

Christian County
Missouri
2020 Multi-Jurisdictional
Natural Hazard Mitigation Plan





FEMA

February 2, 2021

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

Subject: Review of the Christian County Multi-jurisdiction Hazard Mitigation Plan Update

Dear Mr. Remillard:

The purpose of this letter is to provide the status of the above referenced Local Hazard Mitigation Plan, pursuant to the requirements of 44 CFR Part 201 - Mitigation Planning and the Local Multi-Hazard Mitigation Planning Guidance. The Local Hazard Mitigation Plan Review Tool documents the Region's review and compliance with all required elements of 44 CFR Part 201.6, as well as identifies the jurisdictions participating in the planning process. FEMA's approval will be for a period of five years effective starting with the approval date indicated below.

Prior to the expiration of the plan the community will be required to review and revise their plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities. After the review or revisions are completed the plan will need to be resubmitted for approval by FEMA in order to continue to be eligible for mitigation project grant funding.

Plan Name	Date Submitted	Date Approved	Date of Plan Adoption	Date of Plan Expiration	Review Status
Christian County	January 5, 2021	February 2, 2021	March 5, 2020	February 2, 2026	Approved

If you have any questions or concerns, please contact Joe Chandler, Planning Team Lead, at (816) 283-7071.

Sincerely,

Catherine R. Sanders, Director
Mitigation Division

CONTRIBUTORS

Christian County Hazard Mitigation Planning Committee

Jurisdictional Representatives

Name	Title	Department	Jurisdiction/Agency/Organization
Mike Robertson	Christian County Commissioner	Commission	Christian County
Todd Wiesehan	Director	Resource Management	Christian County
Mike Lawton	Deputy Director	Emergency Services	Christian County
Cheryl Mitchell	EMA Administrator	Emergency Management	Christian County
Linda Barger	Assistant EMA Director	Emergency Management	Christian County
Miranda Beale	Administrator	Highway Department	Christian County
Thomas Kock	Captain Sheriff	Police	Christian County
Phil Amtower	EMD	Emergency Management	Christian County
Valeria Carr	Senior Planner	Planning	Christian County
Amy Vorn	Mapper	Assessor's Office	Christian County
Ralph Phillips	Presiding Commissioner	Commission	Christian County
Shawny Phillips	Operations Specialist	Police	Christian County
Kimberly Foster	CERT Supervisor	Health	Christian County
Christie Thompson	Administrator	Ambulance District	Christian County Ambulance District
Kristy Keithley	City Clerk	Administration	City of Clever
Jeanette Curtis	City Clerk	Administration	City of Fremont Hills
Madrid Hill	E.M.C	Emergency Management	City of Highlandville
Clint Ellingsworth	Mayor	Elected Official	City of Highlandville
Jackie Weeks	Chief	Police	City of Highlandville
Chris Russell	CEO	Chamber of Commerce	City of Nixa
Scott Godbey	City Planner	Planning	City of Nixa
Whitney Weaver	Assistance Chief	Fire	City of Nixa
Jason Fleetwood	Operation Lieutenant	Police	City of Nixa
Chad Tennis	Major	Police	City of Nixa
Amber Ryan	Floodplain Manager	Planning and Development	City of Ozark

Tim Auchtung	MS4 Coordinator	Public Works	City of Ozark
Justin Arnold	Interim Chief	Police	City of Ozark
Jenni Davis	Mayor	Elected Official	City of Sparta
Zac Rants	Chief Communication Officer & Safety Coordinator	Administration	Nixa School District
Casey Owens	Director of Communication	Administration	Ozark School District
Mark Deed	Captain	School Police	Ozark School District
Jerome Ransom	Security Supervisor	Security	Ozarks Technical Community College
Rocky Valentine	Superintendent	Sparta Schools	Sparta School District
Della Bell-Freeman	Superintendent	Administration	Spokane School District
Gail Hingham	Board Member	Board of Trustees	Village of Saddlebrooke

