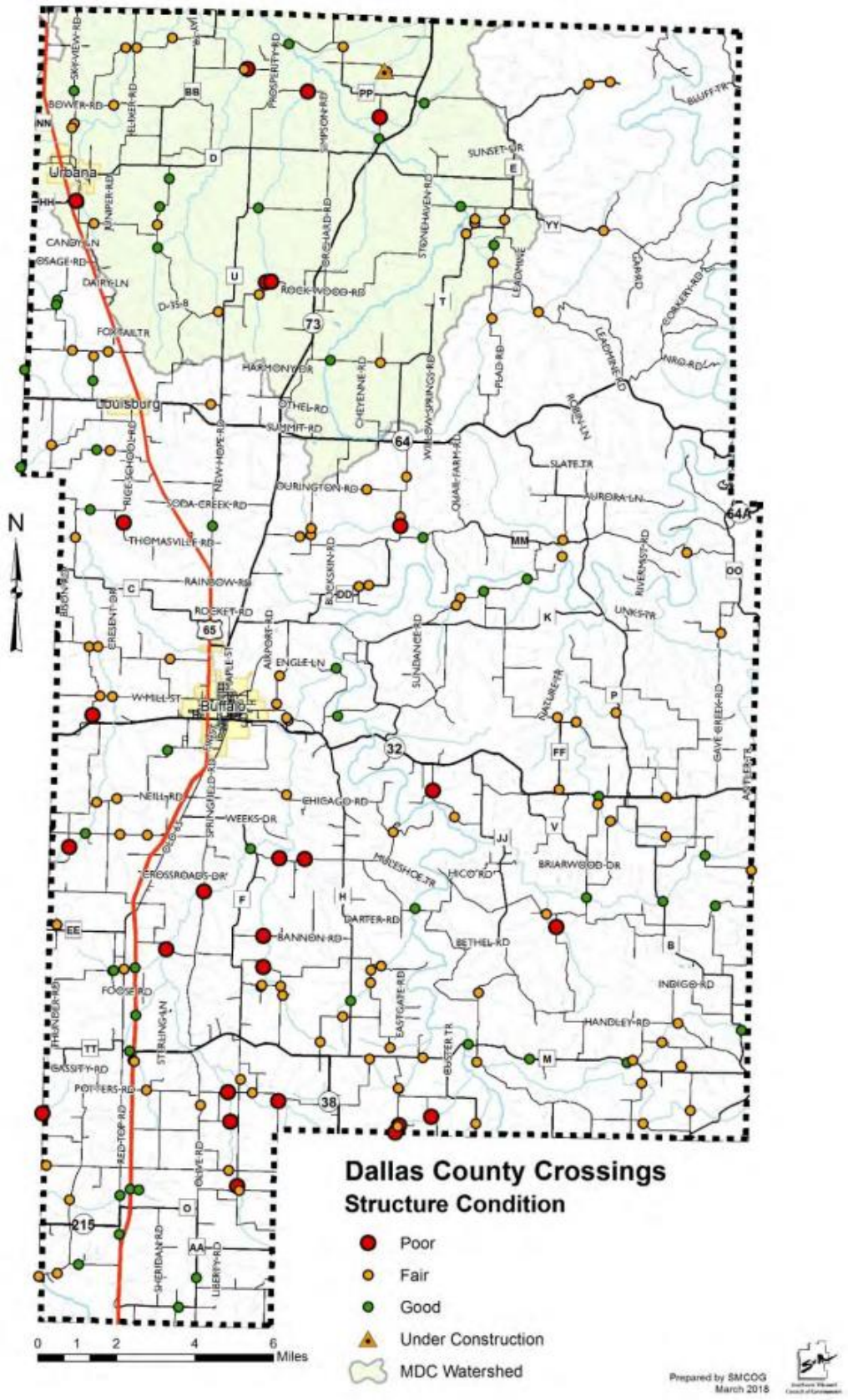
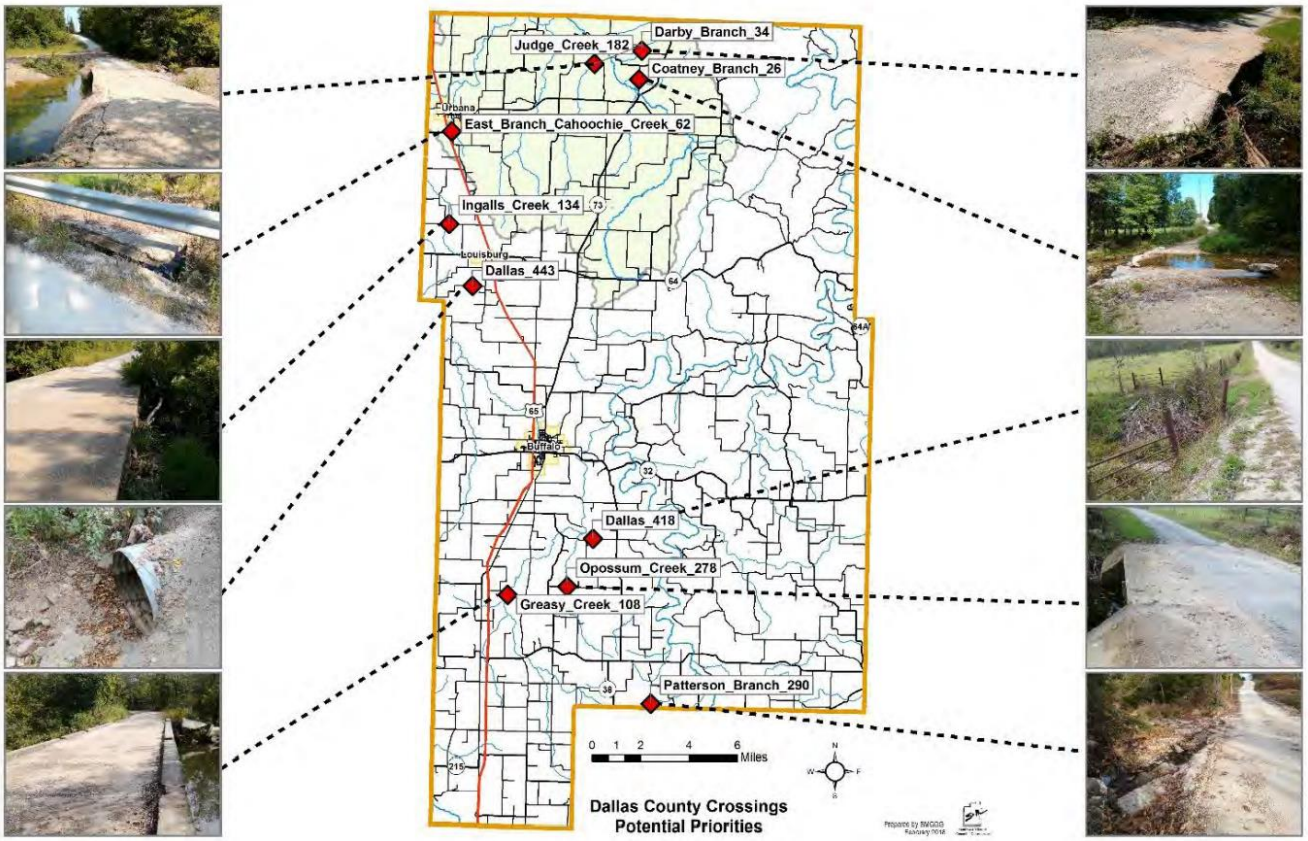


Figure 3.10. Dallas County Low Water Crossing Type



Impact of Previous and Future Development

Future development could impact flash and riverine flooding in Dallas County. Development in low-lying areas near rivers and streams or where interior drainage systems are not adequate to provide drainage during heavy rainfall events will be at risk of flash flooding. Future development would also increase impervious surfaces causing additional water run-off and drainage problems during heavy rainfall events.

Hazard Summary by Jurisdiction

All jurisdictions in the county are at risk of flood hazards. However, as demonstrated in **Table 3.19**, exposure of assets near SFHAs vary among jurisdictions. Based on **Figures 3.5** through **3.7** demonstrating the flood areas for each jurisdiction, the participating cities of Buffalo and Urbana both have minimal exposure to the floodplain. However, Buffalo does have a critical facility (fire station) located adjacent to the floodplain, which could cause issues in the future.

Community Comments on Hazard

57% of the residents that participated in the Community survey stated that they have been impacted by hazards such as flooding and severe weather. 14% of the respondents said that drainage culverts caused flooding issues. 42.9% of respondents stated that they believe flooding (flash & riverine) is likely to impact their community, while 35.7% of respondents believe that flooding will occasionally impact the community. 71.5% of respondents stated they are at least somewhat concerned about flooding and impact on the community, while 57.1% of respondents feel it would have a critical impact

on the community. The respondents of the survey ranked sample mitigation projects in order of those that could benefit the community. The respondents ranked “flood-prone property acquisition & structure demolition/relocation” and “flood-prone structure elevation” projects at second and third respectively. It is important to note that in the additional comments section of the survey, ditches and culverts were mentioned.

Problem Statement

Floods are frequent events and have been listed in 16 out of 23 presidential disaster declarations that have included Dallas County dating back to 1993. From 2003-2020, flooding (both riverine and flash) caused $1,146,000 in property damage. Luckily, there have been no reported injuries or deaths. Significant debris accumulation and damage at low water crossings are a regular occurrence due to flash flooding throughout the county.

Dallas County, Buffalo, and Urbana all participate in the NFIP. These communities have passed floodplain management ordinances and have the ability to substantially regulate development in the floodplain. Their participation in the NFIP enables residents to purchase flood insurance. Street flooding in incorporated areas can be addressed through storm water management projects and enforcement of storm water management regulations, where applicable.

Several low water crossings at numerous locations throughout the county have been affected by floods and flash flooding. All warning signs and gauges should be installed and replaced at frequently flooded low water crossings to provide warning to motorists. Hazard awareness programs and education during and prior to flood events in the county broadcasted by the media can mitigate future risks to motorists at low water crossings.

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.

According to the 2018 State Plan, Missouri has 5,113 total dams recording in the National Inventory of Dams. Dam owners are charged with the primary responsibility for the safe design, operation, and maintenance of their dams. They are also responsible for providing early warning of problems at the dam, for developing an effective emergency action plan, and for coordinating that plan with local officials.

Missouri's topography allows lakes to be built easily and inexpensively, contributing to the high number of dams. Despite the large number of total dams in the state, there are only 685 (about 13.4 percent) state regulated dams, with an additional 57 federally regulated dams. The remaining 4,371 dams are un-regulated.

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

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

The Missouri Dam and Reservoir Safety Council Rules and Regulations uses three classes of downstream environmental zone used when considering permits. The downstream environment zone is the area below the dam that would become inundated should the dam fail. Inundation is defined as water two feet or more over the submerged ground outside of the stream channel. These classes are based on the number of structures and types of development contained within the inundation area as presented in **Table 3.20**. The downstream environment zone classification is also used to prescribe the frequency of inspection.

Table 3.20. MoDNR Dam Hazard Classification Definitions

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

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

Dams in the NID are classified according to hazard potential, an indicator of the consequences of dam failure. A dam's hazard potential classification, presented in **Table 3.21**, does not indicate its condition. Dams assigned the high hazard potential classification are those where failure will potentially result in loss of human life. Significant hazard potential are those dams where failure results in no probable loss of human life but can cause economic loss. Dams assigned the low hazard potential classification are those where failure or results in no probable loss of human life and low economic or environmental losses. Losses are principally limited to the owner's property.

Table 3.21. NID Dam Hazard Classification Definitions

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

Source: National Inventory of Dams https://nid.usace.army.mil/#/

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

Geographic Location

Dams Located Within the Planning Area

There are four recorded dams in Dallas County in the NID databases – one is classified as high hazard dams (Thurman Lake Dam), while the other three are low hazard. None of them are state regulated. **Table 3.22** provides a summary of the dams located in the county and **Figures 3.11** through **3.15** provides the locations of dams.

Table 3.22. Dams in Dallas County

Dam Name	Emergency Action Plan (EAP)AP	Dam Height (Ft)	Normal Storage (Acre-Ft)	Last Inspection Date	River	Nearest Downstream City	Distance To Nearest City (Miles)	Dam Owner	NID classification
Thurman Lake Dam	Not required	25	33	-	TR-Goose Creek	March	-	June Thurman	High
Hutton Lake Dam	Not required	26	37	-	TR- Indian Creek	Bennett Springs	-	D. H. Hutton	Low
Maddux Lake Dam	Not required	25	67	-	TR- Little Niangua	Tuscumbia	-	Dale Maddux	Low
Hannon Lake Dam	Not required	15	43	-	Patterson Branch	March	5	E. G. Hannon	Low

Sources: National Inventory of Dams https://nid.usace.army.mil/#/

Figure 3.11. Dam locations in Dallas County

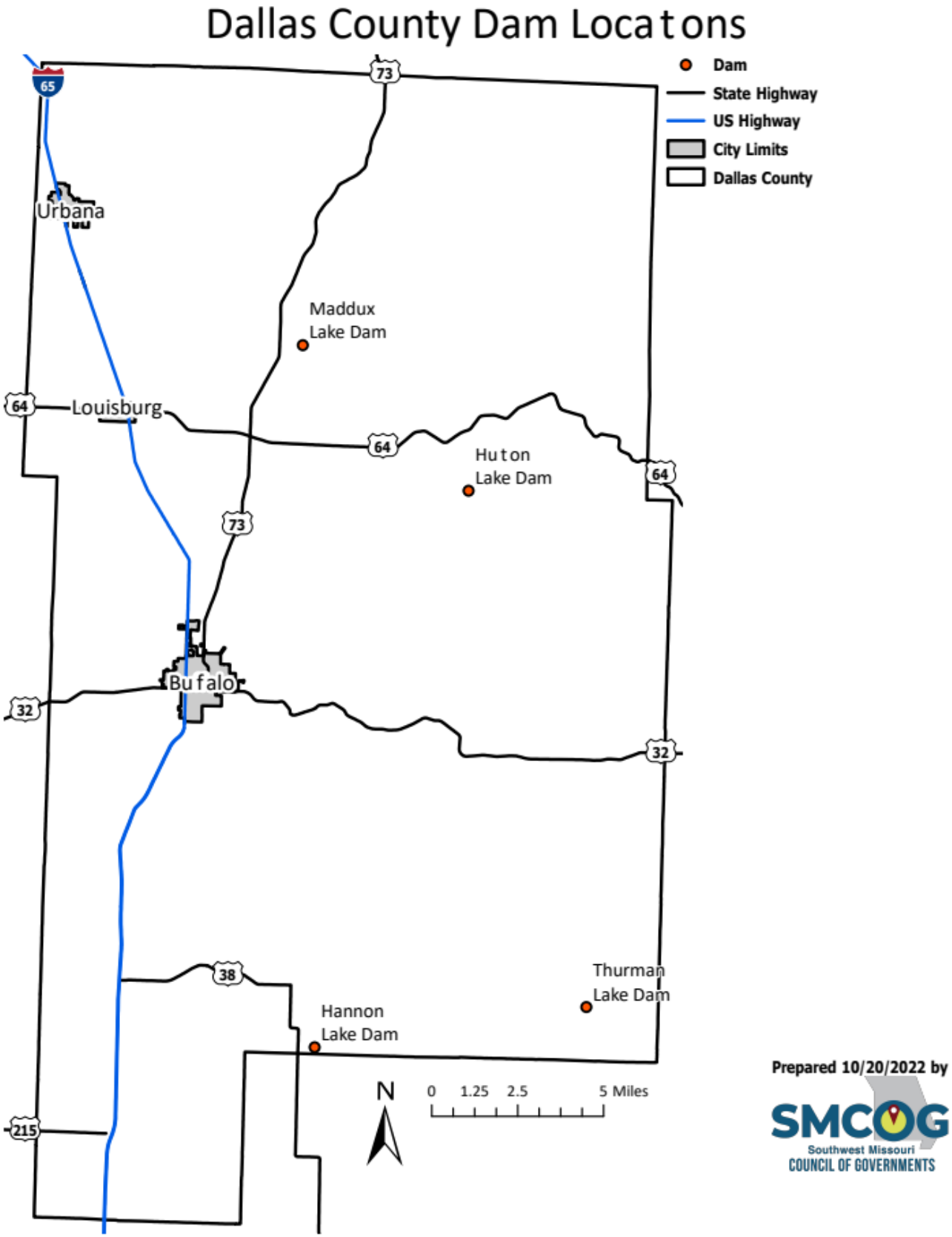


Figure 3.12. Hannon Lake Dam

Figure 3.13. Hutton Lake Dam

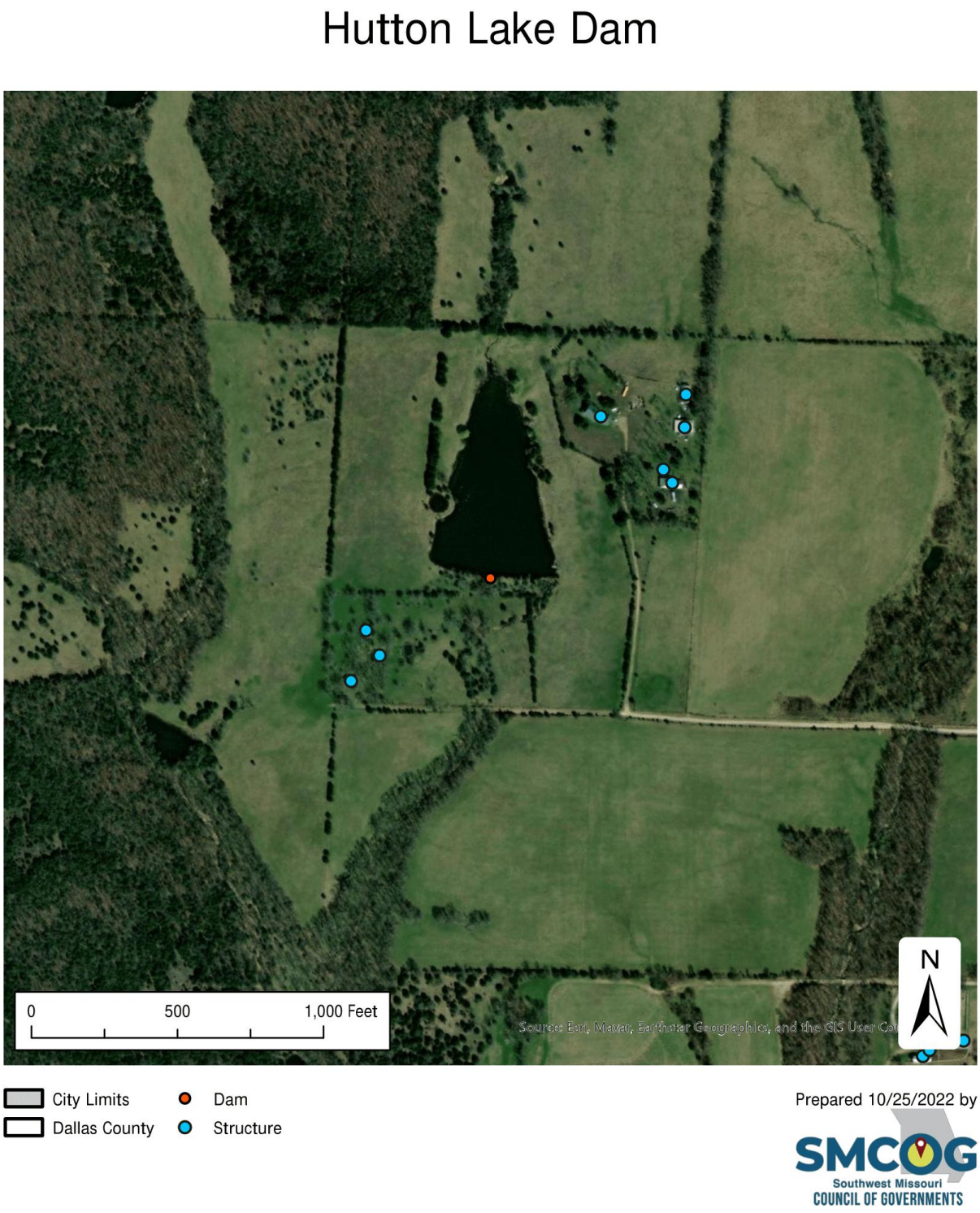


Figure 3.14. Maddux Lake Dam

Figure 3.15. Thurman Lake Dam (High Hazard)

Strength/Magnitude/Extent

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

Previous Occurrences

According to the 2018 State Hazard Mitigation Plan, there are no recorded instances of dam failure within Dallas County. From 1975 to 2016, there were 86 instances of dam failure statewide, with the vast majority occurring during the 1990s.

Probability of Future Occurrence

Since there have been no recorded events in Dallas County in the past 20 years, a calculation of a probability percent would give a 0% probability of a dam failure. The age and ownership of dams are the most significant factors affecting the risk of dam failure. The likelihood of a dam failure is always possible, but the impact of the dams located in Dallas County would be relatively low.

Changing Future Conditions Considerations

According to the 2018 State Plan, dam failure is tied to flooding and the increased pressure that flooding has on dams. Future condition projections imply an increase in precipitation and more extreme events, which may increase flood risk and put additional stress on dams.

Vulnerability

Vulnerability Overview

Vulnerability to dam failure in Dallas County is very small due to the limited number of dams in the county, and the small size of the waterbodies those dams contain. The one high hazard dam appears to serve as an agricultural use. If the dam were to fail, a few structures could be impacted, as well as a roadway. The majority of any structures impacted appear to be owned by the dam owner, but the drainage area would likely retain much of the water. The three low hazard dams would cause little to no damage in the event of a failure due to limited structures in potential impact areas.

Potential Losses to Existing Development:

In the event of a failure of the high hazard dam in the County, losses would be minimal to none, because there are few structures downstream. If the dam were to fail, a few structures could be impacted, as well as a roadway. It can be assumed that the water in the event of a dam failure would follow the downstream topography. As shown in **Figure 3.15** there are few downstream structures within or near a floodplain, so it is unlikely that a failure of this dams would cause any significant damage to existing development. The majority of any structures impacted appear to be owned by the dam owner, but the drainage area would likely retain much of the water. There are no critical facilities downstream of a dam.