Stakeholder Representatives

Name	Title	Department	Jurisdiction/Agency/Organization
Pam Duitsman	Emergency Specialist	Engagement and Economic Development	MU Extension
Darla Boice	Supervisor	Neighborhood Services	OACAC
Dave Faucett	GIS Analyst	OTO-MPO	Ozarks Transportation Organization
Andrea Sitzes	Executive Director	Show-Me Christian County	Show-Me Christian County

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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. Christian County and participating jurisdictions and school/special districts developed this multi-jurisdictional local hazard mitigation plan update to reduce future losses from hazard events to the County and its communities and school/special districts. The plan is an update of a plan that was approved on March 24, 2016. The plan and the update were prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 to result in eligibility for the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance Grant Programs.

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

- Unincorporated Christian County
- City of Clever
- City of Fremont Hills
- City of Highlandville
- City of Nixa
- City of Ozark
- Village of Saddlebrooke
- City of Sparta
- Nixa School District
- Ozark School District
- Sparta School District
- Spokane School District
- Ozark Technical Community College – Richwood Valley
- Billings Special Road District
- Christian County Ambulance District

The following jurisdictions were invited to participate, but did not:

- The City of Billings
- The City of Chadwick
- The City of Spokane
- Billings School District
- Chadwick School District
- Clever School District
- Billings Fire Protection District
- Chadwick Fire Protection District
- Clever Fire Protection District
- Garrison Road District
- Highlandville Fire Protection District
- Christian County 911
- Logan Rogersville Fire Protection District
- Nixa Fire Protection District
- Ozark Fire Protection District
- Ozark Road District
- Selmore Road District

- South Sparta District
- Sparta Fire Protection District
- Stoneshire Road District

Christian County and several the entities listed above developed a Multi-Jurisdictional Hazard Mitigation Plan that was approved by FEMA on March 24, 2016. This current planning effort serves to update that previously approved plan.

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

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

- Goal 1: Protect lives and livelihood of the population
- Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy
- Goal 3: Ensure continued operation of government and 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 Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
	Prevention Public Education							
1.2	Increase, promote, establish, and maintain participation in citizen preparedness activities	Christian County	38	1	All			
1.3	Seek funding for and maintain program providing low-cost NOAA radios	Christian County	36	1	All			
1.6	Create and update tornado/severe storm plans and identify refuge areas	Christian County	34	1	Tornado, high wind events	✓	✓	
1.7	Encourage community organization programs to provide winter weatherization for at risk pop.	Christian County	27	1	Extreme Temperatures	✓	✓	
1.8	Encourage local organizations to make space available in their facility for at risk pop	Christian County	24	1	Extreme Temperatures	✓	✓	
1.6	Encourage community organization programs to provide winter weatherization for at risk pop.	City of Nixa	30	1	Extreme Temperatures	✓	✓	
1.2	Purchase and install NOAA weather radios in schools, government buildings, parks, and other public facilities	Village of Saddlebrooke	36	1	Tornado, tstorm, flood, winter weather, drought, heat			
1.5	Create/update tornado/severe tstorm plans and identify strong, safe places in public facilities	Village of Saddlebrooke	36	1	Tornado, t-storm	✓	✓	
1.1	Increase, promote, establish, and maintain participation in citizen preparedness activities	CC Ambulance District	41	1	All			
1.2	Create and update tornado/severe t-storm plans and identify refuge areas that comply with FEMA publication 431	CC Ambulance District	27	1	Tornado, high wind events	✓	✓	
1.2	Increase, promote, establish, and maintain participation in citizen preparedness groups	City of Clever	40	1	All			
1.1	Install, replace, and maintain low water crossing markings and gauges	Billings Special Road District	35	1	Flood	✓	✓	
1.2	Increase, promote, establish, and maintain participation in citizen preparedness groups	Ozark School District	40	1	All			
1.5	Encourage community organization programs to provide winter weatherization for at risk pop.	Ozark School District	33	1	Extreme temperatures	✓	✓	
1.3	Create/update tornado and severe storm plans and identity refuge areas	Nixa School District	39	1	Tornado, high wind events	✓	✓	
1.4	Encourage community organization programs to provide winter weatherization for at risk pop	Nixa Public Schools	27	1	Extreme temperatures	✓	✓	

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.3	Work with chamber of commerce to distribute fans to those in need	City of Sparta	33	1	Extreme temperatures			
1.2	Increase, promote, establish, and maintain participation in citizen preparedness activities	Spokane School District	26	1	All			
1.5	Encourage community organization programs to provide winter weatherization for at risk pop	Spokane School District	24	1	Extreme temperatures	✓	✓	
1.1	Continue collaboration between government and community organizations/businesses to host community expos promoting hazard awareness	City of Ozark	35	1	All			
1.2	Increase public awareness on techniques to reduce the risk of the spread of wildfires	City of Ozark	28	1	Wildfire			
1.4	Increase, promote, establish, and maintain participation in citizen preparedness activities	City of Ozark	32	1	All			
2.1	Increase public awareness to techniques to reduce the risk of the spread of wildfires	Christian County	29	2	Wildfire			
2.2	Promote homeowner purchase of flood insurance and Missouri FAIR Plan sinkhole loss policies	Christian County	30	2	Flood, sinkholes/land subsidence			
2.6	Implement burn restrictions during times of weather conditions conducive to the spread of wildfires	Christian County	29	2	Wildfire			
2.8	Continue development of GIS database	Christian County	31	2	Dam failure, flood, sinkhole, wildfire			
2.3	Develop an ordinance to restrict the use of public water resources for non-essential usage	City of Nixa	29	2	Drought			
2.6	Enforce floodplain management requirements	City of Nixa	31	2	Flooding	✓	✓	✓
2.7	Maintain Storm Ready status with the National Weather Service	City of Nixa	34	2	Tornado, severe t-storm, hail, lightning, severe winter weather			
2.1	Enforce floodplain management requirements	City of Fremont Hills	24	2	Flooding	✓	✓	✓
2.2	Maintain Storm Ready status with the National Weather Service	City of Fremont Hills	25	2	Tornado, severe t-storm, flooding, severe winter weather			
2.3	Enforce floodplain management requirements	City of Highlandville	36	2	Flooding	✓	✓	✓

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
2.1	Enforce floodplain management requirements	Village of Saddlebrooke	38	2	Flooding			✓
2.2	Work with regulatory agencies to obtain appropriate permits to maintain waterways in order to reduce impact of flooding	Village of Saddlebrooke	38	2	Flood	✓	✓	
2.1	Enforce floodplain management requirements	City of Clever	40	2	Flooding	✓	✓	✓
2.2	Maintain Storm Ready status with the National Weather Service	City of Clever	11	2	Tornado, severe t-storm, hail, lightning, severe winter weather			
2.1	Enforce floodplain management requirements (NFIP)	City of Sparta	41	2	Flooding	✓	✓	✓
2.2	Maintain Storm Ready status	City of Sparta	40	2	Flooding, severe t-storm, tornado			
2.1	Enforce floodplain management requirements	City of Ozark	40	2	Flooding	✓	✓	✓
3.1	Enforce floodplain management requirements	Christian County	38	3	Flooding	✓	✓	✓
3.6	Enhance strategies and coordinate with utility providers to manage encroachment of vegetation in easements and rights of way	Christian County	29	3	Tornado, severe t-storm, hail, lightning, severe winter storm			
3.7	Plan for and maintain adequate snow and debris clearing capabilities	Christian County	35	3	Flooding, severe winter storm			
3.2	Plan for and maintain adequate snow and debris clearing capabilities	City of Nixa	41	3	Flood, severe winter weather			
3.2	Develop an ordinance to restrict the use of public water resources for non-essential usage	City of Highlandville	25	3	Drought			
3.3	Continue to monitor and identify funding from state and federal programs	City of Highlandville	25	3	All		✓	
3.1	Promote and provide NIMS training	Village of Saddlebrooke	37	3	All			
3.3	Integrate hazard mitigation into comp plan and storm water management policies	Village of Saddlebrooke	36	3	All			
3.6	Continue development of GIS database to enhance decision making abilities	Village of Saddlebrooke	38	3	All			
3.2	Continue to monitor and identify funding from state and federal programs	CC Ambulance District	41	3	All		✓	