Impact of Previous and Future Development

Any future development in Dallas County that occurs in low-lying areas downstream of dams would be impacted in the event of a dam failure. However, due to the rural locations of all dams in the county, substantial future development in potentially affected areas is not anticipated.

Hazard Summary by Jurisdiction

No municipalities or school districts would suffer damages in the event of a dam failure. All potential damage would occur in the unincorporated parts of the county.

Community Comments on Hazard

Per the community survey, 92.9% of respondents indicated that they believe dam failure is unlikely to impact their community. Additionally, 57.1% of respondents stated they are “not at all concerned” about dam failure and 21.4% are “not so concerned”. When asked what magnitude of impact would dam failure have on the community, 57.1% said “no impact” and 42.9% said “limited impact”. There were no additional comments about dams or dam failure.

Problem Statement

Overall, dam failure is a relatively low risk to Dallas County and the incorporated communities. Only one of the four dams present in the county is classified as high hazard. Because none of the dams in the County are state regulated, there are no inundation maps for the County. Records do not indicate any inspections in recent years. Due to the number of unregulated dams in Missouri and the lack of manpower, inspections of these dams are unlikely in the coming years.

Although the probability of dam failure in the county is very low, there is still a small potential for damage. All dams are earthen dams and are prone to erosion and damage from floods. To mitigate this problem, dam owners should be contacted to set up inspections to evaluate the state of dams. Any damage caused by unregulated dams becomes the responsibility of the dam owner.

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. The 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 energy to buildings and other structures on the earth's surface.

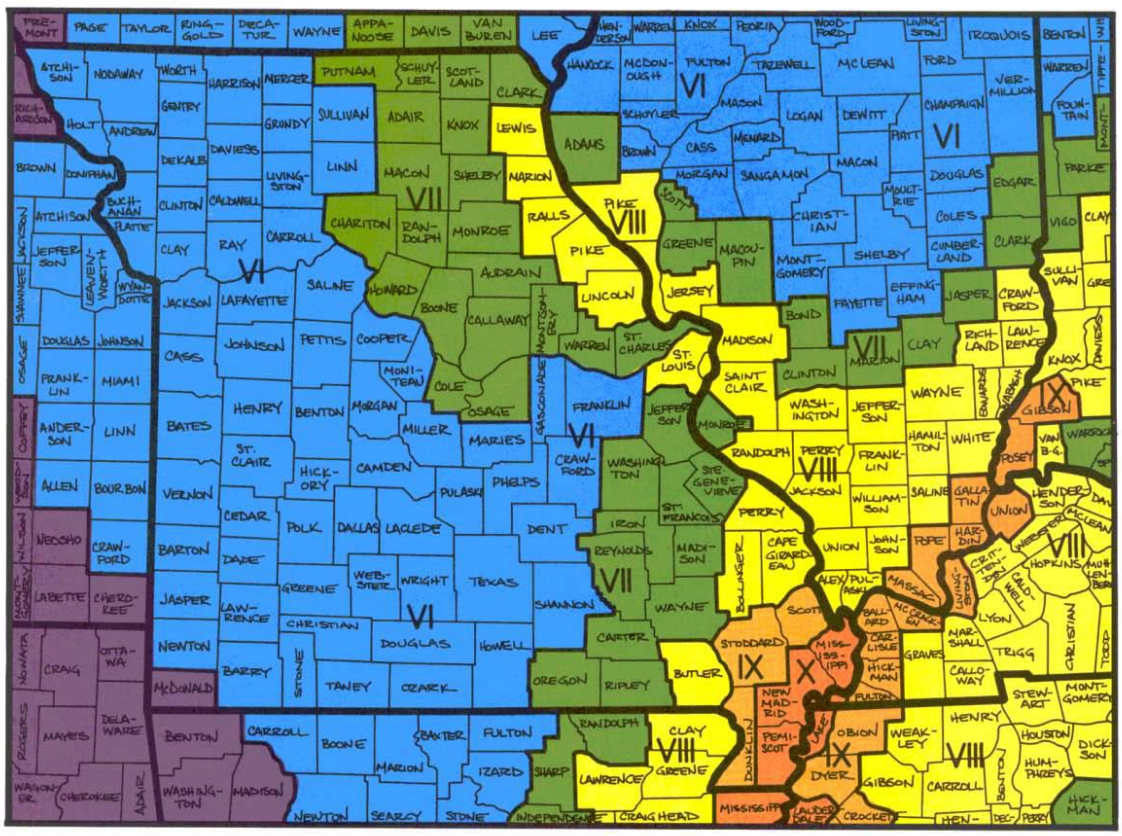
Subterranean faults were formed many millions of years ago on or near the surface of the earth. Subsequent to that time, these ancient faults subsided, while the areas adjacent were pushed up. As this fault zone (also known as a rift) lowered, sediments filled in the lower areas. Under pressure, the sediments hardened into limestones, sandstones, and shales – thus burying the rifts. The pressures on the North American plate and the movements along the San Andreas Fault by the Pacific plate have reactivated the buried rift(s) in the Mississippi embayment. This rift system is called the Reelfoot Rift and underlies the New Madrid Seismic Zone (Braile et al., 1986).

Geographic Location

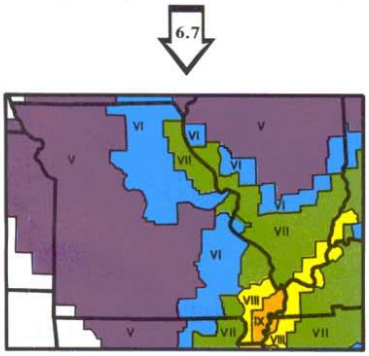
The greatest hazard from earthquakes in Dallas County comes from the New Madrid Seismic Zone situated in the boot heel area of southeast Missouri. The potential of high magnitude earthquakes occurring along the New Madrid fault presents risk that does not vary across the county. The Nemaha uplift in central Kansas is also prone to seismic activity; however, the center of the Humbolt fault zone near the Nemaha Uplift is over 250 miles west of Dallas County and produces lower magnitude seismic events.

Figure 3.16 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 secondary maps in **Figure 3.16** show the same regional intensities for 6.7 and 9.6 earthquakes, respectively. Dallas County is located in zone VI from a potential magnitude 7.6 earthquake along the New Madrid fault. Residents would feel movement, there could be minimal damage to structures, and dishes and glassware would likely be broken.

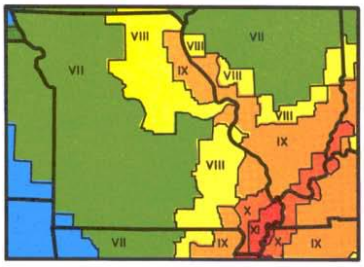
Figure 3.16. Impact Zones for Earthquake Along the New Madrid Fault



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



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



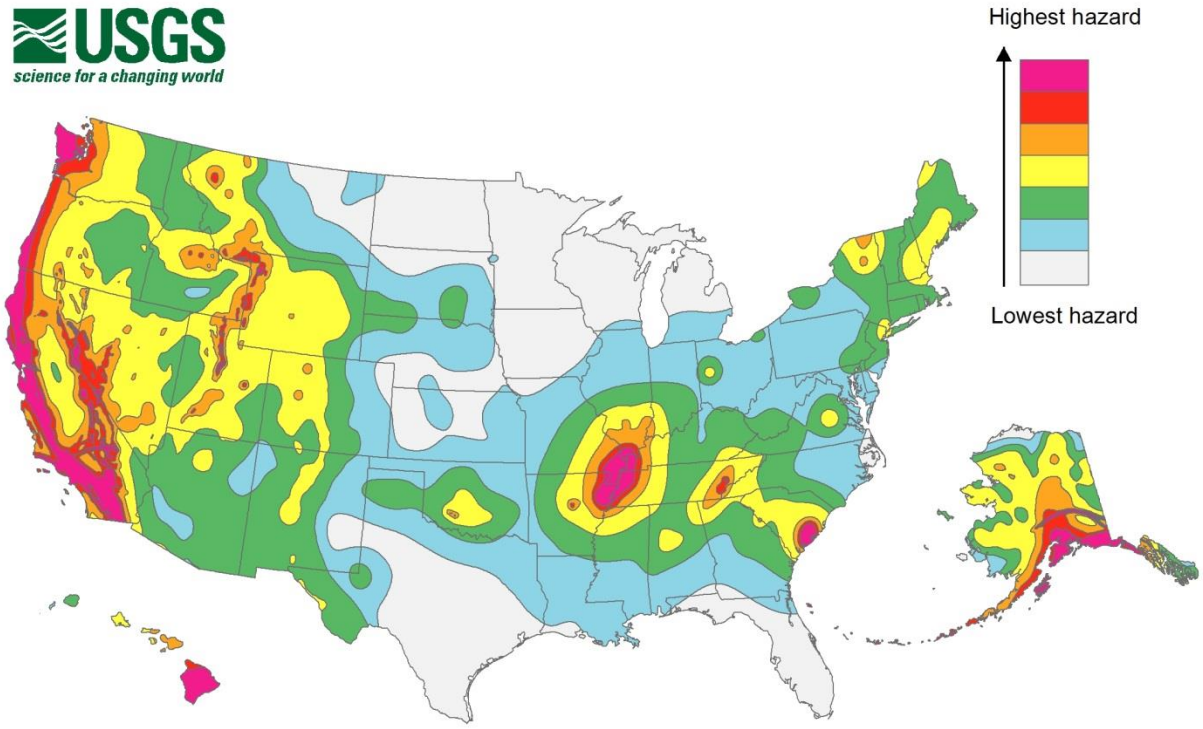
This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude – 8.6 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.

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

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

Figure 3.17 illustrates seismicity in the United States.

Figure 3.17. 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, shown below in **Table 3.23** 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.

Table 3.23. Modified Mercalli Intensity Scale

Intensity Level	Description
I	People do not feel any movement.
II	A few people might notice movement.
III	Many people indoors feel movement; Hanging objects swing.
IV	Most people indoors feel movement; Dishes, windows, and doors rattle; Walls, frames, and structures creak; Liquids in open vessels are slightly disturbed; Parked cars rocked.
V	Almost everyone feels movement. Most people are awakened; Doors swing open or closed; Dishes are broken: Pictures on the wall move: Windows crack in some cases; Small objects move or are turned over: Liquids might spill out of open containers.
VI	Almost everyone feels movement. Most people are awakened; Considerable quantities of dishes, glassware, and windows are broken; People have trouble walking; Pictures fall off walls; Objects fall from shelves; Plaster in walls might crake; Some furniture is overturned; Small bells in churches, chapels, and schools ring.
VII	People have difficulty standing; Considerable damage in poorly built or badly designed buildings, adobe houses, old walls, and spires; Damage is slight to moderate in well-built buildings; Numerous windows are broken; Weak chimneys break at rooflines; Cornices from towers and high buildings fall; Loose bricks fall from buildings; Heavy furniture is overturned and damaged; Some sand and gravel stream banks cave in.
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 may shift on foundations; Tall structures such as towers and might chimneys twist and fall; Temporary or permanent changes in springs and wells; Sand and mud is ejected.
IX	Most buildings suffer damage; Houses not bolted down move off their foundations; Some underground pipes are broken; The ground cracks conspicuously; Reservoirs suffer damage.
X	Well-built wooden structures destroyed; most masonry and frame structures destroyed, including foundations; Rails bent; Dams seriously damaged; Cracks open in pavement.
XI	Few, if any masonry structures remain standing; Large well-built bridges destroyed; Rails bent greatly; Buried pipelines are rendered completely useless. Water mixed with sand and mud ejected in large amounts.
XII	Damage is total, and nearly all works of construction are damaged greatly or destroyed. Objects are thrown into the air. The ground moves in waves or ripples. Large amounts of rock may move. Lakes are dammed, waterfalls formed, and rivers are deflected

Previous Occurrences

There are no historical records of an earthquake occurrence within Dallas County. The southeastern portion of Missouri is most susceptible to earthquakes because it overlies the New Madrid Seismic Zone. Earthquake hazards in the western part of the State also exist because of the historical earthquakes in eastern Kansas and Nebraska. No area of Missouri is immune from the danger of earthquakes. Minor, but potentially damaging, earthquakes can occur anywhere in the state (SEMA, 2013).

Probability of Future Occurrence

Without a historical record for earthquakes in Dallas County it is not possible to calculate a precise probability of earthquake occurrence. The Center for Earthquake Research and Information (CERI) at the University of Memphis has computed conditional probabilities of a magnitude 6.0 earthquake in the New Madrid seismic zone. According to a fact sheet prepared by SEMA in 2003, the probability of a magnitude 6.0 to 7.5 or greater earthquake along the New Madrid Fault is 25 to 40 percent over the next 50 years. At the 25% level, the likelihood of an earthquake happening in a given year is 1.0%. At the 40% level, the likelihood of an earthquake happening in a given year is 1.6%.

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 that are caused by changing future conditions.

Vulnerability

Vulnerability Overview

Ground shaking is the most damaging effect from earthquakes. Ground shaking will impact all structures and critical infrastructure such as roads and electrical transmission systems. The greatest earthquake risk to Dallas County is the New Madrid fault in the boot-heel region of Missouri. A 7.6 magnitude earthquake would result in damage to poorly built buildings; considerable quantities of dishes, glassware and windows breaking; people having trouble walking; pictures falling off walls; objects falling from shelves; plaster in walls cracking; and furniture overturning. Damage to structures will occur but will vary depending on the quality of construction. In addition, underground utilities may be damaged and some injuries may occur, but fatalities are unlikely.

Potential Losses to Existing Development

The potential losses to existing development would be based on the total exposure for all communities in the planning area. The total exposure for each jurisdiction was used to estimate losses due to a 7.6 earthquake along the New Madrid Fault. A damage factor of 0.5% was applied to each jurisdiction's total building and contents based on the expected impact for Zone VI on the Modified Mercalli Scale. **Table 3.24** summarizes the estimated losses for each jurisdiction.

Table 3.24. Estimated Potential Earthquake Losses

Jurisdiction	Potential Earthquake Losses ($)
Unincorporated Dallas County	$7,074,345
City of Buffalo	$2,856,000
City of Urbana	$434,585
Total	**$10,364,930**

Source: Hazus

Impact of Previous and Future Development

Previous development that may have been constructed without adherence to building codes may be at a greater risk of damage during an event. If future development follows building codes, it is not expected to increase the risk other than contributing to the overall exposure of what could become

damaged as a result of an earthquake event. The city of Buffalo currently enforces building codes.

Hazard Summary by Jurisdiction

Earthquake intensity is not likely to vary greatly throughout the county as the risk of occurrence is the same throughout. However, potential damage will be more significant in communities with a higher number of structures built in or prior to 1939. **Table 3.25** provides a summary.

Table 3.25. Housing Units Built in 1939 or Earlier

Jurisdiction	Built 1939 or earlier (#)	Built 1939 or earlier (%)
Dallas County	422	8.8%
City of Buffalo	84	6.9%
City of Urbana	17	9.2%

Source: US Census Bureau American Community Survey 2020 5 Year Estimates https://data.census.gov/

Community Comments on Hazard

Earthquakes are a low priority per the community survey. 92.9% of the respondents indicated this event is unlikely to impact their community. When asked about their concern about earthquakes, 85.7% of respondents stated they are not concerned. 71.4% of responses believe that earthquakes will have limited or no impact on their communities.

Problem Statement

Based on likely damage from a 7.6 magnitude earthquake along the New Madrid fault line, older, poorly built structures will suffer slight damage. Of the two participating cities, Buffalo has the most structures built prior to 1939 (84), while Urbana has a higher percentage of their structures built prior to 1939 (9.2%). Adopting, updating, and enforcing building codes would assist in mitigating damages associated with earthquake events. Introducing public awareness programs that teach residents of the risks to older structures in earthquake events may motivate the public to support such legislation, as well as cooperate with its enforcement.

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.

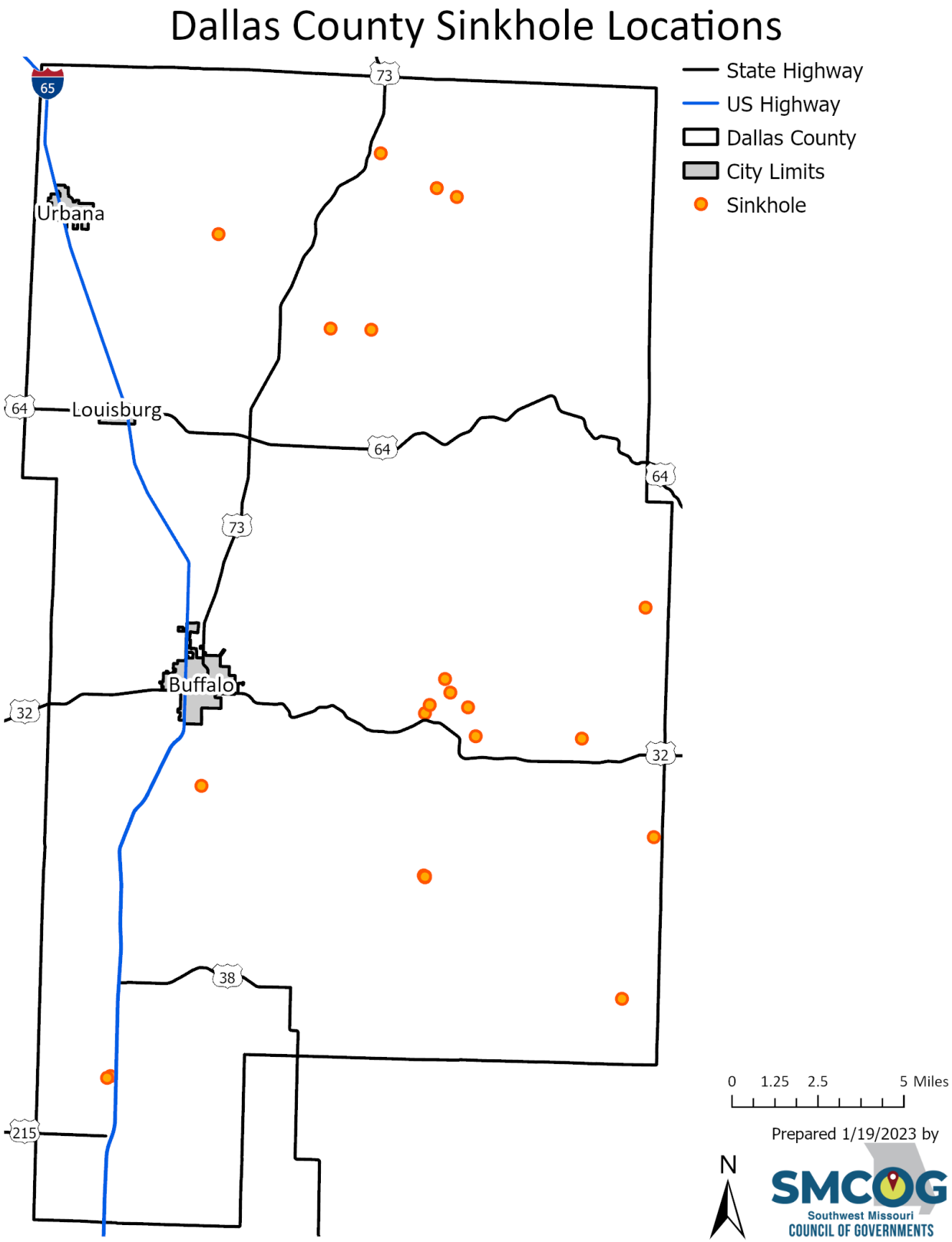
In the case of sinkholes, the rock below the surface is rock that has been dissolving by circulating groundwater. As the rock dissolves, spaces and caverns form, and ultimately the land above the spaces collapses. In Missouri, sinkhole problems are usually a result of surface materials above openings 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.

Geographic Location

There are 20 identified sinkhole formations in Dallas County, all located within the unincorporated parts of the county. **Figure 3.18** shows their locations.

Figure 3.18. Sinkholes and Mines, Occurrences, and Prospects in Dallas 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. Since the last plan update, there have been no new sinkhole formations in Dallas County.

Probability of Future Occurrence

There is currently no database regarding sinkhole occurrences in Dallas County. Because of this, no official estimation can be made regarding the probability of future occurrences. Historically across the state, sinkholes occur in areas away from development and typically do not cause serious damage.

Changing Future Conditions Considerations

Changes in climate conditions could increase the number of sinkhole occurrences throughout Dallas County. Drought periods can reduce groundwater levels, making the sediments within a sinkhole-prone hazard area dry and unstable. Severe storms triggered by drought could bring torrential rainfall that washes out the supporting sediments, undercutting the ground and creating conditions conducive to sinkhole formation.

Vulnerability

Vulnerability Overview

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

According to the 2018 Missouri State Hazard Mitigation Plan, Dallas County rated low-medium on the sinkholes per county rating values. This category is comprised of counties that contain between 1-100 per county.

Potential Losses to Existing Development

Sinkhole loss estimates were established using GIS processes and appraised valuations. A sinkhole point shapefile was used to generate a half-mile buffer around each sinkhole. The buffer layer was designated as the hazard-prone areas for sinkholes. The map layer of the sinkhole hazard-prone areas was used as an overlay on the parcel data to generate the loss estimates from this hazard by jurisdiction. Existing structure data was also used to determine which parcels contained structures that fell within the sinkhole hazard-prone area. The data presented was extracted solely from these select parcels.

Table 3.26 provides the building count by type and by jurisdiction based on the results of the sinkhole analysis. **Table 3.27** provides a dollar amount for total exposure by jurisdiction and estimated losses. To calculate the losses a damage factor of 0.5% was applied to the total exposure.