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
3.2	Continue to monitor and identify funding from state and federal programs	Ozark School District	41	3	All		✓	
3.2	Continue to monitor and identify funding from state and federal programs	Nixa School District	31	3	All		✓	
3.2	Develop an ordinance to restrict the use of public water resources for non-essential usage	City of Ozark	28	3	Drought			
3.3	Continue to monitor and identify funding from state and federal programs	City of Ozark	30	3	All		✓	
3.4	Continue development of GIS database	City of Ozark	24	3	All			
	Structure and Infrastructure Projects							
1.4	Install, replace, and maintain low water markings in flood prone areas	Christian County	37	1	Flooding	✓	✓	
1.5	Integrate safe room construction in community buildings	Christian County	32	1	Tornado	✓	✓	
1.9	Promote and distribute FEMA publication 320	Christian County	29	1	Tornado, high wind events			
1.1	Integrate safe room construction in community buildings	City of Nixa	38	1	Tornado	✓	✓	
1.8	Enforce visible 911 addressing for residences and buildings	City of Nixa	37	1	All	✓	✓	
1.1	Increase the number of warning sirens in developing areas	City of Highlandville	28	1	Tornado, t-storm, hail, lightning	✓	✓	
1.2	Integrate safe room construction in community buildings	City of Highlandville	28	1	tornado	✓	✓	
1.1	Update fire alarm and security systems	OTC	37	1	All	✓	✓	
1.2	Retrofit doors to vulnerable facilities with metal doors or place protective glass film on glass doors and windows	OTC	38	1	Tornado, severe thunderstorm	✓	✓	
1.3	Increase number of warning sirens in developing areas and make all sirens radio-activated	City of Clever	32	1	Tornado, severe t-storm, hail, lightning	✓	✓	
1.4	Integrate safe room construction in community buildings	City of Clever	37	1	Tornado	✓	✓	
1.3	Integrate safe room construction in community buildings	Ozark School District	37	1	tornado	✓	✓	
1.5	Retrofit doors to all vulnerable facilities with metal doors, or place protective film on glass doors and windows	Ozark School District	37	1	Tornado, high wind events	✓		

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.2	Integrate safe room construction in community buildings	Nixa School District	37	1	Tornado	✓	✓	
1.5	Retrofit doors to all vulnerable facilities with metal doors, or place protective film on glass doors and windows	Nixa School District			Tornado, high wind events	✓		
1.3	Integrate safe room construction in community buildings	Spokane School District	27	1	tornado	✓	✓	
1.6	Retrofit doors to all vulnerable facilities with metal doors, or place protective film on glass doors and windows	Spokane School District	24	1	Tornado, high wind events	✓		
1.4	Integrate safe room construction in community buildings	City of Fremont Hills	38	1	Tornado	✓	✓	
1.6	Integrate safe room construction in community buildings	City of Ozark	38	1	Tornado	✓	✓	
1.4	Update/rebuild facility in Nixa and relocated Ozark facility to a more central location	Christian County Ambulance District	35	1	All	✓	✓	
2.3	Replace and improve low water crossings where identified as effective	Christian County	32	2	Riverine/flash flooding	✓	✓	
2.4	Acquire, elevate, or flood-proof properties and critical infrastructure within hazard areas	Christian County	26	2	River/flash flooding, sinkholes	✓		
2.4	Encourage electrical utilities to use underground construction methods where possible to reduce disruption of service	City of Nixa	39	2	Tornado, severe t-storm, hail, lightning, severe winter weather	✓		
2.5	Acquire, elevate, or flood-proof properties and critical infrastructure within hazard areas	City of Nixa	30	2	Flood, sinkholes	✓		
2.1	Encourage electrical utilities to use underground construction methods where possible to reduce disruption of service	City of Highlandville	29	2	Tornado, severe t-storm, hail, lightning, severe winter weather	✓		
2.3	Adopt the IBC and IRC	City of Clever	41	2	Tornado, high wind events, earthquakes	✓	✓	
2.1	Replace and improve low water crossings where identified as effective	Billings Special Road District	35	2	Flood	✓	✓	