Table 3.26. Sinkhole Exposure by Building Type

Jurisdiction	Residential	Commercial	Agricultural	Industrial	Total Building Count
Unincorporated Dallas County	606	7	0	2	615
City of Buffalo	0	0	0	0	0
City of Urbana	0	0	0	0	0
Total	**606**	**7**	**0**	**2**	**615**

Source: Hazus

Table 3.27. Sinkhole Estimated Losses

Jurisdiction	Residential	Commercial	Agricultural	Industrial	Total
Unincorporated Dallas County	$126,105,000	$7,980,000	$651,000	$0	$134,736,000
City of Buffalo	0	0	0	0	0
City of Urbana	0	0	0	0	0
Total	$126,105,000	$7,980,000	$651,000	$0	$134,736,000

Source: Hazus

Impact of Previous and Future Development

Future development in areas of known risk to sinkhole formation in the planning area will increase the vulnerability to this hazard. Population and development in these areas in the unincorporated parts of Dallas County will increase exposure to sinkhole occurrence. Future development may also change storm runoff patterns and cause expansion of existing or formation of new sinkholes.

Hazard Summary by Jurisdiction

The risk of sinkhole damage for individual communities and school districts is limited to the amount of exposure of buildings and infrastructure. Some parts of the county are more at risk for potential sinkhole formations such as areas around the Little Niangua River in the northern part of the county, and between the Niangua River and Fourmile Creek. None of the participating jurisdictions have structures at risk of sinkholes, but much of the unincorporated county is at risk.

Community Comments on Hazard

Sinkholes are not a top priority In Dallas County. 64.3% of respondents believe sinkholes are “unlikely” to impact their community. When asked about their concern level, 71.4% of respondents are “not at all” concerned. 57.1% of respondents believe that sinkholes will have a limited impact on the community.

Problem Statement

It is likely that more sinkholes will occur as development increases within the county. Sinkholes can be remediated with fill material. Once a sinkhole has been remediated, building should be prohibited at the site. Existing sinkholes can expand if surface runoff erodes the edges of the sinkhole. Storm water runoff should be diverted away from known sinkholes. Jurisdictions may adopt regulations prohibiting construction at least 30 feet from known sinkholes. Undeveloped land that is in a sinkhole risk area can be used for park space or other recreational purposes. Additionally, jurisdictions can utilize public awareness campaigns about sinkholes and risks associated with developing in prone areas. Maps of sinkholes and prone areas should be available to members of the public.

3.4.5 Drought

Hazard Profile

Hazard Description

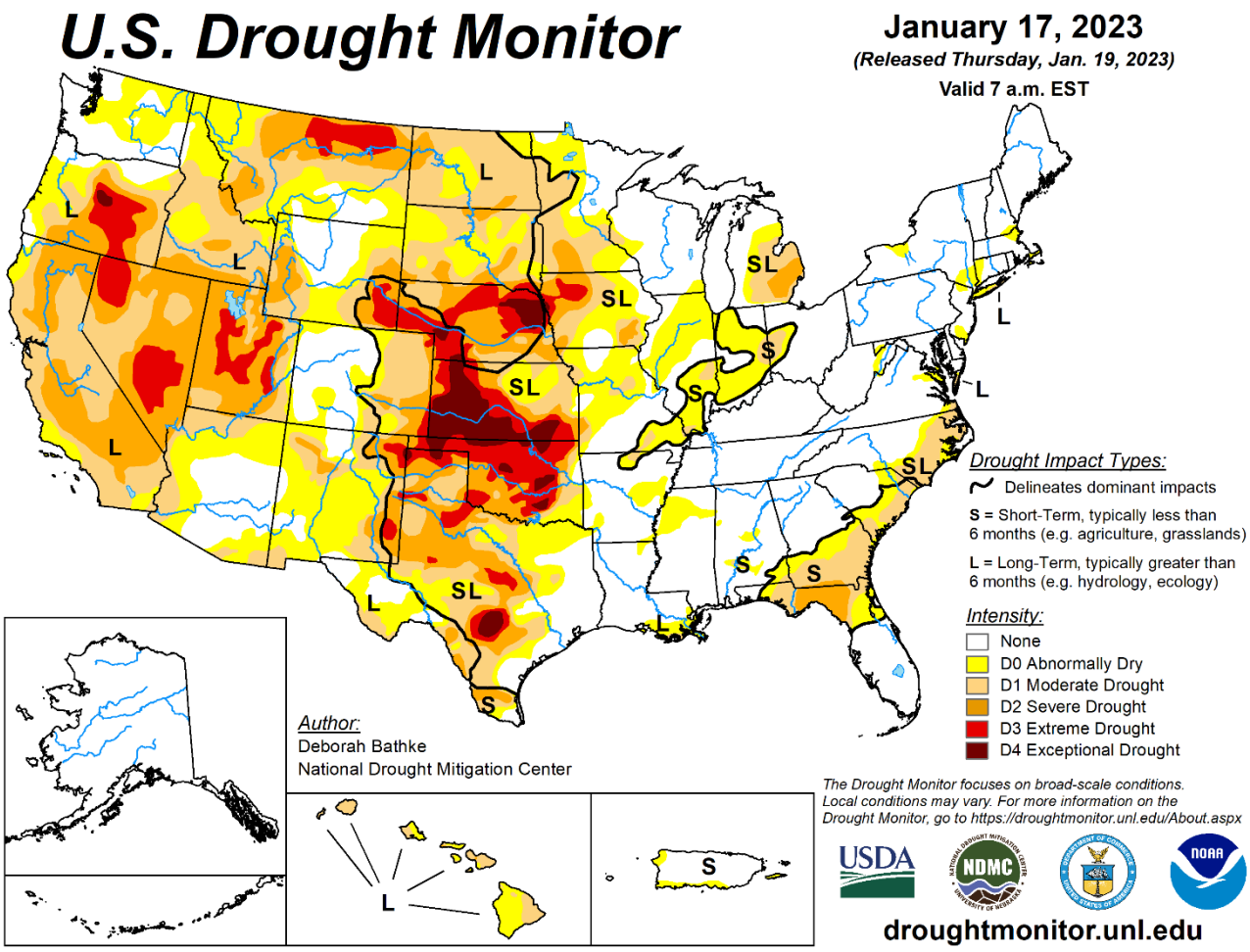
Drought is generally defined as a condition of moisture levels significantly below normal for an extended period of time over a large area that adversely affects plants, animal life, and humans. A drought period can last for months, years, or even decades. There are four types of drought conditions relevant 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 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 are also out of phase with impacts in other economic sectors.
- Agricultural drought focuses on soil moisture deficiencies, differences between actual and potential evaporation, reduced ground water or reservoir levels, etc. Plant demand for water depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil.
- Socioeconomic drought refers to when physical water shortage begins to affect people.

Geographic Location

Droughts are regional climatic events that can impact large areas and multiple counties. The entire county is at risk of the impacts of drought. However, drought most directly impacts the agricultural sector, so areas within the county where there is extensive agricultural land use can experience significant impacts. **Figure 3.19**. is a recent map from the U.S. Drought Monitor.

Figure 3.19. U.S. Drought Monitor Map



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

Strength/Magnitude/Extent

The most commonly used indicator of drought and drought severity is the Palmer Drought Severity Index (PDSI), jointly published by the NOAA and the United States Department of Agriculture. 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 is also 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

The NCEI storm events database includes three events from 2002-2023. Many of these were multiple reports from persistent drought events that lasted several months. The NCEI reports indicate that there were 14 distinct drought periods during this 20-year timeframe. **Table 3.28** provides a summary of these events.

Table 3.28. Previous Drought Occurrences, 2002-2023

Drought Year	Months	Property Damage	Crop Damage
2006	January-April	$0	$0
2012/13	July-January	$0	$8,680,000
2022	July-August, October	$750,000	$0

Source: National Centers for Environmental Information https://www.ncdc.noaa.gov/stormevents/

Probability of Future Occurrence

Over the 20-year record period from 2003-2022, Dallas County was in a drought for 14 months. There is a total of 240 months in the record period. Based on the number of drought and the total number of months in the record period, there is a 6% probability of drought occurrence in the county at any given month. Although drought is not predictable, long-range outlooks and predicated impacts of climate change could indicate an increased chance of occurrence and severity.

Changing Future Conditions Considerations

Drought frequently affects Missouri, including Dallas County. Increasing temperatures due to a changing climate will inevitably accelerate evaporation rates and increase the frequency of droughts. It can be expected that rivers and groundwater reserves will experience significant reductions in available water with the increasing severity and frequency of droughts. It may be necessary in the future to restrict water usage in Dallas County during droughts, which would mainly affect the county's agriculture industry and would diminish residents' quality of life.

Vulnerability

Vulnerability Overview

Southwest Missouri has moderate drought susceptibility. Groundwater resources are adequate to meet domestic and municipal water needs, but due to required well depths, irrigation wells are very expensive. The topography is generally unsuitable for row-crop irrigation. During extended time periods without precipitation, municipal water sources may be at risk for contamination as the concentration of natural minerals, such as lead, will increase with low water levels.

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.

Impact of Previous and Future Development

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

Hazard Summary by Jurisdiction

Although the probability of drought is the same for the entire county, farming and livestock enterprises in the unincorporated parts of the county would feel the greatest impact. Although communities with wells are susceptible to water shortages due to groundwater reduction, other communities with no source are more at risk to extreme water shortages in the event of a drought. School districts would be the least impacted by drought; however, those districts in communities with single source wells or none at all may experience water shortages prior to those in larger communities. Special districts, such as the Urbana Rural Fire Department, would feel impacts in the form of increased risk for wildfire and reduced fire-fighting water sources.

Community Comments on Hazard

Drought is a significant concern for Dallas County. When asked about the likelihood of droughts impacting their communities, 21.4% believe droughts “occasionally” will impact their communities, while 78.6% believe it is “likely” to happen. 64.3% of respondents are “concerned” about the impact of drought and 35.7% are “very” or “extremely” concerned. When asked the magnitude of impact that drought would cause, 78.5% believe that drought would have a “critical or catastrophic” impact on the community.

Problem Statement

Although drought most likely will not cause structural damage, the impact is greatest on the agriculture sector and, if persistent enough, could cause reductions in groundwater and water shortages in communities that provide potable water services. Potential actions to mitigate the impact of drought would be for communities to develop public information campaigns regarding water conservation techniques and measures and provide notification mechanisms for community members to know when drought conditions may occur. Some methods may include restricting the use of public water resources for non-essential usage, such as landscaping, washing cars, filling swimming pools, etc. during extreme drought periods. School and special districts can also implement water conservation measures at all district facilities as well. Additionally, Dallas County should encourage the use of drought-resistant farming practices to help reduce the negative impacts on crops and municipal drinking water supplies.

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 3.20** uses both 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 of ice jams on flat rivers or streams. When combined with high winds from winter storms, extreme cold becomes extreme wind chill, which is hazardous to health and safety.

The National Institute on Aging estimates that more than 2.5 million Americans are elderly and especially vulnerable to hypothermia, with the isolated elders being most at risk. About 10 percent of people over the age of 65 have some kind of bodily temperature-regulating defect, and 3-4 percent of all hospital patients over 65 are hypothermic.

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

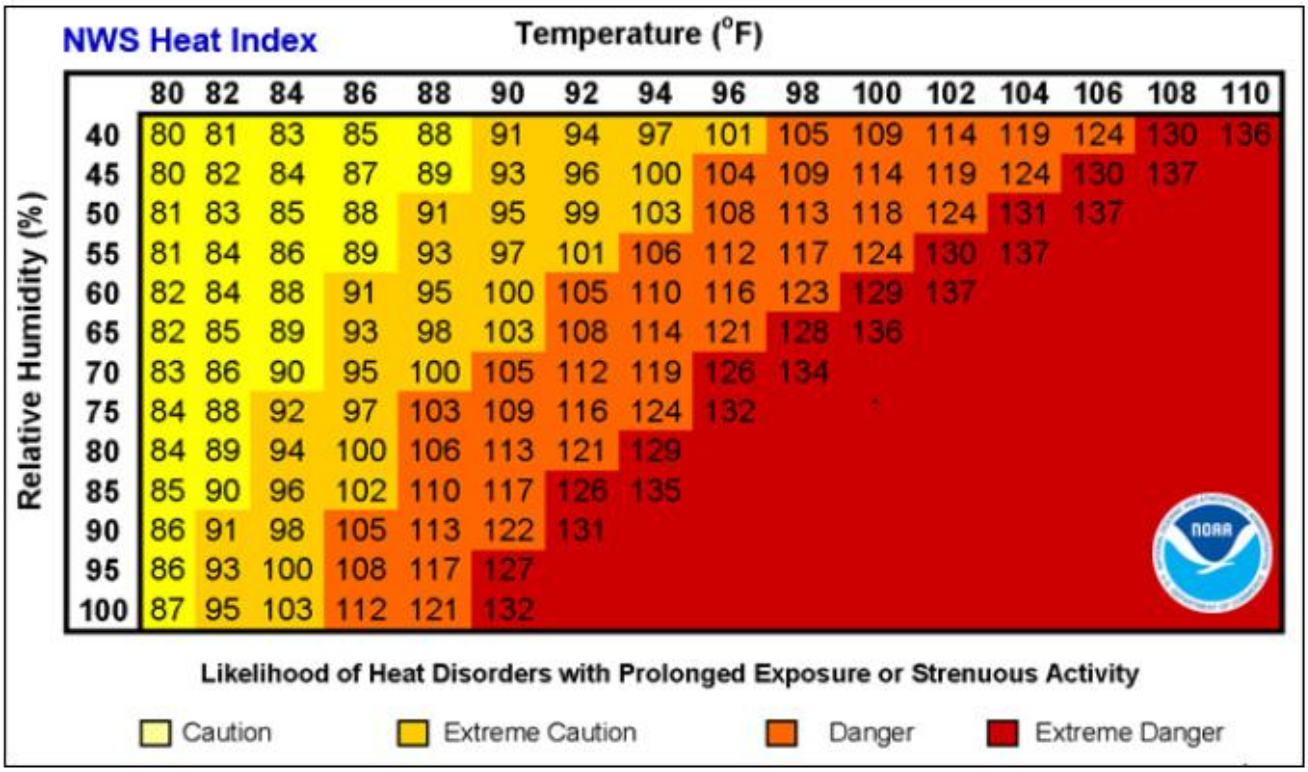
Geographic Location

Extreme temperatures (both extreme heat and extreme cold) are an area-wide hazard and do not vary across the county.

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 there are two or more consecutive days where the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F) and the nighttime minimum Heat Index is 80°F or above. A heat advisory is issued when temperatures reach 105 degrees, and a warning is issued at 115 degrees.

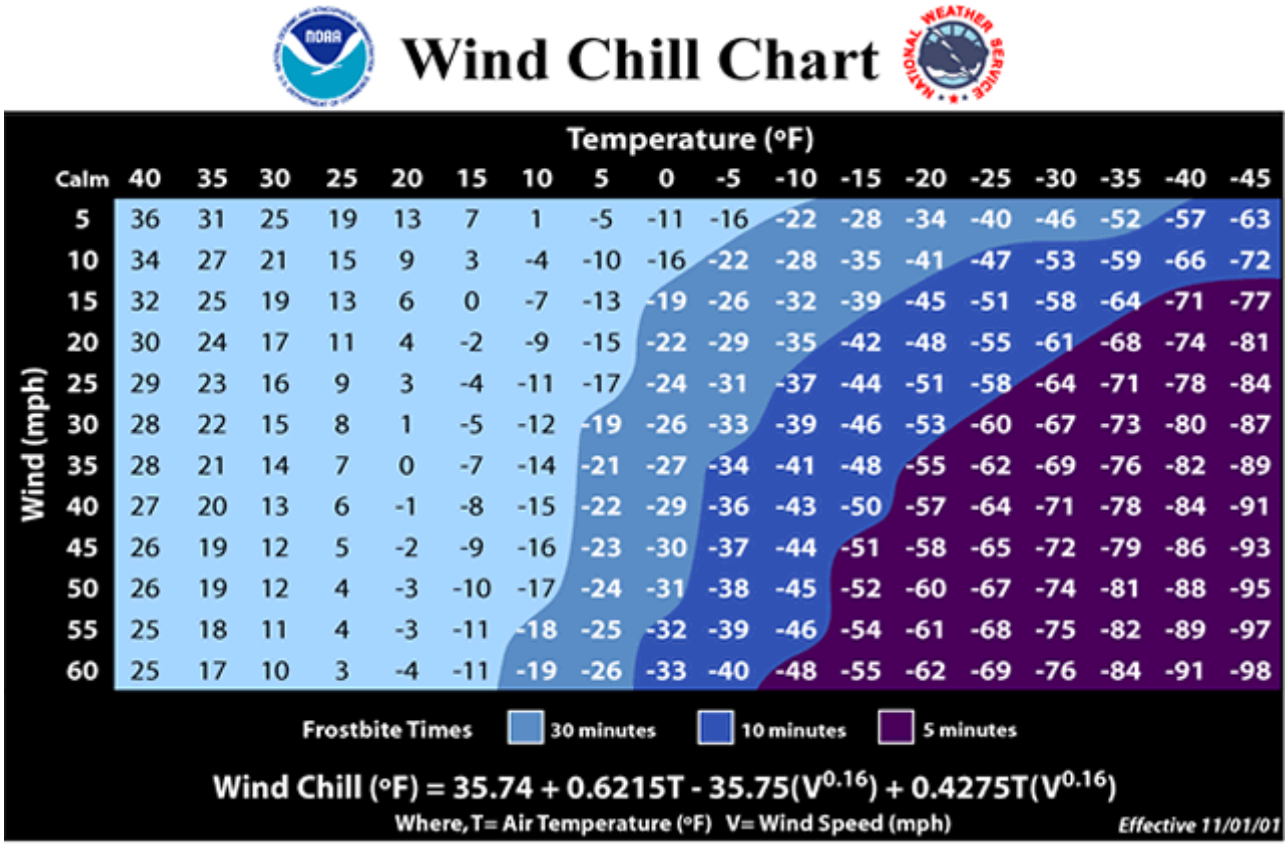
Figure 3.20. Heat Index (HI) Chart



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. **Figure 3.21** 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 3.21. Wind Chill Chart



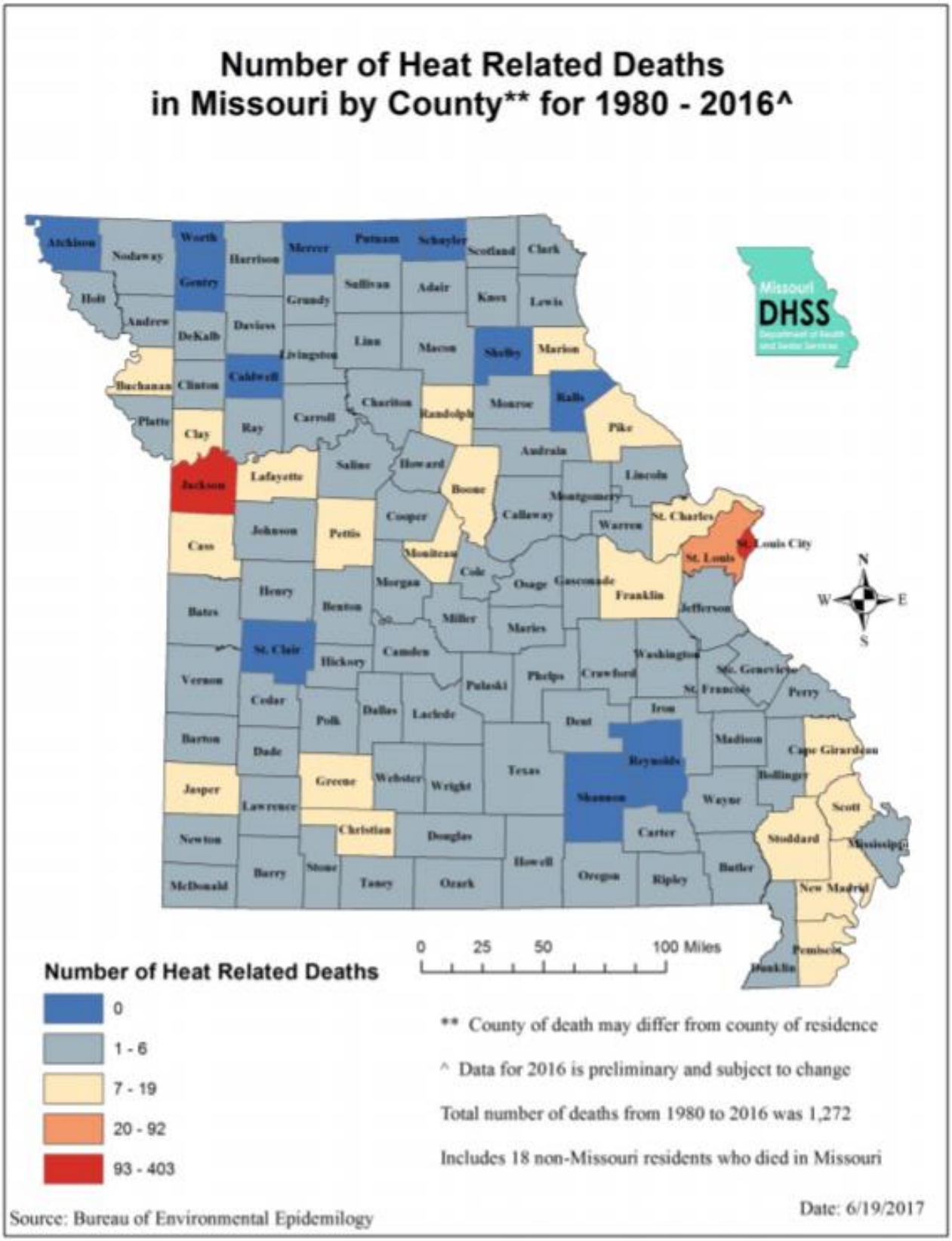
Source: https://www.weather.gov/safety/cold-wind-chill-chart

Previous Occurrences

According to the NCEI database, there was 1 recorded extreme heat event from 2003-2022 in Dallas County. This event lasted for 3 months in 2012 (June, July, August). There were no reported deaths, injuries, or property/crop damage.

Figure 3.22 is a map created by The Missouri Department of Health and Senior Services (DHSS) for heat related fatalities by county. The map indicates that there have been between 1 and 6 heat related fatalities in Dallas County from 1980 to 2016.

Figure 3.22. Heat Related Deaths in Missouri 1980- 2016



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

There was 1 recorded extreme cold event in the NCEI database from 2003-2022 in Dallas County. This event occurred in February 2021, and there were no associated deaths, injuries, or property/crop damage.

Probability of Future Occurrence

From 2003-2022, there was 1 total extreme heat event in Dallas County that lasted for 3 months. As a result, there is a 5% chance that an extreme heat event will occur in any given year. Over that same time period, there was 1 total extreme cold event, which also gives a 5% chance for an extreme cold event in any given year.

It should be noted that there are limitations to the accuracy of these projections. The events recorded in the NCEI database describe extreme heat as prolonged periods where temperatures rose at least 10° above normal for at least 12 consecutive days, and extreme cold as prolonged periods where the temperature was at least 10° below normal for at least 12 consecutive days. Heat and cold advisories and warnings are issued for shorter periods of extreme heat and cold nearly every year and may not meet the threshold for consecutive days in the NCEI database. This data limitation indicates that extreme temperature events may be underreported in the NCEI.

Changing Future Conditions Considerations

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

The impacts of extreme heat events are experienced most acutely by the elderly and other 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.

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

Vulnerability

Vulnerability Overview

High humidity, which often accompanies heat in Missouri, can make the effects of heat even more harmful. While heat-related illness and death can occur from exposure to intense heat in just one afternoon, heat stress on the body has a cumulative effect. Consequently, the persistence of a heat wave increases the threat to public health. 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 3.29 lists typical symptoms and health impacts due to exposure to extreme heat.

Table 3.29. Typical Health Impacts of Extreme Heat

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

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

Potential Losses to Existing Development

Based on information from the 2018 Missouri State Hazard Mitigation Plan, Dallas County has a total vulnerability description of Low for both extreme heat and extreme cold. This description takes into account the likelihood of occurrences and total vulnerability of the population.

Impact of Previous and Future Development

Population growth can result in increases in the age-groups that are most vulnerable to extreme temperatures. 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 US Census 2020 American Community Survey 5-Year Estimates population percentages in each jurisdiction comprised of those under age 5 and over age 65. **Table 3.30** below summarizes vulnerable populations in the participating jurisdictions.

Table 3.30. Dallas County Population Under Age 5 and Over Age 65

Jurisdiction	Population Under 5	Population 65 Years and Over	Percent of Total Population
Dallas County	1,098	3,531	27%
City of Buffalo	175	638	26%
City of Urbana	10	68	18%

Source: US Census Bureau American Community Survey 2020 5 Year Estimates https://data.census.gov/

Community Comments on Hazard

The majority of respondents to the community survey (64%) indicated this event is either “likely” or “highly likely” to impact their community, 43% are “very concerned” about this hazard, and 57% think this could have a “critical” or “catastrophic” impact if it were to occur.

Problem Statement

Older and younger segments of the population are more vulnerable to the impact of extreme heat. In addition, people living below the poverty level may be more vulnerable during periods of extreme

temperatures due to a lack of air conditioning or heating in their homes. Institutionalized populations, such as those living in nursing homes, become more vulnerable to extreme temperatures due to power outages.

To help reduce the risk of death, heating and cooling centers should be promoted and known to the public, especially to those who have young children or are over the age of 65. Partnering with local community organizations to continue to donate fans and offer weatherization programs would mitigate the impact on vulnerable populations in the county. Additionally, backup generators should be installed in critical facilities, especially those housing vulnerable populations, to ensure property heating and cooling during extreme temperature events.

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 they 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 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

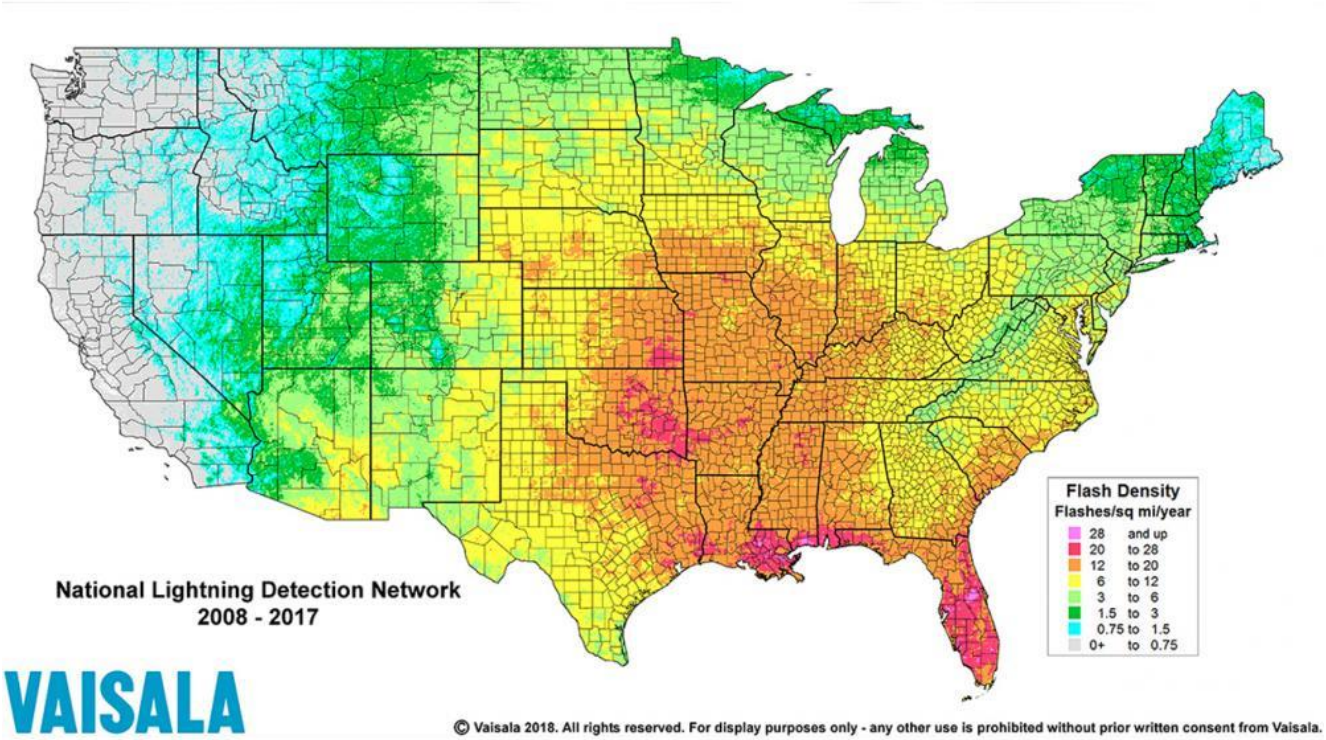
According to the National Oceanic and Atmospheric Administration (NOAA), hail is precipitation that is formed when thunderstorm updrafts carry raindrops upward into extremely cold atmosphere causing them to freeze. The raindrops form into small frozen droplets. They continue to grow as they come into 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 to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 miles per hour, while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 miles per hour. According to the NOAA, the largest hailstone in diameter recorded in the United States was found in Vivian, South Dakota on July 23, 2010. It was eight inches in diameter, almost the size of a soccer ball. Soccer-ball-sized hail is the exception, but even small pea-sized hail can do damage.

Geographic Location

Thunderstorms, high winds, hail, and lightning events are an area-wide hazard that can happen anywhere in Dallas County. Although these events occur similarly throughout the County, they are more frequently reported in the urbanized areas. In addition, damages are more likely to occur in more densely developed areas. **Figure 3.23** shows lightning frequency in the United States. Dallas County is located in an area with an average flash density of 12-20 flashes per square mile per year.

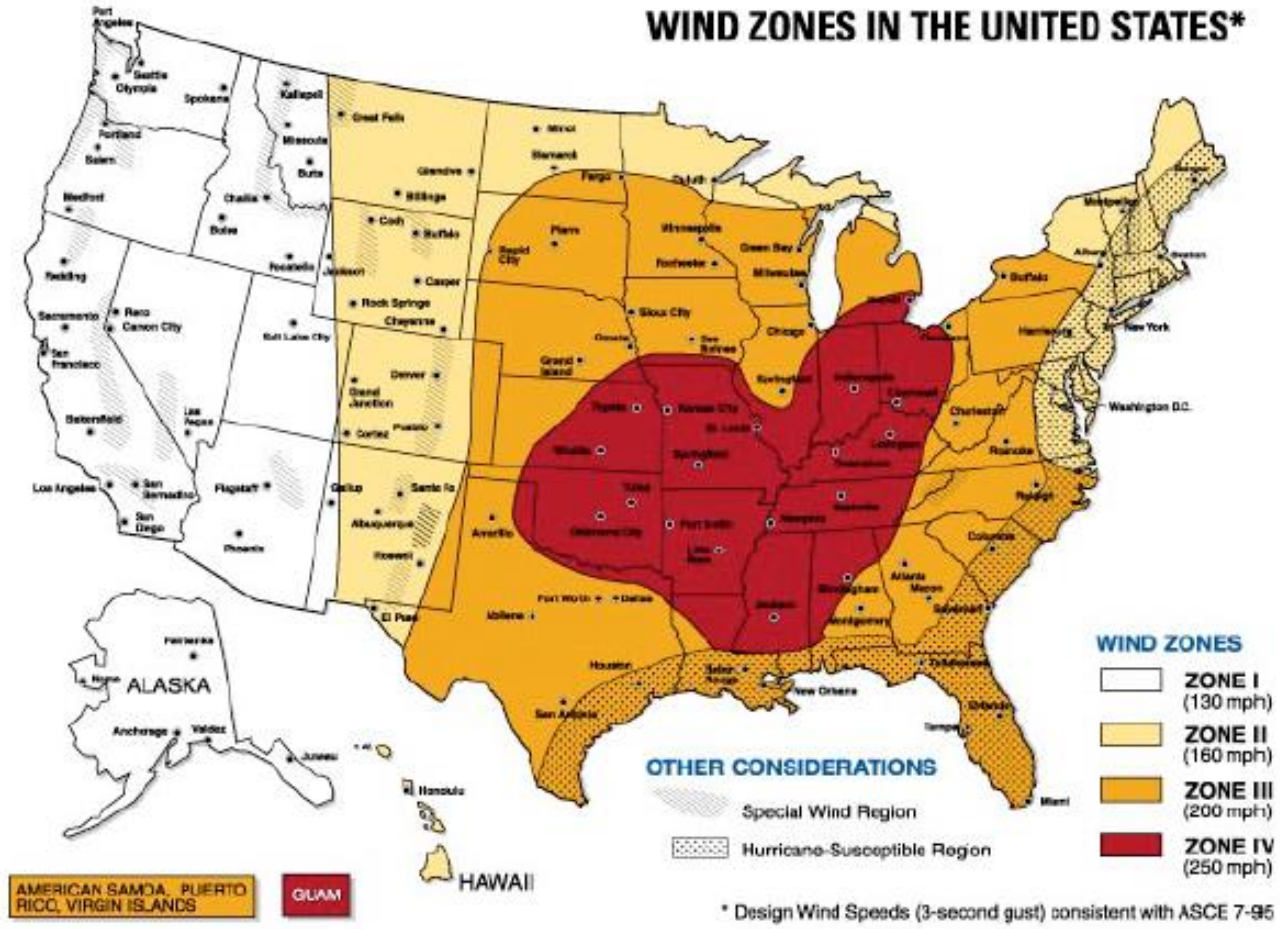
Figure 3.23. Location and Frequency of Lightning in Missouri



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

Figure 3.24 shows wind zones in the United States. Dallas County lies in Zone IV, the zone with the highest possible wind speeds in the country.

Figure 3.24. Wind Zones in the United States



Source: FEMA 320, Taking Shelter from the Storm, 3rd edition, https://www.fema.gov/pdf/library/ism2_s1.pdf

Strength/Magnitude/Extent

Based on information provided by the Tornado and Storm Research Organization (TORRO), **Table 3.31** below describes typical damage impacts of the various sizes of hail.

Table 3.31. Tornado and Storm Research Organization Hailstorm Intensity Scale

Scale	Intensity Category	Diameter (mm)	Size Description	Typical Damage Impacts
H0	Hard Hail	5	Pea	No damage
H1	Potentially Damaging	5-15	Mothball	Slight general damage to plants, crops
H2	Significant	10-20	Marble, grape	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	Golf ball > Pullett's egg	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60	Hen's egg	Bodywork of grounded aircraft dented; brick walls pitted
H7	Destructive	50-75	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries

H8	Destructive	60-90	Large orange > softball	Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University. Notes: In addition to hail diameter, factors including number and density of hailstones, hail fall speed and surface wind speeds affect severity https://www.torro.org.uk/research/hail/hscale

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

The onset of thunderstorms with lightning, high wind, and hail is generally rapid. Duration is less than six hours and warning time is generally six to twelve hours. Nationwide, lightning kills 75 to 100 people each year. Lightning strikes can also start structural and wildland fires, as well as damage electrical systems and equipment.

Previous Occurrences

Thunderstorm Winds

Table 3.32. Thunderstorm Wind Events in Dallas County 2003-2022

Location	Events	Deaths	Injuries	Property Damage	Crop Damage
Unincorporated Dallas County	55	0	1	$3,163,000	$0
City of Buffalo	20	0	0	$407,000	$0
City of Urbana	8	0	0	$10,000	$0
Total	**83**	**0**	**1**	**$3,580,000**	**$0**

Source: National Centers for Environmental Information https://www.ncdc.noaa.gov/stormevents/

High Winds

Table 3.33. High Wind Events in Dallas County 2003-2022

Location	Events	Deaths	Injuries	Property Damage	Crop Damage
Unincorporated Dallas County	2	0	0	$0	$0
City of Buffalo	0	0	0	$0	$0
City of Urbana	0	0	0	$0	$0
Total	**2**	**0**	**0**	**$0**	**$0**

Source: National Centers for Environmental Information https://www.ncdc.noaa.gov/stormevents/

Lightning

Table 3.34. Lightning Events in Dallas County 2003-2022

Location	Events	Deaths	Injuries	Property Damage	Crop Damage
Unincorporated Dallas County	0	0	0	$0	$0
City of Buffalo	2	0	0	$2,000	$0
City of Urbana	0	0	0	$0	$0
Total	**2**	**0**	**0**	**$2,000**	**$0**

Source: National Centers for Environmental Information https://www.ncdc.noaa.gov/stormevents/

Hail

Table 3.35. Hail Events in Dallas County 2003-2022

Location	Events	Deaths	Injuries	Property Damage	Crop Damage
Unincorporated Dallas County	47	0	0	$0	$0
City of Buffalo	24	0	0	$110,000	$0
City of Urbana	11	0	0	$0	$0
Total	**82**	**0**	**0**	**$110,000**	**$**

Source: National Centers for Environmental Information https://www.ncdc.noaa.gov/stormevents/

Probability of Future Occurrence

Thunderstorm Winds

From 2003-2022, there were 83 thunderstorm wind events in Dallas County. Based on this, we can estimate that there is a 100% chance of an event occurring in any given year, with an average of 4.15 events occurring annually.

High Winds

From 2003-2022, there were 2 high wind events in Dallas County. Based on this, we can estimate that there is a 10% chance of an event occurring in any given year, with an average of .1 events occurring annually.

Lightning

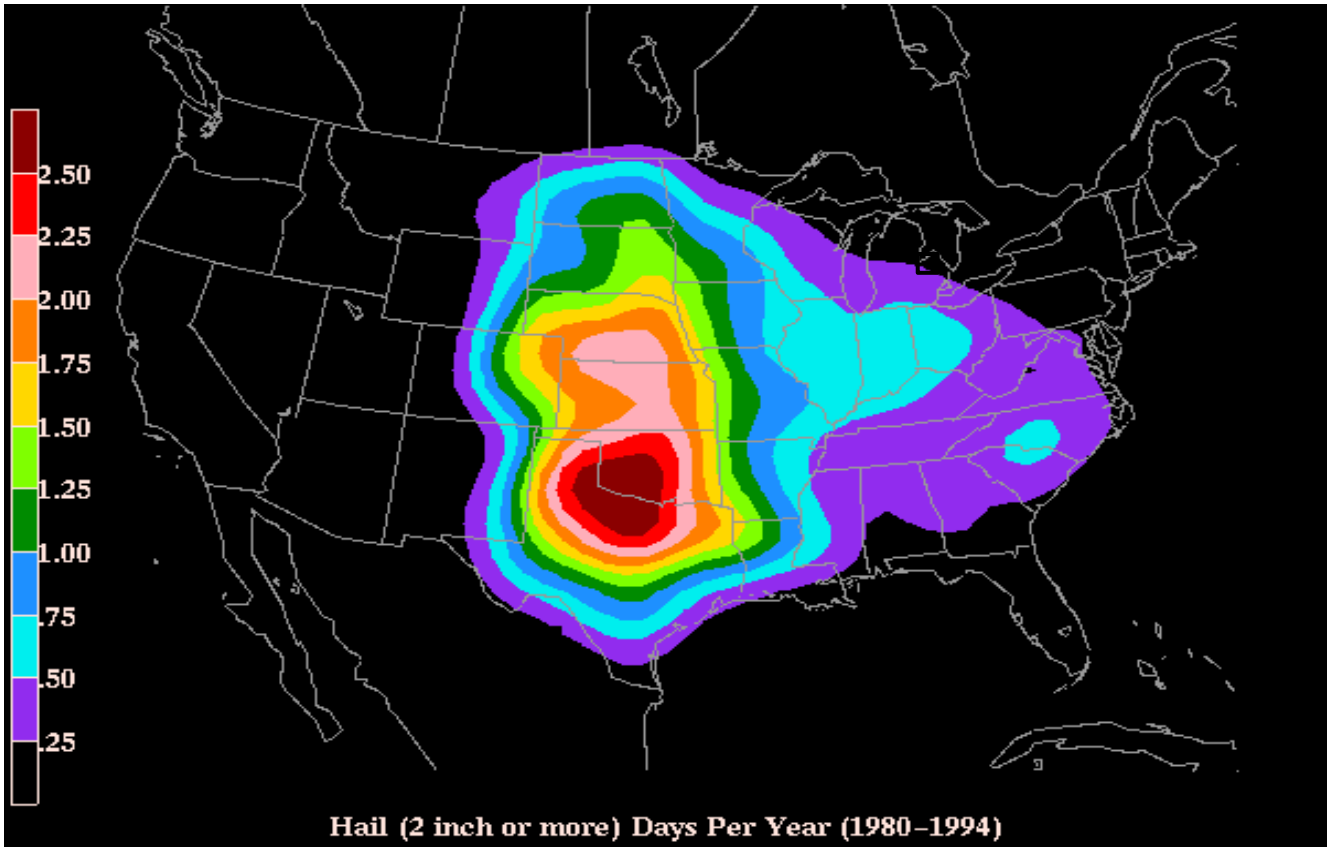
From 2003-2022, there were 2 lightning events in Dallas County. Based on this, we can estimate that there is a 10% chance of an event occurring in any given year, with an average of .1 events occurring annually. It should be noted that limitations to the use of NCEI reported lightning events include the fact that only lightning events that result in fatality, injury, and/or property and crop damage are in the NCEI.

Hail

From 2003-2022, there were 82 hail events in Dallas County. Based on this, we can estimate that there is a 100% chance of an event occurring in any given year, with an average of 4.1 events occurring annually

Figure 3.25 is a map based on hailstorm data from 1980-1994. Dallas County is located in a zone that should experience hail with a diameter of 2" or more up to 1.25 days per year.

Figure 3.25. Annual Hailstorm Probability (2" diameter or larger), U 1980- 1994



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

Changing Future Conditions Considerations

Increases in temperature and more frequent droughts will accelerate the evaporation of water into the atmosphere, which will produce higher water concentrations. Elevated levels of moisture raise the likelihood of severe thunderstorms and tornadoes. Lives and property are endangered when the risk of these events increases, especially in jurisdictions that do not have a community safe room or the funds to construct one. This kind of event also possesses the threat of increasing the magnitude and frequency of other hazard events like riverine flooding, sinkhole occurrence, and flash flooding, putting residents in even greater danger.

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, sometimes fatal.

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 damage occurs 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 damage 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.

Potential Losses to Existing Development

Potential losses are difficult to determine, but we can estimate this by looking at historical losses for thunderstorm wind, high wind, hail, and lightning events. These events can damage critical facilities, schools, local government structures, and private property. Potential annual losses throughout the county are:

Thunderstorm winds - $179,000
High Winds - $0
Lightning - $100
Hail - $5,500

Impact of Previous and Future Development

Development and population growth within Unincorporated Dallas County, as well as in specific jurisdictions, including school and special districts, results in an increase of population and buildings. Development occurring in these areas will result in more exposure that is vulnerable to damages from thunderstorms, heavy winds, lightning, and precipitation.

Hazard Summary by Jurisdiction

Thunderstorms, heavy winds, lightning, and heavy precipitation affect areas with more structures built prior to 1939. Jurisdictions which have building plans or feature building codes/ordinances within their Comprehensive/Land Use plans will be more effective in mitigating the effects of these hazards.

Community Comments on Hazard

While 71% of the community survey responses indicated this event is “highly likely” to occur and 64% are “very” or “extremely” concerned about this hazard, responders were split on the severity of impact it would have if it did occur – 50% felt the impact would be “limited”, while 50% felt it would be “critical” or “catastrophic”.

Problem Statement

Poorly built structures, barns, and outbuildings are more vulnerable to the impact of high winds during thunderstorms. High winds can topple utility poles and lead to power outages. Both high winds and hail can damage roofs. Hail can also damage crops and dent cars and trucks. Additionally, people are at risk to injury and death during high wind events. Crop insurance mitigates the risk to farmers and the agriculture sector within the county. Lightning events have caused structural fires, can strike electrical utilities leading to power outages, or strike municipal water systems causing water supply outages.

The risk of property damage, injury, and death in the county can be mitigated by identifying safe refuge areas in public buildings, nursing homes and other facilities that house vulnerable populations that do not have a safe room. The purchasing and installation of NOAA weather radios in schools, government buildings and public areas may assist in providing early warning to allow for public to seek shelter during high wind events. Education and hazard awareness programs in public schools would also increase public safety in the event of severe thunderstorm events. Additionally, school systems with existing alert systems may utilize for severe weather notifications and the County may investigate a county-wide alert system to provide important severe weather information.

3.4.8 Severe Winter Weather

Hazard Profile

Hazard Description

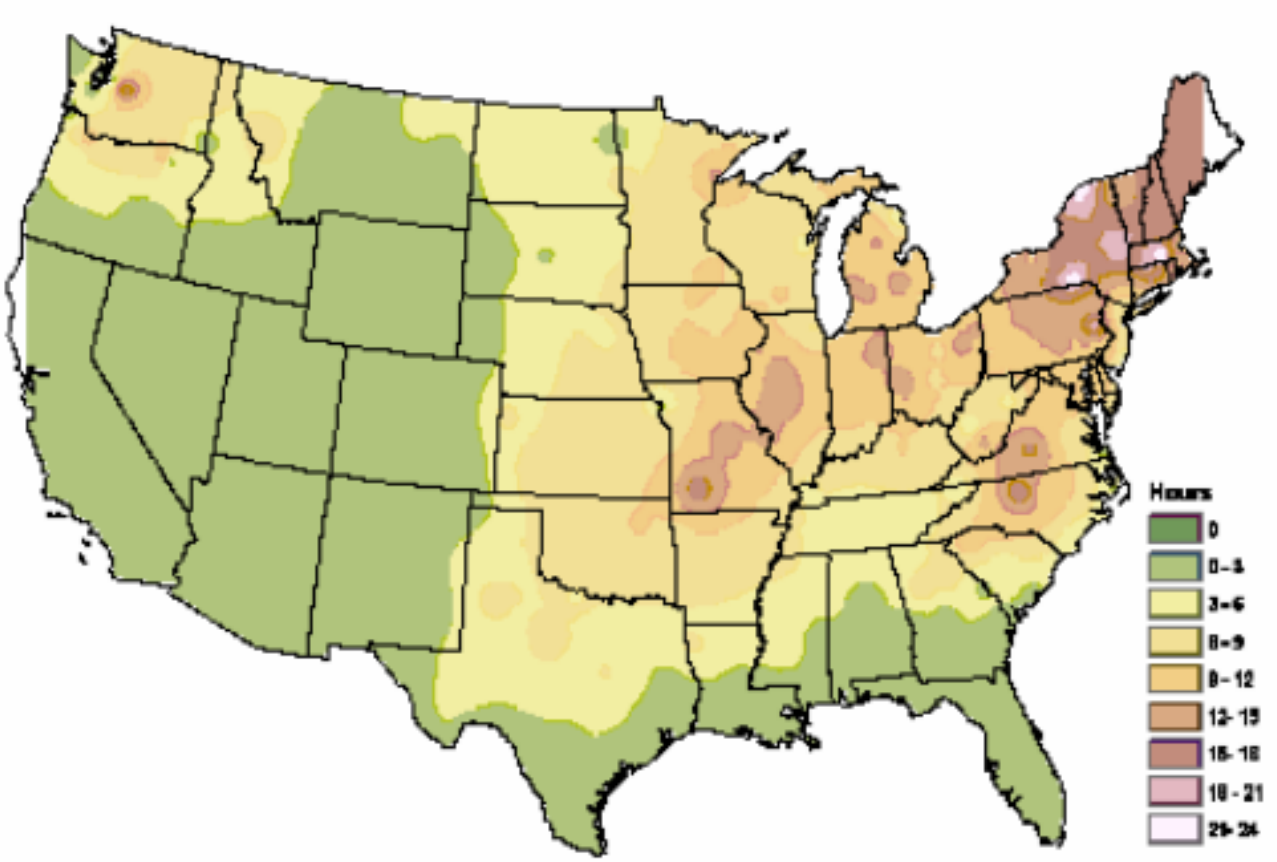
A major winter storm can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. The National Weather Service describes different types of winter storm events as follows:

- **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 county is vulnerable to heavy snow, ice, extreme cold temperatures, and freezing rain. **Figure 3.26** depicts the average number of hours per year with freezing rain. Dallas County is located in a zone that can expect 12-18 hours of freezing rain per year.

Figure 3.26. NWS Statewide Average Number of Hours per Year with Freezing Rain



Source: American Meteorological Society. "Freezing Rain Events in the United States." http://ams.confex.com/ams/pdfpapers/71872.pdf

Strength/Magnitude/Extent

Severe winter storms include heavy snowfall, ice, and strong winds which can push the wind chill well below zero degrees in Dallas County.

For severe weather conditions, the National Weather Service issues the following warnings 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 3.36 describes the NCEI reported winter events and damages from 2003-2022.

Table 3.36. Dallas County Winter Weather Events Summary, 2003-2022

Type of Event	Date	Injuries	Property Damage	Crop Damage
Blizzard	02/01/2011	0	$0	$0
Extreme Cold/Wind Chill	02/14/2021	0	$0	$0
Heavy Snow	12/10/2003, 03/04/2008	0	$0	$0
Ice Storm	01/25/2004, 01/12/2007, 12/09/2007, 02/11/2008, 02/21/2008, 01/13/2017	0	$105,000,000	$0
Sleet	N/A	0	$0	$0
Winter Storm	02/23/2003, 03/05/2003, 02/05/2004, 11/30/2006, 01/20/2007, 01/26/2009, 01/29/2010, 03/20/2010, 02/21/2013, 02/26/2013, 01/05/2014, 03/02/2014, 02/28/2015, 01/01/2021, 02/02/2022, 02/23/2022	0	$25,000	$0
Winter Weather	12/31/2020	0	$0	$0
Total			**$105,025,000**	**$0**

Source: National Centers for Environmental Information https://www.ncdc.noaa.gov/stormevents/

The most significant event occurred was an ice storm that occurred in January 2007. Several counties, mainly along and north of the interstate 44 3.94 corridor, experienced ice accumulations up to 2.5 inches. Power outages that lasted up to three weeks and catastrophic tree damage were the main impacts resulting from this historic event. Several indirect fatalities due to the extreme elements were documented. Carbon monoxide poisoning occurred within a few homes as gas generators were being used in garages, which allowed dangerous levels of carbon monoxide to seep into houses.

Probability of Future Occurrence

The probability for all of the different types of winter weather events are included as one probability, since one storm generally includes multiple types of events. There were 27 severe winter storm events in Dallas County from 2003-2022. This gives us an average of 1.35 winter storm events occurring per year, or a 100% probability.

Changing Future Conditions Considerations

A shorter overall winter season and fewer days of extreme cold may have both positive and negative indirect impacts. Warmer winter temperatures may result in changing distributions of native plant and animal species and/or an increase in pests and non-native species. Warmer winter temperatures will result in a reduction of lake ice cover. Reduced lake ice cover impacts aquatic ecosystems by raising water temperatures. Water temperature is linked to dissolved oxygen levels and many other environmental parameters that affect fish, plant, and other animal populations. A lack of ice cover also leaves lakes exposed to wind and evaporation during a time of year when they are normally protected.

As both temperature and precipitation increase during the winter months, freezing rain will be more likely. Additional wintertime precipitation in any form will contribute to saturation and increase the risk and/or severity of spring flooding. A greater proportion of wintertime precipitation may fall as rain rather than snow.

Vulnerability

Vulnerability Overview

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 causes 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 the 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 the 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.

In the 2018 State Plan, the five factors considered in determining overall severe winter storm vulnerability were housing density, building exposure, social vulnerability, likelihood of occurrence, and average annual property loss. The state ranked each of these criteria using a scale from one to five, one being lowest and five being the highest, to rank each county's vulnerability to severe winter weather. Dallas County received the following vulnerability rating for each criterion:

- Housing Densit: low
- Building Exposure: low
- Social Vulnerability: medium
- Likelihood of Occurrence: low medium
- Average Annual Property Loss: high

This equates to an overall vulnerability rating of medium.

Potential Losses to Existing Development

During the 20-year period from 2003-2022, Dallas County suffered a total of $105,025,000 in property damage due to severe winter weather events. Based on this, we can expect the county to experience $5,251,250 in losses per year moving forward. However, if we remove the ice storm event in 2007 that accounts for nearly all the damage totals, we can expect the county to experience $1,250 in losses per year.

Impact of Previous and Future Development

Increased development and any resulting increases in population will increase exposure to damage from severe winter weather. Future commercial development can expect functional downtime and decreased revenues during periods of severe winter weather. Future construction of facilities that will serve vulnerable populations will need to be prepared for extreme weather conditions. Road construction in the county will increase the need for snow removal and salt to keep transportation lifelines open during periods of severe winter weather. Any increase in agriculture crop production will also increase the risk of exposure.

Hazard Summary by Jurisdiction

Severe winter weather can cause power outages and put structures at risk of fires when individuals in homes resort to fuel heaters. The risk of extreme cold deaths and frostbite varies among segments of the populations. People over 65 and those living below the poverty level have an increased vulnerability to severe winter weather. **Table 3.37** includes information on populations over 65 and the percentage living below the poverty level by participating jurisdictions jurisdiction.

Table 3.37. Extreme Temperature Vulnerable Populations

Jurisdiction	% of Families Living Below the Poverty Line	Population Over 65	Population Over 65 (Percentage)
Dallas County	15.4%	3,531	21.0%
City of Buffalo	41.1%	638	20.6%
City of Urbana	10.1%	68	15.4%

Source: US Census Bureau American Community Survey 2020 5 Year Estimates https://data.census.gov/

Community Comments on Hazard

The most common comment on this hazard in the community survey referenced the 2007 ice storm. One responder indicated they had been without power for two weeks, while another lost power for several days and worked extra hours in emergency services in Buffalo during the outage.

Problem Statement

Heavy snow can bring a community to a standstill by inhibiting transportation (in whiteout conditions), weighing down utility lines, and by causing structural collapse in buildings not designed to withstand the weight of the snow. Repair and snow removal costs can be significant. Ice buildup can collapse utility lines and communication towers, as well as make transportation difficult and hazardous. People over 65 and those living in poverty have an increased risk of hypothermia and frostbite due to extreme cold and wind chill.

Organizing outreach to at-risk populations, including establishing and promoting accessible heating and cooling centers can help reduce the potential exposure to harsh winter weather. Additionally, identifying debris disposal and burning locations can assist in facilitating recovery efforts after a significant winter storm or ice incident. An automated alert system could also be utilized to notify residents of incoming winter weather and warming locations in the community.

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 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

There are no specific likely locations for future occurrences as the threat from this hazard is countywide.

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 3.37**) 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 3.38. 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 Number	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 3.39**. The damage descriptions are summaries. For the actual EF scale, it is necessary to look up the damage indicator (type of structure damaged) and refer to the degrees of damage associated with that indicator. Information on the Enhanced Fujita Scale's damage indicators and degrees or damage is located online at www.spc.noaa.gov/efscale/ef-scale.html.

Table 3.39. 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 distance.
EF4	166-200	0.7%	Devastating. Well-constructed houses and whole frame houses completely levelled; cars thrown, and small missiles generated.
EF5	>200	<0.1%	Explosive. Strong frame houses levelled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 ft.; steel reinforced concrete structure badly damaged; high rise buildings have significant structural deformation; incredible phenomena will occur.

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

Enhanced weather forecasting has provided the ability to predict severe weather likely to produce tornadoes days in advance. Tornado watches can be delivered to those in the path of these storms several hours in advance. The 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 3.40** below provides details on tornadoes in Dallas County from 2003-2022.

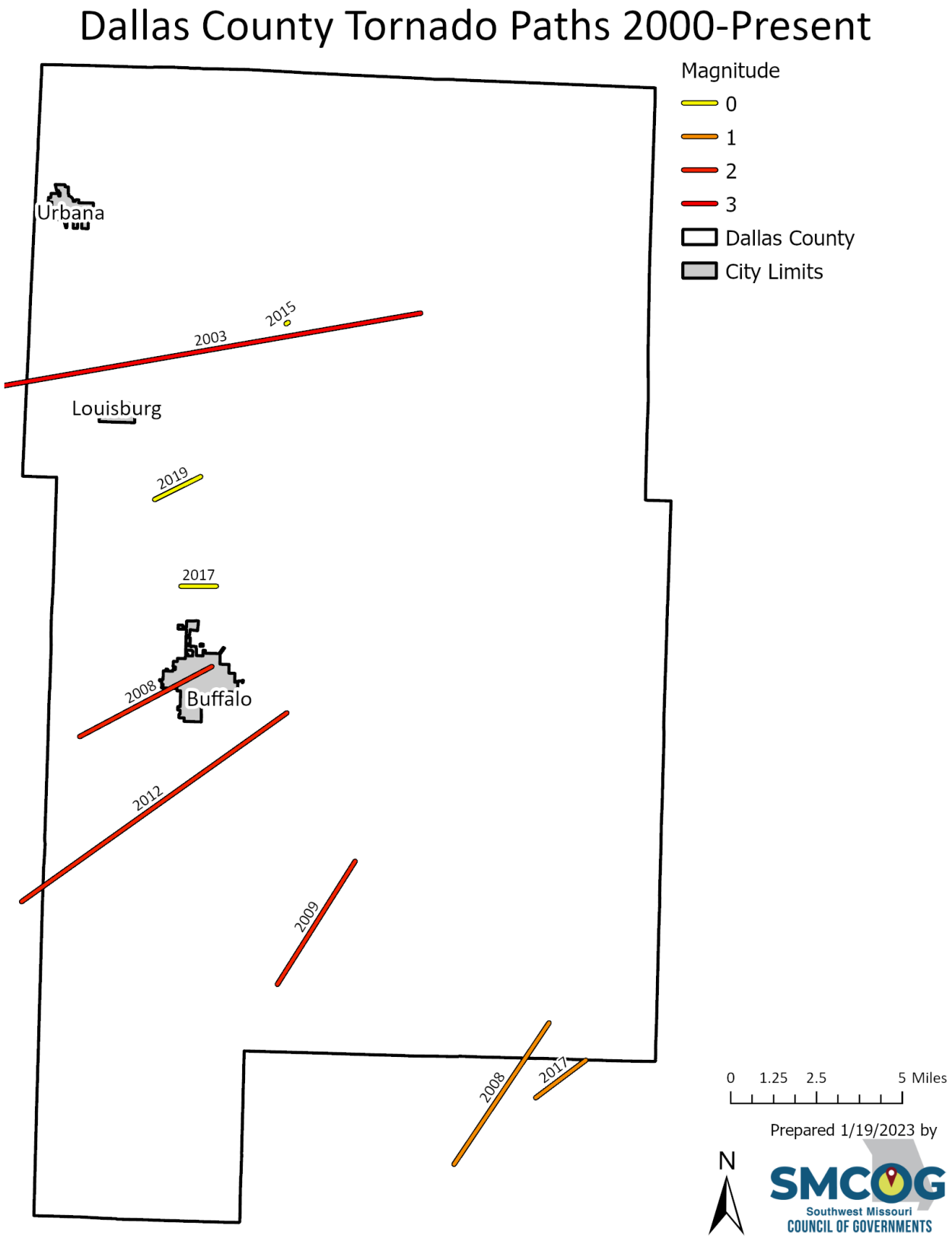
Table 3.40. Recorded Tornadoes in Dallas County, 2003-2022

Date	Beginning Location	Ending Location	Length (miles)	Width (yards)	F/EF Rating	Death	Injury	Property Damage	Crop Damages
05/04/2003	Louisburg	Louisburg	14	880	F3	2	10	$3,800,000	$0
05/04/2003	Tunas	Tunas	.2	20	F0	0	0	$0	$0
05/06/2003	Olive	Olive	.2	25	F0	0	0	$0	$0
01/07/2008	Handley	Handley	1.33	150	EF0	0	0	$0	$0
03/31/2008	Foose	Buffalo	4.67	300	EF2	0	3	$1,000,000	$0
05/08/2009	March	Spring Grove	4.25	400	EF2	0	2	$2,000,000	$0
02/28/2012	Foose	Cloverdale	9	100	EF2	1	12	$650,000	$0
05/17/2015	Wood Hill	Wood Hill	.1	40	EF0	0	0	$5,000	$0
03/01/2017	Buffalo Arpt	Buffalo Arpt	1	100	EF0	0	0	$25,000	$0
04/30/2019	Louisburg	Pumpkin	1.5	50	EF0	0	0	$68,000	$0
Total								**$7,548,000**	**$0**

Source: National Centers for Environmental Information https://www.ncdc.noaa.gov/stormevents/

Figure **3.27** below shows historic tornado paths in Dallas County.

Figure 3.27. Dallas County Map of Historic Tornado Events



Probability of Future Occurrence

Over a 20-year period from 2003-2022, there were a total of 10 tornado events record by the NCEI in Dallas County, 6 of which were damaging events. This means there is a 50% chance there will be a tornado event and a 30% chance for a damaging tornado event in any given year.

Changing Future Conditions Considerations

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

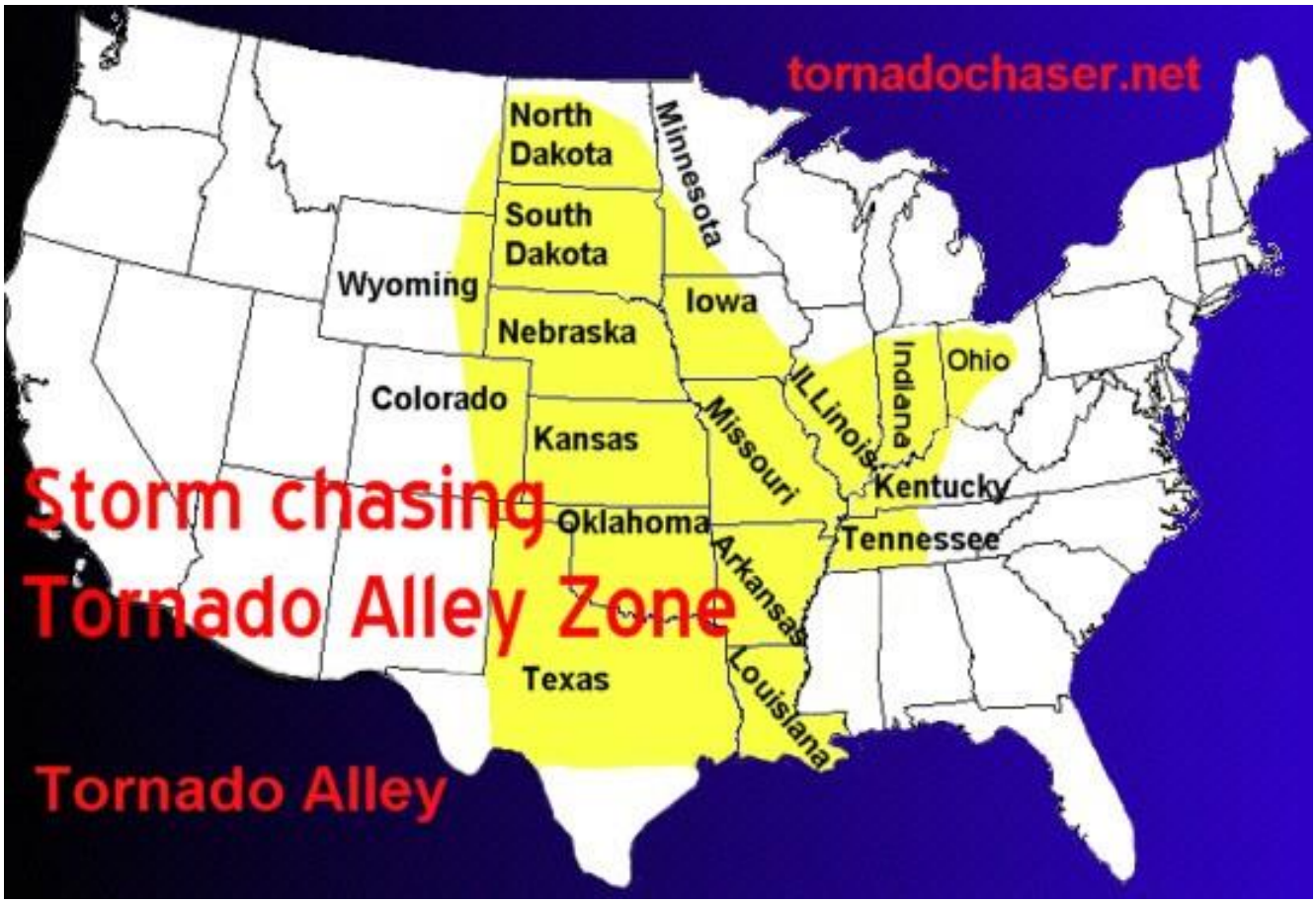
According to the 2018 State Plan, the following six factors were considered in determining overall tornado vulnerability: building exposure, population density, social vulnerability, percentage of mobile homes, likelihood of occurrence, and annual property loss. The state ranked each of these criteria using a scale from one to five, one being lowest and five being the highest, ranking each county's vulnerability to tornadoes. Dallas County received the following vulnerability rating for each factor:

- Building exposure – Low
- Population density – Low
- Social vulnerability – Medium
- Percentage of mobile homes – Medium-High
- Likelihood of occurrence – Low
- Annual property loss – Low

This equates to an overall vulnerability rating of Low Medium.

Figure 3.28 illustrates areas where dangerous tornadoes historically have occurred.

Figure 3.28. Tornado Alley in the U.S.



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

Potential Losses to Existing Development

Potential losses for each jurisdiction are estimated based on the total exposure with an applied damage factor of 1% - an estimate of the average damage a tornado could cause in a community. **Table 3.41** provides a summary of the estimated total losses for each participating jurisdiction.

Table 3.41. Estimated Potential Tornado Losses by Jurisdiction

Jurisdiction	Total Exposure	Estimated Losses
Dallas County	$1,414,869,000	$14,148,690
City of Buffalo	$571,200,000	$5,712,000
City of Urbana	$86,917,000	$869,170
Total	**$2,072,986,000**	**$20,729,860**

Source: Hazus

Impact of Previous and Future Development

Development across the county and within incorporated jurisdictions increases the potential for losses. From 2003-2022, the average annual losses countywide were $377,400. This indicates the potential future losses if the current development were to remain with no additional development. Future development and population increases will increase exposure to damage. It is anticipated that some communities may experience new development, but those communities that enforce building codes (Buffalo) may help reduce the risk of building damage.

Hazard Summary by Jurisdiction

Although tornado events are an area-wide hazard, communities with a greater percentage of structures built prior to 1939 are considered to be more vulnerable to the impact of high wind and hail damage. 84 structures in Buffalo and 17 in Urbana were built prior to 1939.

Community Comments on Hazard

While no respondents to the community survey indicated they had specifically been impacted by a tornado, the community as a whole seems to rate this hazard very highly. 64% believe this hazard is "likely" or "highly likely" to occur, 78.6% are "very" or "extremely" concerned, and 85.7% feel it would have a "critical" or "catastrophic" impact if it were to happen. Additionally, "structural retrofitting of existing buildings to add tornado safe rooms" consistently scored the highest on the list of sample mitigation projects.

Problem Statement

Tornadoes are the most violent of all atmospheric storms and are capable of tremendous destruction. Wind speeds can exceed 250 miles per hour and damage paths can be more than one mile wide and 50 miles long. From 2003-2022, tornado events in Dallas County have resulted in 3 deaths, 27 injuries, and $7,548,000 in property damage. Information in the 2018 State Plan indicates that the county has a Low-Medium vulnerability to tornados.

The risk of property damage, injury, and death in the county can be mitigated by constructing FEMA saferooms in facilities that house vulnerable populations such as nursing homes, government buildings, and schools. Additionally, identifying safe refuge areas in public buildings, nursing homes and other facilities that house vulnerable populations that do not have a safe room can mitigate injury and loss of life. Retrofitting school district facilities with protective filming of windows and installation of storm proof doors will provide more protection for students and staff at school facilities. Promoting the installation of NOAA weather radios, and additional warnings and alerts systems such as Swift 911 or Nixle, will also provide the public and schools more time to find shelter during tornado events.

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 Missouri fires occur during the spring season between February and May. The length and severity of wildland fires depends 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 to burn their garden spots, brush piles, and other areas in the spring. Some landowners also believe it is necessary to burn their forests in the spring to promote grass growth, kill ticks, and reduce brush. Therefore, spring months are the most dangerous for wildfires. The second most critical period of the year is fall. Depending on the weather conditions, a sizeable number of fires may occur between mid-October and late November.

Geographic Location

Damages due to wildfires are higher in communities with more Wildland-Urban Interface (WUI) areas. The term refers to the zone of transition between unoccupied land and human development and needs to be defined in the plan. Within the WUI, there are two specific areas identified: 1) Interface and 2) Intermix. The interface areas are those areas that abut wildland vegetation and the intermix areas are those areas that intermingle with wildland areas. **Figure 3.29** shows the WUI and **Figure 3.30** shows the wildfire hazard potential of Dallas County.

Figure 3.29. Dallas County Wildland Urban Interface

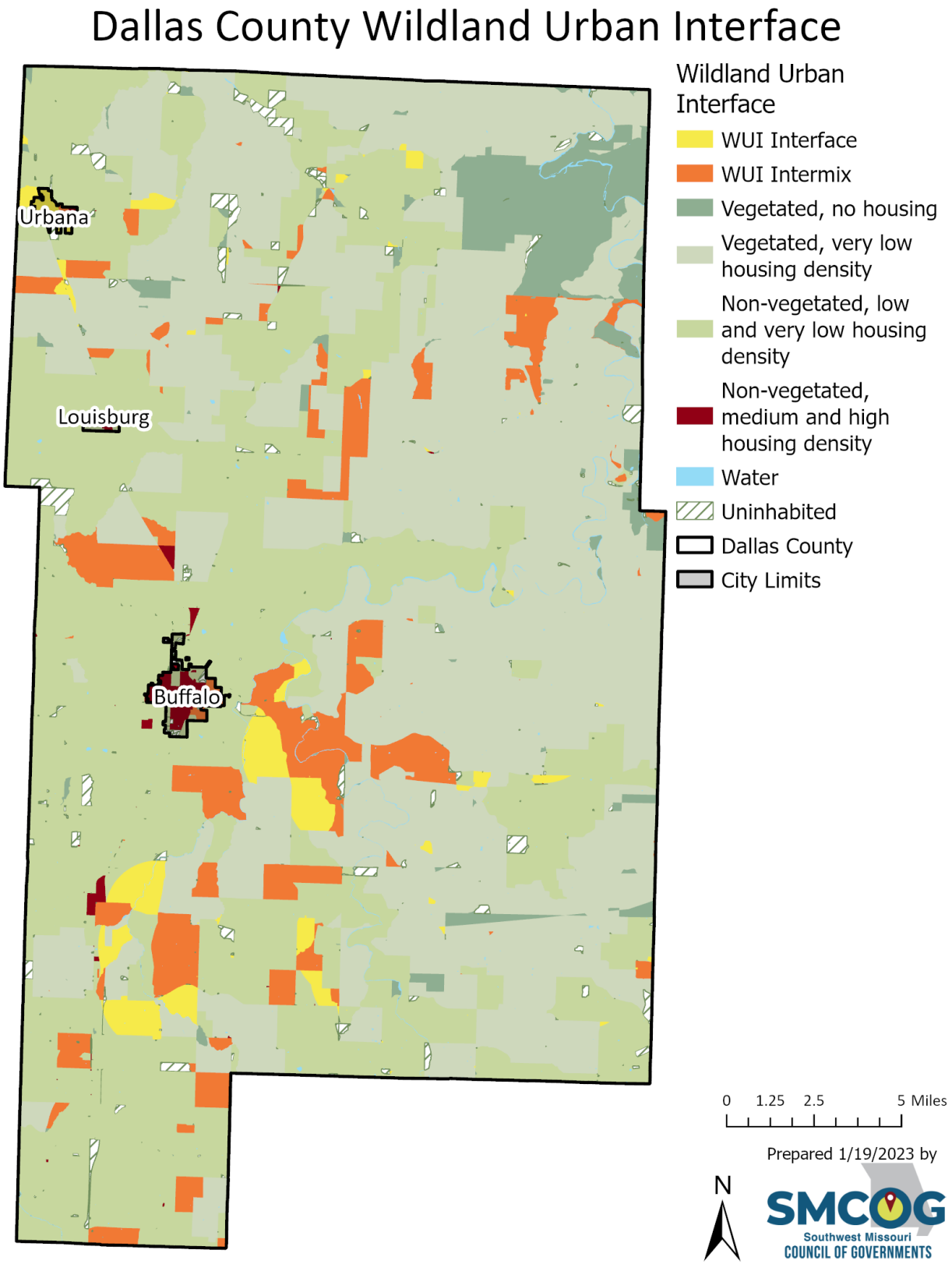
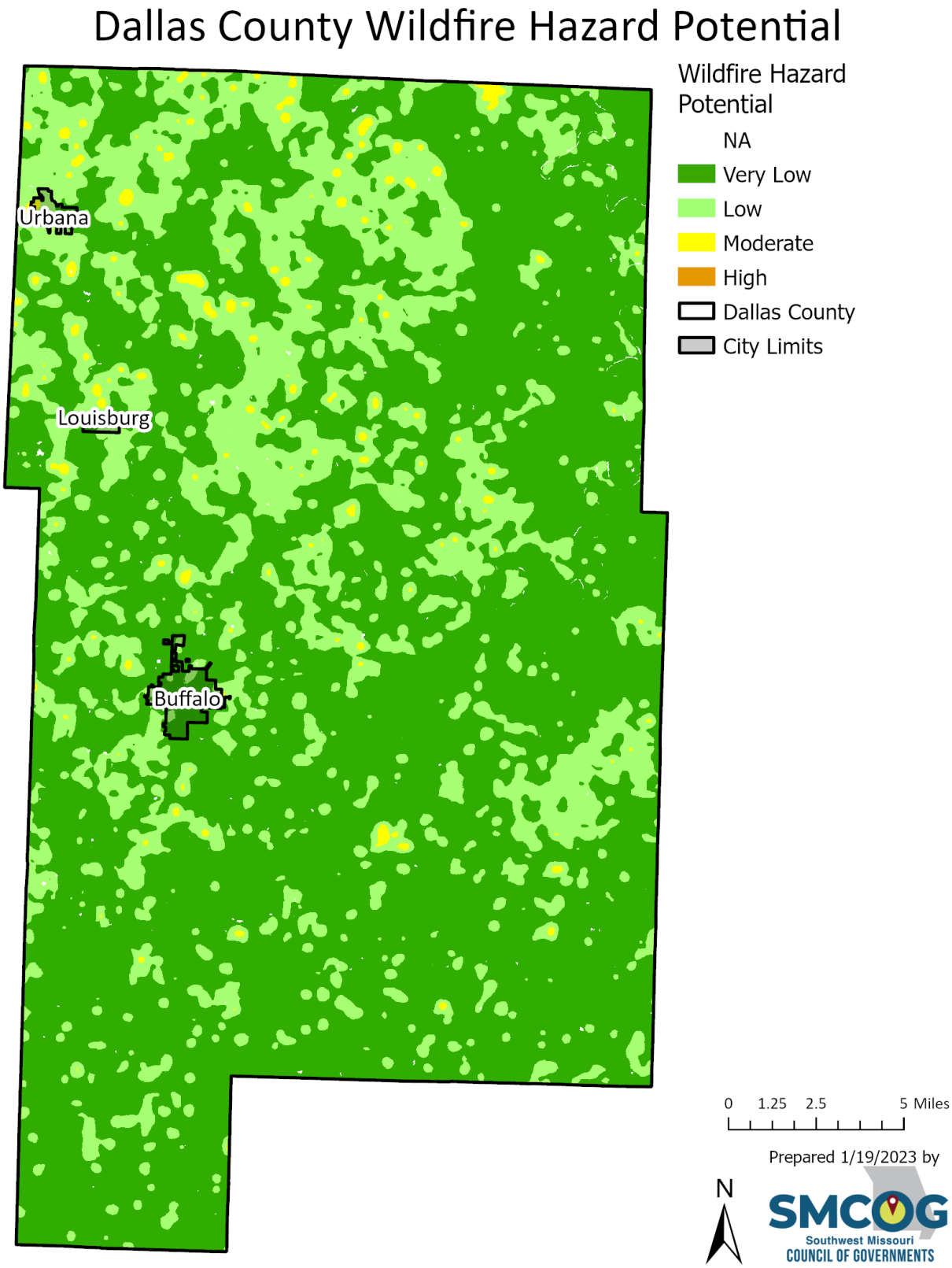


Figure 3.30. Dallas County Wildfire Hazard Potential



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 dead leaves on the ground or dried grasses. They sometimes do "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 large fire storms.

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 to 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 Department of Conservation (MDC) Wildfire Data, there were a total of 1,010 wildfires in Dallas County from 2003-2022. 51,867 acres were burned, 1,110 buildings were threatened, 29 buildings were damaged, and 21 buildings were destroyed. The most damage occurred in 2012, which accounted for 12% of the total wildfires, 22% of the total acres burned, and 30% of all buildings threatened, damaged, and destroyed. **Table 3.42** provides a summary.

Table 3.42. Dallas County Wildfires 2003-2022

Year	Number of Wildfires	Buildings Destroyed	Buildings Damaged	Buildings Threatened	Acres Burned
2003	84	0	0	0	3,789
2004	54	0	0	0	3,995
2005	59	0	0	0	1,377
2006	73	0	0	19	7,653
2007	3	0	0	4	87
2008	45	0	1	24	952
2009	52	3	4	130	2,571
2010	50	0	0	54	4,540
2011	78	2	2	116	3,149
2012	121	8	8	333	11,580
2013	22	2	0	44	247
2014	129	1	1	132	5,424
2015	38	0	3	52	380
2016	53	0	2	43	2,824
2017	22	0	1	31	572
2018	21	3	1	23	253
2019	21	1	1	42	1,822
2020	19	0	3	18	90
2021	28	1	1	16	289
2022	38	0	1	29	273
Total	**1,010**	**21**	**29**	**1,110**	**51,867**

Source: Missouri Department of Conservation https://mdc12.mdc.mo.gov/Applications/MDCFireReporting/Home/FireReportSearch

Probability of Future Occurrence

There was a total of 1,010 reported wildfires from 2003-2022, with several events taking place each year. This equates to a 100% probability of wildfire events in Dallas County in any given year, with an average of 51 events per year.

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 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.

Vulnerability

Vulnerability Overview

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

Potential Losses to Existing Development

Based on historical data, we can estimate that 2 buildings are destroyed, 3 buildings are damaged, 56 buildings are threatened, and 2,594 acres of land are burned per year due to wildfires in Dallas County.

Impact of Previous and Future Development

It is anticipated that there will be limited future development in WUI areas throughout the unincorporated parts of the county. Future growth in WUI areas of the county will increase the risk and exposure to wildfires. It is expected that WUI development in cities can be mitigated by development regulations reducing the risk of potential wildfires.

Hazard Summary by Jurisdiction

There are few areas of moderate risk that fall within jurisdictional boundaries; many areas at risk are under the jurisdiction of Dallas County. Much of the county consists of grasslands, however, and lower-risk areas could quickly become dangerous in the event of a wildfire. School facilities in Greenfield are located near, but not within, an identified medium risk area, and are more likely to be affected in the event of a wildfire.

This hazard is the primary focus of participating special fire protection districts in the county, including the Urbana Rural Fire Department. As many local jurisdictions do not have municipal fire departments, these special districts are important to all communities for protection against wildfire and assisting in reducing exposure to wildfire risk.

Table 3.43 summarizes the structure exposure for Dallas County and participating cities. The exposure amount indicates the dollar amount of assets at risk and the variability of vulnerability from place to place.

Table 3.43. Wildfire Structure Exposure by Jurisdiction

Jurisdiction	Residential Buildings ($)	Commercial Buildings ($)	Agricultural Buildings ($)	Total Exposure ($)
Unincorporated Dallas County	$271,365,750	$16,498,250	$1,825,250	$289,689,250
City of Buffalo	$22,146,125	$6,884,375	$1,176,750	$30,207,250
City of Urbana	$8,214,000	$3,693,750	$692,000	$12,599,750

Source: Hazus

Community Comments on Hazard

Wildfires are generally not a big concern for residents of Dallas County, as 71.4% felt it is “unlikely” or “occasionally” likely to occur. Additionally, “wildfire mitigation” scored the second lowest on the list of sample mitigation projects.

Problem Statement

Wildfire occurrences are relatively frequent within Dallas County. These events can destroy, damage, and threaten structures in hazard prone areas. Populations and structures in WUI areas of the county have an increased risk of wildfires due to the level of fuel mixed with structures. Cities may adopt landscape ordinances that include fire safe landscape design requirements in these areas. They may also adopt building codes or design requirements that encourage non-combustible materials for new construction.

The unincorporated parts of the county have the highest risk and exposure to wildfires. County officials and fire departments can implement burn restrictions during weather conditions conducive to the spread of wildfire. Additionally, understanding highest risk locations and developing safe evacuation routes that members of the public are aware of can reduce the risk of loss of life or injury.

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

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

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

4.1 Goals

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

This planning effort is an update to Dallas County's existing hazard mitigation plan approved by FEMA on August 6, 2018. Therefore, the goals from that 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 second 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. During this update process, the MPC opted to adopt the same goals that were developed during the previous plan update. The plan goals are as follows:

- **Goal 1**: Protect the lives and livelihoods of all citizens.

- **Goal 2:** Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
- **Goal 3:** Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.

4.2 Identification and Analysis of Mitigation Actions

44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

The plan includes a mitigation strategy that 1) analyzes actions and/or projects that the jurisdiction considered to reduce the impacts of hazards identified in the risk assessment, and 2) identifies the actions and/or projects that the jurisdiction intends to implement. Each jurisdiction has considered actions that reduce risk to existing buildings and infrastructure, as well as limiting risk to future development and redevelopment. These actions fall under several categories: prevention, structure and infrastructure projects, natural systems protection, emergency services, and education and outreach. The mitigation plan may include non-mitigation actions, such as actions that are emergency response or operational preparedness in nature.

During the second 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.

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.

Jurisdiction representatives on the MPC were encouraged to review the details of the risk assessment vulnerability analysis specific to their jurisdiction and the previously identified mitigation actions prior to Meeting #3. Representatives were provided a link to two FEMA publication, *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013)* and *Hazard Mitigation Assistance Guidance: Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program (February 2015)*. These documents were developed by FEMA as a resource for identification of a range of potential mitigation actions for reducing risk to natural hazards and disasters.

The focus of meetings #3 and #4 was to update the mitigation strategy. For a comprehensive range of mitigation actions to consider, the MPC reviewed the following information during meeting #3:

- A list of actions proposed in the previous mitigation plan
- Input during meetings
- Key issues from the risk assessments
- Responses to data collection questionnaires where jurisdictions had reported progress made on previous actions

The MPC reviewed the actions from the previously approved plan for progress made since the plan had been adopted. The list of previous actions was included in the data collection

questionnaire for each jurisdiction. The questionnaires were sent via email prior to meeting #1 and reviewed at meetings #1 and #2 before discussion at meeting #3. 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
- Not Yet Started, with a discussion of the reasons for lack of progress

During meeting #3, discussion of action modification occurred in order to make actions SMART: specific, measurable, achievable, relevant, and time-bound. SMCOG staff provided recommended altered language for some items and general discussion. MPC members were also encouraged to identify repetitive loss locations or infrastructure where the potential cost of a project may be high, but over time would cost less than frequent repairs and public assistance claims.

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, 44 continuing actions (either ongoing or modified), and 3 deleted actions. **Table 4.1** provides a full summary.

Table 4.1. Action Status Summary

Jurisdiction	Completed Actions	Continuing Actions (ongoing or modified)	Deleted Actions
Dallas County	0	16	2
City of Buffalo	0	16	0
City of Urbana	-	-	-
Dallas County R-I School District	0	7	1
Dallas County 911	-	-	-
Urbana Rural Fire Department	0	5	0
Total	**0**	**44**	**3**

The City of Urbana and Dallas County 911 did not participate in the previous plan.

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

Table 4.2. Summary of Deleted Actions from the Previous Plan

Deleted Action Number	Action Description	Reason for Deletion
Dallas County 1.2	**Natural Hazard Awareness** – work with private section business organizations and community service organizations to distribute information to the public on natural hazards and resources available to reduce risk	None provided
Dallas County 3.4	**Redundancy Plans** – support development of redundancy plans for utility and telecommunication service providers in the county	None provided
Dallas County R-I 3.4	**Redundancy Plans** – support development of redundancy plans for utility and telecommunication service providers in the county	None provided

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 or within their organization to finalize the actions to be submitted for the updated mitigation strategy. 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 for grant funding applications. 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 the projects. 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?

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. Sample STAPLEE Worksheet

STAPLEE Worksheet		
Name of Jurisdiction:		
Action or Project		
Action/Project Number:		
Name of Action or Project:		
Mitigation Category:		
STAPLEE Criteria **Evaluation Rating** Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0		**Score**
S: Is it **Socially** Acceptable		
T: Is it **Technically** feasible and potentially successful?		
A: Does the jurisdiction have the **Administrative** capacity to execute this action?		
P: Is it **Politically** acceptable?		
L: Is there **Legal** authority to implement?		
E: Is it **Economically** beneficial?		
E: Will the project have either a neutral or positive impact on the natural **Environment**?		
Will historic structures be saved or protected?		
Could it be implemented quickly?		
STAPLEE SCORE		
Mitigation Effectiveness Criteria	**Evaluation Rating**	**Score**
Will the implemented action result in lives saved?	Assign from 5-10 points based on the likelihood that lives 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)		

☐ **High Priority (30+ points)**	☐ **Medium Priority (25 - 29 points)**	☐ **Low Priority (<25 points)**

Completed by
(Name, Title, Phone Number) _____

In addition to the STAPLEE cost benefit review prioritization, an implementation plan for each action was discussed. An action worksheet was used to develop the implementation plan. The action worksheet format is shown in **Figure 4.2.**

Figure 4.2. Sample Action Worksheet

Action Worksheet	
Name of Jurisdiction:	
Risk / Vulnerability	
Hazard(s) Addressed:	
Problem being Mitigated:	
Action or Project	
Applicable Goal Statement:	
Action/Project Number:	
Name of Action or Project:	
Mitigation Category:	
Action or Project Description:	
Estimated Cost:	
Benefits:	
Plan for Implementation	
Responsible Organization/Department:	
Supporting Organization/Department:	
Action/Project Priority:	
Timeline for Completion:	
Potential Fund Sources:	
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	
Report of Progress:	

4.3.1 Dallas County Mitigation Actions

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Citizens are not aware of best ways to reduce risk of natural hazards
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihood of all citizens.
Action/Project Number:	Dallas County 1.1
Name of Action or Project:	**Public Awareness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Distribute informational material to citizens, businesses, and vulnerable population groups on natural hazards and ways to reduce risk
Estimated Cost:	Can be completed with current budget
Benefits:	Increased public awareness regarding hazards
Plan for Implementation	
Responsible Organization/Department:	EMA
Supporting Organization/Department:	
Action/Project Priority:	28
Timeline for Completion:	2 years
Potential Fund Sources:	Local tax revenue
Local Planning Mechanisms to be Used in Implementation, if any:	emergency operations plan, mitigation plan
Progress Report	
Action Status:	In progress
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	No proper warning system for hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihood of all citizens
Action/Project Number:	Dallas County 1.2
Name of Action or Project:	**Alert Systems**
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote the use of NOAA radios and/or automated alert systems in businesses, homes, and vulnerable facilities such as schools, nursing homes, medical clinics, and day care centers.
Estimated Cost:	Can be completed with current budget
Benefits:	Advance warning of severe weather
Plan for Implementation	
Responsible Organization/Department:	EMA
Supporting Organization/Department:	
Action/Project Priority:	35
Timeline for Completion:	2 years
Potential Fund Sources:	City/county taxes
Local Planning Mechanisms to be Used in Implementation, if any:	Comp plan, capital improvement plan, emergency operations plan, mitigation plan, floodplain ordinance, budgeting, grant writing
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Need for proper smoke detection in public and private buildings
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihood of all citizens
Action/Project Number:	Dallas County 1.3
Name of Action or Project:	**Citizen Preparedness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote the use of smoke alarms in homes, businesses, and places of public congregation.
Estimated Cost:	Can be completed with current budget
Benefits:	Increased citizen awareness and participation
Plan for Implementation	
Responsible Organization/Department:	County Commission
Supporting Organization/Department:	Local fire departments, red cross
Action/Project Priority:	31
Timeline for Completion:	2 years
Potential Fund Sources:	Business donations
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing not started
Report of Progress:	Lack of interest

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, severe thunderstorm
Problem being Mitigated:	Lack of proper notification system for flooded roadways
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihood of all citizens
Action/Project Number:	Dallas County 1.4
Name of Action or Project:	**Procedure for Flooded Roadways**
Mitigation Category:	Education and Outreach
Action or Project Description:	Create a procedure for notification of flooded roadways.
Estimated Cost:	Can potentially be completed with current budget. Might have to explore hiring additional staff
Benefits:	Citizens will be properly notified of flooded roadways and hazardous conditions
Plan for Implementation	
Responsible Organization/Department:	EMA
Supporting Organization/Department:	Commissioners
Action/Project Priority:	37
Timeline for Completion:	1 year
Potential Fund Sources:	None needed
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	600+ subscriptions currently

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, severe thunderstorm, severe winter weather
Problem being Mitigated:	No safe place to shelter during severe hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihood of all citizens
Action/Project Number:	Dallas County 1.5
Name of Action or Project:	**Safe environments during severe weather**
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Where feasible, retrofit existing critical and vulnerable facilities to provide a safer environment during severe weather events
Estimated Cost:	$10,000+ per project
Benefits:	Safe place to shelter during hazard events
Plan for Implementation	
Responsible Organization/Department:	County Commission
Supporting Organization/Department:	EMA
Action/Project Priority:	30
Timeline for Completion:	2 years
Potential Fund Sources:	HMA grants
Local Planning Mechanisms to be Used in Implementation, if any:	Comp plan, capital improvement plan, emergency operations plan, mitigation plan, floodplain ordinance, budgeting, grant writing
Progress Report	
Action Status:	Continuing not started
Report of Progress:	Lack of funding has limited this project

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	No backup source of power
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	Dallas County 2.1
Name of Action or Project:	**Back-up generators**
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Promote installation of back-up generators in all communities for critical infrastructure, such as water towers and wastewater treatment facilities, and in critical/vulnerable facilities including schools, medical facilities, storm shelters, and critical government buildings.
Estimated Cost:	$20,000
Benefits:	Prevent complete loss of power
Plan for Implementation	
Responsible Organization/Department:	EMA
Supporting Organization/Department:	Local jurisdictions
Action/Project Priority:	31
Timeline for Completion:	2 years
Potential Fund Sources:	HMA grants
Local Planning Mechanisms to be Used in Implementation, if any:	Comp plan, capital improvement plan, emergency operations plan, mitigation plan, floodplain ordinance, budgeting, grant writing
Progress Report	
Action Status:	Continuing not started
Report of Progress:	Lack of funding

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, severe thunderstorm
Problem being Mitigated:	Outdated low water crossings that are deteriorating
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	Dallas County 2.2
Name of Action or Project:	**Low water crossing upgrades**
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Upgrade low water crossings where feasible
Estimated Cost:	$10,000+ per project depending on the scope
Benefits:	Reduced flooding and hazardous driving conditions
Plan for Implementation	
Responsible Organization/Department:	County Commission
Supporting Organization/Department:	EMA
Action/Project Priority:	31
Timeline for Completion:	2 years
Potential Fund Sources:	HMA grants, tax revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comp plan, capital improvement plan, emergency operations plan, mitigation plan, floodplain ordinance, budgeting, grant writing
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Lack of fundings limits this project

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, severe thunderstorm
Problem being Mitigated:	Drainage system getting overloaded and clogged
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	Dallas County 2.3
Name of Action or Project:	**Storm Water Impact**
Mitigation Category:	Prevention
Action or Project Description:	Clean debris from drainage channels and under bridges to improve capacities of storm drainage systems.
Estimated Cost:	$10,000
Benefits:	Reduce chance of flooding and damage to storm water system
Plan for Implementation	
Responsible Organization/Department:	EMA
Supporting Organization/Department:	Local jurisdictions
Action/Project Priority:	29
Timeline for Completion:	2 years
Potential Fund Sources:	Local tax funding
Local Planning Mechanisms to be Used in Implementation, if any:	Comp plan, capital improvement plan, emergency operations plan, mitigation plan, floodplain ordinance, budgeting, grant writing
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Outdated building methods that can lead to damages
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	Dallas County 2.4
Name of Action or Project:	**Building Codes**
Mitigation Category:	Prevention
Action or Project Description:	Adopt building codes for new construction
Estimated Cost:	Can potentially be completed with current staff and budget
Benefits:	Updated building techniques that are safer
Plan for Implementation	
Responsible Organization/Department:	County Commissioners
Supporting Organization/Department:	County Clerk
Action/Project Priority:	30
Timeline for Completion:	2 years
Potential Fund Sources:	Building inspection fees
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing not started
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Home buyers and builders are not aware of proper hazard mitigation construction techniques
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	Dallas County 2.5
Name of Action or Project:	**Construction Technique Awareness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote an educational campaign for homebuyers and builders on installing construction techniques such as, hurricane straps in new construction.
Estimated Cost:	Can be completed with current budget
Benefits:	Improved resiliency
Plan for Implementation	
Responsible Organization/Department:	County Commission
Supporting Organization/Department:	EMA
Action/Project Priority:	29
Timeline for Completion:	2 years
Potential Fund Sources:	Local taxes
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing not started
Report of Progress:	Public apathy towards this project limits it

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Flooding caused by debris overloading waterways
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	Dallas County 2.6
Name of Action or Project:	**Stream and River Clean Up**
Mitigation Category:	Natural Systems Protection
Action or Project Description:	Clean debris from county rivers and streams to increase capacity of water bodies and mitigate floods
Estimated Cost:	$100,000
Benefits:	Prevents flooding
Plan for Implementation	
Responsible Organization/Department:	County Commission
Supporting Organization/Department:	Road and Bridge Dept
Action/Project Priority:	26
Timeline for Completion:	3 years
Potential Fund Sources:	ARPA funds, DNR grants, local taxes
Local Planning Mechanisms to be Used in Implementation, if any:	Comp plan, emergency operations plan, mitigation plan, floodplain ordinance
Progress Report	
Action Status:	Continuing not started
Report of Progress:	Cost prohibitive

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Floodplain management
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	Dallas County 2.7
Name of Action or Project:	**NFIP**
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain ordinance and other NFIP requirements
Estimated Cost:	Can be completed with current staff/budget
Benefits:	Proper floodplain management to reduce the risk of flooding
Plan for Implementation	
Responsible Organization/Department:	County Commission
Supporting Organization/Department:	EMA
Action/Project Priority:	
Timeline for Completion:	Ongoing
Potential Fund Sources:	Tax revenue
Local Planning Mechanisms to be Used in Implementation, if any:	emergency operations plan, mitigation plan, floodplain ordinance,
Progress Report	
Action Status:	New
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of centralized database for mitigation resources
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	Dallas County 3.1
Name of Action or Project:	**Database Resources**
Mitigation Category:	Education and Outreach
Action or Project Description:	Establish and maintain a database on available mitigation resources and programs that can be shared with local governments, response and preparedness agencies, and emergency care providers.
Estimated Cost:	Less than $10,000
Benefits:	Easy to access database of mitigation resources and grant opportunities
Plan for Implementation	
Responsible Organization/Department:	County Commission
Supporting Organization/Department:	
Action/Project Priority:	28
Timeline for Completion:	1 year
Potential Fund Sources:	General revenue
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing not started
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Inefficient communication methods for emergency personnel
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	Dallas County 3.2
Name of Action or Project:	**Communications Equipment**
Mitigation Category:	Emergency Services
Action or Project Description:	Provide adequate communications equipment for essential emergency personnel.
Estimated Cost:	$500,000
Benefits:	Improved communication
Plan for Implementation	
Responsible Organization/Department:	County Commission
Supporting Organization/Department:	EMA
Action/Project Priority:	29
Timeline for Completion:	2 years
Potential Fund Sources:	HMA grants, tax revenue
Local Planning Mechanisms to be Used in Implementation, if any:	budgeting, grant writing
Progress Report	
Action Status:	Continuing not started
Report of Progress:	Cost prohibitive

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	No proper data storage system for hazard mitigation and disaster recovery information
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	Dallas County 3.3
Name of Action or Project:	**Data Backup**
Mitigation Category:	Education and Outreach
Action or Project Description:	Establish a records management and data backup systems for jurisdictions.
Estimated Cost:	$100,000
Benefits:	Prevents completes loss of data
Plan for Implementation	
Responsible Organization/Department:	County Clerk
Supporting Organization/Department:	
Action/Project Priority:	26
Timeline for Completion:	2 years
Potential Fund Sources:	Local tax revenue
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing not started
Report of Progress:	Lack of interest/cost prohibitive

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Limited GIS capabilities
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	Dallas County 3.4
Name of Action or Project:	**County GIS**
Mitigation Category:	Education and Outreach
Action or Project Description:	Utilize and enhance the countywide multi-jurisdictional GIS system.
Estimated Cost:	No cost
Benefits:	Improved GIS capabilities
Plan for Implementation	
Responsible Organization/Department:	Assessor's Office
Supporting Organization/Department:	County Clerk
Action/Project Priority:	31
Timeline for Completion:	1 year
Potential Fund Sources:	None needed
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Many agencies and the public already have limited access to the county GIS system

Action Worksheet	
Name of Jurisdiction:	Dallas County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Limited communication between municipalities
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	Dallas County 3.5
Name of Action or Project:	**Communication Cooperation**
Mitigation Category:	Education and Outreach
Action or Project Description:	Ensure communication channels and cooperation with surrounding jurisdictions.
Estimated Cost:	No cost
Benefits:	Improved communication between municipalities
Plan for Implementation	
Responsible Organization/Department:	EMD
Supporting Organization/Department:	EMA
Action/Project Priority:	33
Timeline for Completion:	6 months
Potential Fund Sources:	None
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	

4.3.2 City of Buffalo Mitigation Actions

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Citizens are not aware of best ways to reduce risk of natural hazards
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens.
Action/Project Number:	City of Buffalo 1.1
Name of Action or Project:	**Public Awareness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Distribute informational material to citizens, businesses, and vulnerable population groups on natural hazards and ways to reduce risks.
Estimated Cost:	0 - $10,000.00
Benefits:	Informing the citizens and businesses of critical information needed to be safe and find safety in disaster situations.
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management, Police & Fire Departments
Action/Project Priority:	15
Timeline for Completion:	1 Year
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing not started**
Report of Progress:	Locating Funding Sources

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of public information regarding natural hazards and how to reduce risk
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens.
Action/Project Number:	City of Buffalo 1.2
Name of Action or Project:	**Natural Hazard Awareness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Work with private sector business organizations and community service organizations to distribute information to the public on natural hazards and resources available to reduce risk.
Estimated Cost:	0 - $10,000.00
Benefits:	Providing the public with the information needed, to be informed when and what to do in case of a natural disaster situations.
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management, Police and Fire Departments
Action/Project Priority:	47
Timeline for Completion:	1 Year
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing not started**
Report of Progress:	Funding Sources to Implement Materials

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	Severe thunderstorm, tornado
Problem being Mitigated:	Lack of storm siren coverage for entire city
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens.
Action/Project Number:	City of Buffalo 1.3
Name of Action or Project:	**Storm Sirens**
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Maintain storm sirens in all population centers in the county.
Estimated Cost:	$75,000.00
Benefits:	Continued application of alerting citizens that are outdoors of impending weather and to seek shelter.
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management
Action/Project Priority:	43
Timeline for Completion:	1 Year
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing in Progress**
Report of Progress:	Storm Sirens are currently in place, this project would increase coverage.

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	No proper warning system for hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens.
Action/Project Number:	City of Buffalo 1.4
Name of Action or Project:	**Alert Systems**
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote the use of NOAA radios and/or automated alert systems in businesses, homes, and vulnerable facilities such as schools, nursing homes, medical clinics, and day care centers.
Estimated Cost:	0 - $10,000.00
Benefits:	Alerting the citizens of potential hazards as they approach or occur in the area, to seek shelter or provide emergent messages
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management, Police & Fire Departments
Action/Project Priority:	44
Timeline for Completion:	1 Year
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing in Progress**
Report of Progress:	The promotion of weather radios and now using valuable applications on your phone has been a large concern, providing citizens of the information needed and ways to receive information.

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Need for proper smoke detection in public and private buildings
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens.
Action/Project Number:	City of Buffalo 1.5
Name of Action or Project:	**Citizen Preparedness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote the use of smoke alarms in homes, businesses, and places of public congregation.
Estimated Cost:	0 - $10,000.00
Benefits:	Provide the citizens with a smoke detector program and installation by its local fire departments, reduces the fire hazards in homes and businesses
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Fire Departments
Action/Project Priority:	42
Timeline for Completion:	3 months
Potential Fund Sources:	Grants, Red Cross, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing in Progress**
Report of Progress:	A program is currently in place, additional funding would cover most areas

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, severe thunderstorm
Problem being Mitigated:	Lack of proper notification system for flooded roadways
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens.
Action/Project Number:	City of Buffalo 1.6
Name of Action or Project:	**Procedure for Flooded Roadways**
Mitigation Category:	Education and Outreach
Action or Project Description:	Create a procedure for notification of flooded roadways.
Estimated Cost:	0 - $5,000.00
Benefits:	Signage and Gates are a possibility to inform traffic of flooded roadways
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management, Emergency Service, Public Works
Action/Project Priority:	39
Timeline for Completion:	3 Months
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing not started**
Report of Progress:	Limited Funds, Grant sources

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, severe thunderstorm, severe winter weather
Problem being Mitigated:	No safe place to shelter during severe hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens.
Action/Project Number:	City of Buffalo 1.7
Name of Action or Project:	**Safe environments during severe weather**
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Where feasible, retrofit existing critical and vulnerable facilities to provide a safer environment during severe weather events
Estimated Cost:	$5,000.000.00
Benefits:	Shelter/Safe Room to protect citizens from potential weather issues are needed in some areas of the city.
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management
Action/Project Priority:	44
Timeline for Completion:	1-2 Years
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing in progress**
Report of Progress:	Safe areas for shelter are needed in some areas in town where severe weather may impact the citizens. Parks and assembly areas need shelter from the elements.

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	No backup source of power
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	City of Buffalo 2.1
Name of Action or Project:	**Back-up generators**
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Promote installation of back-up generators in all communities for critical infrastructure, such as water towers and wastewater treatment facilities, and in critical/vulnerable facilities including schools, medical facilities, storm shelters, and critical government buildings.
Estimated Cost:	$150,000.00
Benefits:	To allow continuity of government and emergency operations in the event of utility power outages
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management
Action/Project Priority:	40
Timeline for Completion:	2 years
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing not started**
Report of Progress:	Funding the Project

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, severe thunderstorm
Problem being Mitigated:	Outdated low water crossings that are deteriorating
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	City of Buffalo 2.2
Name of Action or Project:	**Low water crossing upgrades**
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Upgrade low water crossings where feasible
Estimated Cost:	3,000,000.00
Benefits:	Providing better traffic allowance in areas where flooding occurs
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management, Public Works
Action/Project Priority:	47
Timeline for Completion:	1 Year
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing not started**
Report of Progress:	Funding the project

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, severe thunderstorm
Problem being Mitigated:	Stormwater systems being overloaded and impacting wastewater treatment facilities
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	City of Buffalo 2.3
Name of Action or Project:	**Storm Water Impact**
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Utilize appropriate structural improvements to eliminate or reduce the impacts of storm water on wastewater treatment facilities and collection systems
Estimated Cost:	$5,000,000.00
Benefits:	Reduce the overload of stormwater drainage into the wastewater treatment facilities
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Public Works
Action/Project Priority:	47
Timeline for Completion:	2 Years
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing not started**
Report of Progress:	Project Funding…

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, severe thunderstorm
Problem being Mitigated:	Drainage system getting overloaded and clogged
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	City of Buffalo 2.4
Name of Action or Project:	**Storm Water Impact**
Mitigation Category:	Prevention
Action or Project Description:	Clean debris from drainage channels and under bridges to improve capacities of storm drainage systems.
Estimated Cost:	0 - $1,000.00
Benefits:	Removing debris will improve the water flow
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Public Works
Action/Project Priority:	41
Timeline for Completion:	1 Month
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing in Progress**
Report of Progress:	The City of Buffalo checks on these trouble areas repeatedly.

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Home buyers and builders are not aware of proper hazard mitigation construction techniques
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	City of Buffalo 2.5
Name of Action or Project:	**Construction Technique Awareness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote an educational campaign for homebuyers and builders on installing construction techniques such as, hurricane straps in new construction.
Estimated Cost:	0 - $1,000.00
Benefits:	Better construction efforts will create better structures to withstand the forces of nature in disaster situations.
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management, Building Inspections
Action/Project Priority:	47
Timeline for Completion:	1 Month
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing not started**
Report of Progress:	Creating a policy and finding the information needed to implement procedures and suggestions.

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Floodplain management
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	City of Buffalo 2.6
Name of Action or Project:	**NFIP**
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain ordinance and other NFIP requirements
Estimated Cost:	Can be completed with current staff/budget
Benefits:	Proper floodplain management to reduce the risk of flooding
Plan for Implementation	
Responsible Organization/Department:	Floodplain manager
Supporting Organization/Department:	
Action/Project Priority:	
Timeline for Completion:	Ongoing
Potential Fund Sources:	Tax revenue
Local Planning Mechanisms to be Used in Implementation, if any:	floodplain ordinance,
Progress Report	
Action Status:	New
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Inefficient communication methods for emergency personnel
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	City of Buffalo 3.1
Name of Action or Project:	**Communications Equipment**
Mitigation Category:	Emergency Services
Action or Project Description:	Provide adequate communications equipment for essential emergency personnel.
Estimated Cost:	$25,000.00
Benefits:	Digital equipment will enhance communications for both police and fire departments
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management, Police and Fire Departments
Action/Project Priority:	36
Timeline for Completion:	3 Months
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing in Progress**
Report of Progress:	Grant Approval and Implemented

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	No proper data storage system for hazard mitigation and disaster recovery information
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	City of Buffalo 3.2
Name of Action or Project:	**Data Backup**
Mitigation Category:	Education and Outreach
Action or Project Description:	Establish a records management and data backup systems for jurisdictions.
Estimated Cost:	$5,000.00
Benefits:	Better System Implemented for Backup Systems
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management, Fire & Police
Action/Project Priority:	31
Timeline for Completion:	3 Months
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing not started**
Report of Progress:	Funding and Implementation

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	No backup system in place for utility and telecommunication service providers
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	City of Buffalo 3.3
Name of Action or Project:	**Redundancy Plans**
Mitigation Category:	Prevention
Action or Project Description:	Support development of redundancy plans for utility and telecommunication service providers in the county
Estimated Cost:	$10,000.00
Benefits:	Providing backup communications for disaster operations
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management, Police and Fire
Action/Project Priority:	36
Timeline for Completion:	3 Months
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing not started**
Report of Progress:	Funding Sources

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Limited communication between municipalities
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	City of Buffalo 3.4
Name of Action or Project:	**Communication Cooperation**
Mitigation Category:	Education and Outreach
Action or Project Description:	Ensure communication channels and cooperation with surrounding jurisdictions.
Estimated Cost:	0 - $25,000.00
Benefits:	Communication Plan is a must when it comes to operations
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management, Police and Fire
Action/Project Priority:	45
Timeline for Completion:	3 Months
Potential Fund Sources:	Grants, General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing not started**
Report of Progress:	Creating a plan and making changes, may have additional costs.

Action Worksheet	
Name of Jurisdiction:	City of Buffalo
Risk / Vulnerability	
Hazard(s) Addressed:	Lack of safe facility during severe weather
Problem being Mitigated:	Unprotected people during public events at the city parks
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, critical infrastructure, and assembly areas in a disaster.
Action/Project Number:	City of Buffalo 3.5
Name of Action or Project:	Saferoom/Shelter
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Construct Saferoom/Shelter at the city parks where people gather outdoors without protection facilities
Estimated Cost:	$2,000,000.00 each for 2 city parks, Total : $4,000,000.00
Benefits:	Safety for people attending any event, a secured location to use as a shelter in times of disaster.
Plan for Implementation	
Responsible Organization/Department:	City of Buffalo
Supporting Organization/Department:	Emergency Management
Action/Project Priority:	41
Timeline for Completion:	1-2 years
Potential Fund Sources:	Grants, general revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan, mitigation plan, emergency operations plan, budgeting
Progress Report	
Action Status:	**Continuing not started**
Report of Progress:	Funding the project.

4.3.3 City of Urbana Mitigation Actions

Action Worksheet	
Name of Jurisdiction:	City of Urbana
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Low water crossing floods and becomes unpassable
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens.
Action/Project Number:	City of Urbana 1.1
Name of Action or Project:	Oak Street Low Water Bridge
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Raise elevation of flow at water crossing - bigger culverts, raise height of bridge
Estimated Cost:	$50,000+
Benefits:	Makes the bridge passable, no more debris washing out, eliminate flooding and wash out around creek
Plan for Implementation	
Responsible Organization/Department:	City of Urbana
Supporting Organization/Department:	
Action/Project Priority:	34
Timeline for Completion:	1-6 months
Potential Fund Sources:	HMA grants, bonds, loans, other grants
Local Planning Mechanisms to be Used in Implementation, if any:	Bidding, procurement, emergency operations plan, mitigation plan
Progress Report	
Action Status:	new
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	City of Urbana
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Low water crossing floods and becomes unpassable
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens.
Action/Project Number:	City of Urbana 1.2
Name of Action or Project:	Mill Street Low Water Bridge
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Raise elevation of flow at water crossing - bigger culverts, raise height of bridge
Estimated Cost:	$50,000+
Benefits:	Makes the bridge passable, no more debris washing out, eliminate flooding and wash out around creek
Plan for Implementation	
Responsible Organization/Department:	City of Urbana
Supporting Organization/Department:	
Action/Project Priority:	34
Timeline for Completion:	1-6 months
Potential Fund Sources:	HMA grants, bonds, loans, other grants
Local Planning Mechanisms to be Used in Implementation, if any:	Bidding, procurement, emergency operations plan, mitigation plan
Progress Report	
Action Status:	new
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	City of Urbana
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, severe thunderstorm, severe winter weather
Problem being Mitigated:	No central location for residents to shelter during storms/tornados
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens.
Action/Project Number:	City of Urbana 1.3
Name of Action or Project:	Urbana City Hall and Safe Room
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Building a new safe room/city hall/EOC
Estimated Cost:	$500,000+
Benefits:	Safe place for city hall/EOC staff and residents to shelter in during severe weather
Plan for Implementation	
Responsible Organization/Department:	City of Urbana
Supporting Organization/Department:	
Action/Project Priority:	34
Timeline for Completion:	12-18 months
Potential Fund Sources:	HMA grants, tax revenue, bonds, loans, other grants
Local Planning Mechanisms to be Used in Implementation, if any:	Bidding, procurement, emergency operations plan, mitigation plan
Progress Report	
Action Status:	new
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	City of Urbana
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Floodplain management
Action or Project	
Applicable Goal Statement:	Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
Action/Project Number:	City of Urbana 2.1
Name of Action or Project:	**NFIP**
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain ordinance and other NFIP requirements
Estimated Cost:	Can be completed with current staff/budget
Benefits:	Proper floodplain management to reduce the risk of flooding
Plan for Implementation	
Responsible Organization/Department:	Floodplain manager
Supporting Organization/Department:	
Action/Project Priority:	
Timeline for Completion:	Ongoing
Potential Fund Sources:	Tax revenue
Local Planning Mechanisms to be Used in Implementation, if any:	floodplain ordinance, mitigation plan
Progress Report	
Action Status:	New
Report of Progress:	

4.3.4 Dallas County R-I School District Mitigation Actions

Action Worksheet	
Name of Jurisdiction:	Dallas County R-I
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Citizens are not aware of best ways to reduce risk of natural hazards
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens
Action/Project Number:	Dallas County R-I 1.1
Name of Action or Project:	**Public Awareness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Distribute informational material to citizens, businesses, and vulnerable population groups on natural hazards and ways to reduce risk
Estimated Cost:	$10,000 for website and calling system
Benefits:	Increased awareness for natural hazards
Plan for Implementation	
Responsible Organization/Department:	Communications Director
Supporting Organization/Department:	School District
Action/Project Priority:	40
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local tax funds
Local Planning Mechanisms to be Used in Implementation, if any:	Budgeting process
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Ongoing process

Action Worksheet	
Name of Jurisdiction:	Dallas County R-I
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of public information regarding natural hazards and how to reduce risk
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens
Action/Project Number:	Dallas County R-I 1.2
Name of Action or Project:	**Natural Hazard Awareness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Work with private sector business organizations and community service organizations to distribute information to the public on natural hazards and resources available to reduce risk.
Estimated Cost:	$10,000
Benefits:	Increased awareness for natural hazards
Plan for Implementation	
Responsible Organization/Department:	Assistant Superintendent
Supporting Organization/Department:	School District
Action/Project Priority:	38
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local tax revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	Dallas County R-I
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	No proper warning system for hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens
Action/Project Number:	Dallas County R-I 1.3
Name of Action or Project:	**Alert Systems**
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote the use of NOAA radios and/or automated alert systems in businesses, homes, and vulnerable facilities such as schools, nursing homes, medical clinics, and day care centers.
Estimated Cost:	$10,000
Benefits:	Advance warning for students, faculty, and staff
Plan for Implementation	
Responsible Organization/Department:	Communications Director
Supporting Organization/Department:	Assistant Superintendent
Action/Project Priority:	36
Timeline for Completion:	Completed and ongoing
Potential Fund Sources:	District funds
Local Planning Mechanisms to be Used in Implementation, if any:	School infrastructure plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	This has been completed, however the promoting of the use continues

Action Worksheet	
Name of Jurisdiction:	Dallas County R-I
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Need for proper smoke detection in public and private buildings
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens
Action/Project Number:	Dallas County R-I 1.4
Name of Action or Project:	**Citizen Preparedness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote the use of smoke alarms in homes, businesses, and places of public congregation.
Estimated Cost:	$5-10k
Benefits:	Safer community
Plan for Implementation	
Responsible Organization/Department:	Communications director
Supporting Organization/Department:	Assistant superintendent
Action/Project Priority:	42
Timeline for Completion:	Ongoing
Potential Fund Sources:	District funds
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	This step continues to be improved upon

Action Worksheet	
Name of Jurisdiction:	Dallas County R-I
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, severe thunderstorm, severe winter weather
Problem being Mitigated:	No safe place to shelter during severe hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect lives and livelihood of all citizens
Action/Project Number:	Dallas County R-I 1.5
Name of Action or Project:	**Safe environments during severe weather**
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Where feasible, retrofit existing critical and vulnerable facilities to provide a safer environment during severe weather events
Estimated Cost:	Unknown at this time
Benefits:	Reduce the risk of damage to facility and students/faculty/staff
Plan for Implementation	
Responsible Organization/Department:	Superintendent
Supporting Organization/Department:	Maintenance director
Action/Project Priority:	36
Timeline for Completion:	5 years
Potential Fund Sources:	FEMA and tax dollars
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Currently there are 2 FEMA shelters for students and staff. The one at the high school opens up to the community

Action Worksheet	
Name of Jurisdiction:	Dallas County R-I
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of centralized database for mitigation resources
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	Dallas County R-I 3.1
Name of Action or Project:	**Database Resources**
Mitigation Category:	Education and Outreach
Action or Project Description:	Establish and maintain a database on available mitigation resources and programs that can be shared with local governments, response and preparedness agencies, and emergency care providers.
Estimated Cost:	$10,000
Benefits:	Increased mitigation awareness
Plan for Implementation	
Responsible Organization/Department:	Assistant superintendent
Supporting Organization/Department:	Communications director
Action/Project Priority:	42
Timeline for Completion:	3 months
Potential Fund Sources:	District funds
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	Dallas County R-I
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Limited communication between municipalities
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	Dallas County R-I 3.3
Name of Action or Project:	**Communication Cooperation**
Mitigation Category:	Education and Outreach
Action or Project Description:	Ensure communication channels and cooperation with surrounding jurisdictions.
Estimated Cost:	$10,000
Benefits:	Better communication during hazards
Plan for Implementation	
Responsible Organization/Department:	Assistant superintendent
Supporting Organization/Department:	
Action/Project Priority:	44
Timeline for Completion:	Ongoing
Potential Fund Sources:	District funds
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	

4.3.5 Dallas County 911 Mitigation Actions

Action Worksheet	
Name of Jurisdiction:	Dallas County 911
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, flooding, severe thunderstorm
Problem being Mitigated:	Unprotected, wood-framed 911 facility
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster.
Action/Project Number:	Dallas County 911 3.1
Name of Action or Project:	Hardened Emergency 911 Communications Center
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Construction of a hardened e-911 communications center with reinforced infrastructure to maintain continuation of emergency communications
Estimated Cost:	$3,500,000
Benefits:	Prevent loss to primary county PSAP building and radio comm infrastructure. Prevent disruption of e-911 telephone comm. Prevent death or serious injury to PSAP personnel. Provide shelter for supporting org staff/personnel
Plan for Implementation	
Responsible Organization/Department:	Dallas County 911 Executive Director
Supporting Organization/Department:	City of Buffalo
Action/Project Priority:	44
Timeline for Completion:	24-36 months
Potential Fund Sources:	Dallas County 911 funds. Lease purchase option agreement
Local Planning Mechanisms to be Used in Implementation, if any:	Potential for consolidated join Public Safety Center with City of Buffalo. Coordinated effort with City of Buffalo and shared infrastructure. Long Term Budget Plan, Critical Facilities Plan
Progress Report	
Action Status:	New
Report of Progress:	Project management and architecture design has started

4.3.6 Urbana Rural Fire Department Mitigation Actions

Action Worksheet	
Name of Jurisdiction:	Urbana Rural Fire Department
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Citizens are not aware of best ways to reduce risk of natural hazards
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihood of all citizens
Action/Project Number:	Urbana Rural Fire Department 1.1
Name of Action or Project:	**Public Awareness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Distribute informational material to citizens, businesses, and vulnerable population groups on natural hazards and ways to reduce risk
Estimated Cost:	Can be completed with current funding
Benefits:	Improved citizen awareness and participation
Plan for Implementation	
Responsible Organization/Department:	URFD
Supporting Organization/Department:	
Action/Project Priority:	25
Timeline for Completion:	Ongoing
Potential Fund Sources:	USDA, tax funds
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	Urbana Rural Fire Department
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of public information regarding natural hazards and how to reduce risk
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihood of all citizens
Action/Project Number:	Urbana Rural Fire Department 1.2
Name of Action or Project:	**Natural Hazard Awareness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Work with private sector business organizations and community service organizations to distribute information to the public on natural hazards and resources available to reduce risk.
Estimated Cost:	Can be completed with current funding
Benefits:	Improved and easier to access public information regarding risk reduction
Plan for Implementation	
Responsible Organization/Department:	URFD
Supporting Organization/Department:	
Action/Project Priority:	26
Timeline for Completion:	Ongoing
Potential Fund Sources:	SEMA grants, tax funds
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Information is presented at town meetings

Action Worksheet	
Name of Jurisdiction:	Urbana Rural Fire Department
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Need for proper smoke detection in public and private buildings
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihood of all citizens
Action/Project Number:	Urbana Rural Fire Department 1.3
Name of Action or Project:	**Citizen Preparedness**
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote the use of smoke alarms in homes, businesses, and places of public congregation.
Estimated Cost:	Can be completed with current funding
Benefits:	Improved citizen awareness and participation
Plan for Implementation	
Responsible Organization/Department:	URFD
Supporting Organization/Department:	Red Cross
Action/Project Priority:	25
Timeline for Completion:	Ongoing
Potential Fund Sources:	Red Cross funds, tax funds
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Fire alarm installations

Action Worksheet	
Name of Jurisdiction:	Urbana Rural Fire Department
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Inefficient communication methods for emergency personnel
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster
Action/Project Number:	Urbana Rural Fire Department 3.1
Name of Action or Project:	**Communications Equipment**
Mitigation Category:	Emergency Services
Action or Project Description:	Provide adequate communications equipment for essential emergency personnel.
Estimated Cost:	$30,000
Benefits:	Improved communication and efficiency
Plan for Implementation	
Responsible Organization/Department:	URFD
Supporting Organization/Department:	
Action/Project Priority:	33
Timeline for Completion:	1 year when funds become available
Potential Fund Sources:	HMA grants, DNR, CDBG
Local Planning Mechanisms to be Used in Implementation, if any:	Grant writing, budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Radios are purchased when affordable

Action Worksheet	
Name of Jurisdiction:	Urbana Rural Fire Department
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Limited communication between municipalities
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster
Action/Project Number:	Urbana Rural Fire Department 3.2
Name of Action or Project:	**Communication Cooperation**
Mitigation Category:	Education and Outreach
Action or Project Description:	Ensure communication channels and cooperation with surrounding jurisdictions.
Estimated Cost:	Can be completed with current funds
Benefits:	Improved communication between fire depts and municipalities
Plan for Implementation	
Responsible Organization/Department:	URFD
Supporting Organization/Department:	
Action/Project Priority:	36
Timeline for Completion:	Ongoing
Potential Fund Sources:	Tax revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Mutual aid agreements
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Coordination with other fire depts, schools, 911

4.4 Mitigation Action Matrix

Table 4.3. Mitigation Action Matrix

#	Action	Jurisdiction	Priority	Goal Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Prevention								
2.4	Storm Water impact	City of Buffalo	41	Goal 2	Flooding, Severe Thunderstorm	X	X	X
2.6	NFIP	City of Buffalo	35	Goal 2	Flooding	X	X	X
3.3	Redundancy Plans	City of Buffalo	36	Goal 3	All			
2.1	NFIP	City of Urbana	35	Goal 2	Flooding	X	X	X
2.3	Storm Water Impact	Dallas County	29	Goal 2	Flooding, Severe Thunderstorm	X	X	X
2.4	Building Codes	Dallas County	30	Goal 2	All	X	X	-
2.7	NFIP	Dallas County	35	Goal 2	Flooding	X	X	X
Structure and Infrastructure Projects								
1.3	Storm Sirens	City of Buffalo	43	Goal 1	Severe thunderstorm, tornado	X		X
1.7	Safe Environments during Severe Weather	City of Buffalo	44	Goal 1	Flooding, Severe Thunderstorm, Severe Winter Weather	X		X
2.1	Back-up Generators	City of Buffalo	40	Goal 2	All		X	-
2.2	Low Water Crossing Upgrades	City of Buffalo	47	Goal 2	Flooding, Severe Thunderstorm	X	X	X
2.3	Storm Water Impact	City of Buffalo	47	Goal 2	Flooding, Severe Thunderstorm	X	X	X
3.5	Saferoom/Shelter	City of Buffalo	41	Goal 3	Lack of Safe Facility during Severe Weather		X	-
1.1	Oak Street Low Water Bridge	City of Urbana	34	Goal 1	Flooding	X		X
1.2	Mill Street Low Water Bridge	City of Urbana	34	Goal 1	Flooding	X		X
1.3	Urbana City Hall and Safe Room	City of Urbana	34	Goal 1	Tornada, Severe Thunderstorm, Severe Winter Weather		X	X
1.5	Safe Environments during Severe Weather	Dallas County	30	Goal 1	Flooding, Severe Thunderstorm, Severe Winter Weather	X		X
2.1	Back-up Generators	Dallas County	31	Goal 2	All	X	X	

#	Action	Jurisdiction	Priority	Goal Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
2.2	Low Water Crossing Upgrades	Dallas County	31	Goal 2	Flooding, Severe Thunderstorms	X		X
3.1	Hardened Emergency 911 Communications Center	Dallas 911	44	Goal 3	Tornado, Flooding, Severe Thunderstorm		X	X
1.5	Safe Environment during Severe Weather	Dallas County R-I School District	36	Goal 1	Flooding, Severe Thunderstorm, Severe Winter Weather		X	X
Natural Systems Protection								
2.6	Stream and River Clean Up	Dallas County	26	Goal 2	Flooding	X	X	X
Emergency Services								
3.1	Communications Equipment	City of Buffalo	36	Goal 3	All			
3.2	Communications Equipment	Dallas County	29	Goal 3	All			
3.1	Communication Equipment	Urbana Rural Fire Department	33	Goal 3	All			
Education and Outreach								
1.1	Public Awareness	City of Buffalo	15	Goal 1	All			
1.2	Natural Hazard Awareness	City of Buffalo	47	Goal 1	All			
1.4	Alert Systems	City of Buffalo	44	Goal 1	All			
1.5	Citizen Preparedness	City of Buffalo	42	Goal 1	All			
1.6	Procedure for Flooded Roadways	City of Buffalo	39	Goal 1	Flood, Severe Thunderstorm			X
2.5	Construction Technique Awareness	City of Buffalo	47	Goal 2	All		X	
3.2	Data Backup	City of Buffalo	31	Goal 3	All			
3.4	Communication Cooperation	City of Buffalo	45	Goal 3	All			
1.1	Public Awareness	Dallas County	28	Goal 1	All			
1.2	Alert Systems	Dallas County	35	Goal 1	All			
1.3	Citizen Preparedness	Dallas County	31	Goal 1	All			
1.4	Procedure for Flooded Roadways	Dallas County	37	Goal 1	Flooding Severe Thunderstorm			X
2.5	Construction Technique Awareness	Dallas County	29	Goal 2	All		X	
3.1	Database Resources	Dallas County	28	Goal 3	All			
3.3	Data Backup	Dallas County	26	Goal 3	All			
3.4	County GIS	Dallas County	31	Goal 3	All			
3.5	Communications Cooperation	Dallas County	33	Goal 3	All			

#	Action	Jurisdiction	Priority	Goal Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.1	Public Awareness	Dallas County R-I School District	40	Goal 1	All			
1.2	Natural Hazard Awareness	Dallas County R-I School District	38	Goal 1	All			
1.3	Alert Systems	Dallas County R-I School District	36	Goal 1	All			
1.4	Citizen Preparedness	Dallas County R-I School District	42	Goal 1	All			
3.1	Database Resources	Dallas County R-I School District	42	Goal 3	All			
3.3	Communication Cooperation	Dallas County R-I School District	44	Goal 3	All			
1.1	Public Awareness	Urbana Rural Fire Department	25	Goal 1	All			
1.2	Natural Hazard Awareness	Urbana Rural Fire Department	26	Goal 1	All			
1.3	Citizen Preparedness	Urbana Rural Fire Department	25	Goal 1	All			
3.2	Communications Cooperation	Urbana Rural Fire Department	36	Goal 3	All			

5 PLAN MAINTENANCE PROCESS

This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

5.1 Monitoring, Evaluating, and Updating the Plan

44 CFR Requirement 201.6(c)(4): The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

5.1.1 Responsibility for Plan Maintenance

The Mitigation Planning Committee (MPC) has served as an advisory body during the plan update process, but it is not a standing committee. Many MPC representatives and stakeholders are also represented on the Local Emergency Planning Committee (LEPC), as well as several other committees and groups in Dallas County. The County Emergency Management Director oversees the LEPC and will be charged with reconvening the MPC, either as part of the already established LEPC or as a separate group, if necessary. However, it will be up to the County Commission, Office of Emergency Management, and the local jurisdictions to carry out the goals and actions outlined. Maintenance will involve agreement of the participating jurisdictions, including schools and special districts, to:

- Meet annually, and after a disaster event, to monitor and evaluate the implementation of the plan
- Act as a forum for hazard mitigation issues
- Disseminate hazard mitigation ideas and activities to all participants
- Pursue the implementation of high priority, low- or no-cost recommended actions
- Maintain vigilant monitoring of multi-objective, cost-share, and other funding opportunities to help the community implement the plan's recommended actions for which no current funding exists
- Monitor and assist in implementation and update of this plan
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters
- Report on plan progress and recommended changes to the County Board of Supervisors

and governing bodies of participating jurisdictions
- Inform and solicit input from the public

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

5.1.2 Plan Maintenance Schedule

It is recommended that the MPC meet annually and after a state or federally declared hazard event as appropriate to monitor progress and update the mitigation strategy. The Dallas County Emergency Management Director will be responsible for initiating the plan reviews and will invite members of the MPC to the meeting.

In coordination with all participating jurisdictions, a five-year written update of the plan will be submitted to the Missouri State Emergency Management Agency (SEMA) and FEMA Region VII per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule

5.1.3 Plan Maintenance Process

Progress on the proposed actions can be monitored by evaluating changes in vulnerabilities identified in the plan. During future meetings, the MPC (or other designated responsible entity) 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,
- 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
- 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 are advised to 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.

5.2 Incorporation into Existing Planning Mechanisms

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

Where possible, plan participants, including school and special districts, will use existing plans and/or programs to implement hazard mitigation actions. Based on the capability assessments of the participating jurisdictions, communities in Dallas 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
- 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
- Other plans and policies outlined in the capability assessment sections for each jurisdiction in Chapter 2 of this plan.

Jurisdictional representatives involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate. The EMD and MPC are also responsible for monitoring this integration and incorporation of the appropriate information into the next five-year update of the multi-jurisdictional hazard mitigation plan.

Additionally, it is recommended that after the annual review of the Hazard Mitigation Plan, the County Emergency Management Director will provide the updated Mitigation Strategy with the current status of each mitigation action to the County (Boards of Supervisors or Commissions) as well as all Mayors, City Clerks, and School District Superintendents. The Emergency Management 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
Dallas County	Capital Improvement Plan Emergency Operations Plan Mitigation Plan Economic Development Plan Watershed Plan Floodplain Ordinance	Budget process Emergency Operations Plan	Emergency Operations Plan Mitigation Plan Comprehensive Plan Capital Improvement Plan Floodplain Ordinance Budgeting Grant writing
City of Buffalo	Comprehensive Plan Builder's Plan Capital Improvement Plan Emergency Operations Plan Recovery Plan Mitigation Plan Debris Management Plan Economic Development Plan Land-Use Plan Flood Mitigation Plan Watershed Plan Firewise Plan Zoning Ordinance Building Code Floodplain Ordinance Subdivision Ordinance Nuisance Ordinance Stormwater Ordinance Drainage Ordinance Site Plan Review Landscape Ordinance Zoning/Land Use Restrictions Hazard Awareness Program Planning and Zoning Land Use Map	Attending meeting of local organizations Budget process Swift 911 Social media reports Public service announcements Comprehensive Plan Emergency Operations Plan Building Codes LEPC	Comprehensive Plan Mitigation Plan Emergency Operations Plan Budgeting Floodplain Ordinance
City of Urbana	Emergency Operations Plan Recovery Plan Mitigation Plan Debris Management Ordinance Flood Mitigation Plan Nuisance Ordinance Floodplain Management	*Did not participate in the previous plan update	Bidding Procurement Emergency Operations Plan Mitigation Plan
Dallas County R-I School District	Master Plan Capital Improvement Plan School Emergency Plan	Budget process School Emergency Plan Master Plan Capital Improvement Plan	Budgeting process Comprehensive Plan School Infrastructure Plan
Dallas County 911	Long Term Budget Plan Critical Facilities Plan LEPC	*Did not participate in the previous plan update	Long Term Budget Plan Critical Facilities Plan
Urbana Rural Fire Department	Mutual Aid Agreements Firewise Program Emergency Operations Plan	Budget process	Grant writing Budgeting Mutual Aid Agreements

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. When the MPC reconvenes for the five-year update, the EMD 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.