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
3.4	Enforce highly visible 911 addressing for residences and businesses	Christian County	28	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather, wildfire	✓	✓	
3.1	Enforce highly visible 911 addressing for residences and businesses	City of Highlandville	27	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather, wildfire	✓	✓	
3.5	Continue coordination to promote infrastructure development practices that reduce damage from flooding	Village of Saddlebrooke	44	3	Flood		✓	
3.2	Enforce highly visible 911 addressing for residences and businesses	City of Clever	40	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather, wildfire	✓	✓	
3.2	Enforce highly visible 911 addressing for residences and businesses	City of Fremont Hills	27	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather, wildfire	✓	✓	
	Natural Systems Protection							
2.5	Develop an open space acquisition, reuse, and preservation plan targeting hazard areas	Christian County	29	2	Flood, sinkholes	✓	✓	
	Emergency Services							
1.7	Identify and make available refuge areas in community buildings	City of Nixa	32	1	Extreme Temperatures	✓	✓	
1.2	Create and update tornado/storm plans and identify refuge areas	City of Fremont Hills	26	1	Tornado, severe t storms	✓	✓	
1.3	Create and update tornado/storm plans and identify refuge areas	City of Highlandville	28	1	Tornado, high wind events	✓	✓	
1.4	Identify and make available refuge areas in community buildings	City of Highlandville	36	1	Extreme temperatures	✓	✓	

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.1	Construction of FEMA safe room	Sparta School District	37	1	Tornado, severe t-storm		✓	
1.5	Create and update tornado/storm plans and identify refuge areas	City of Clever	36	1	Tornado, high wind events	✓	✓	
1.6	Identify/designate heating/cooling refuge areas in community buildings and make these locations available to the public	City of Clever	27	1	Extreme temperatures	✓	✓	
1.2	Establish refuge areas for use during/after sever weather	City of Sparta	33	1	Severe t-storm, tornado, flood, severe winter weather	✓	✓	
1.5	Create and update tornado/storm plans and identify refuge areas	City of Ozark	36	1	Tornado, high wind events	✓	✓	
2.2	Maintain countywide Storm Ready status with the National Weather Service	City of Highlandville	28	2	Tornado, severe t-storm, hail, lightning, severe winter weather			
3.2	Maintain countywide Storm Ready status with the National Weather Service	Christian County	33	3	Tornado, severe t-storm, hail, lightning, severe winter weather			
3.2	Educate the public on the importance of and enforce visible 911 addressing	Village of Saddlebrooke	43	3	All	✓	✓	
3.2	Plan for and maintain adequate snow and debris clearing capabilities	Billings Special Road District	38	3	Flood, severe winter weather			
3.1	Enforce better 911 addressing	City of Sparta	35	3	All	✓	✓	
3.2	Outfit the public works department with the appropriate equipment to clear roads during winter weather events	City of Sparta	39	3	Severe winter weather			
	Education and Outreach							
1.1	Social Media and Public Information	Christian County	37	1	All	✓	✓	
1.2	Increase, promote, establish, and maintain participation in citizen preparedness activities	City of Nixa	36	1	All			
1.3	Promote homeowner purchase of flood insurance and MO FAIR Plan sinkhole loss policy	City of Nixa	30	1	Land subsidence, flood			

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.4	Continue hosting expo to promote public awareness, health, and safety	City of Nixa	33	1	All			
1.5	Create and update tornado/storm plans and identify refuge	City of Nixa	34	1	Tornado, high wind events	✓	✓	
1.1	Promote purchase of flood insurance and MO FAIR Plan sinkhole loss policies	City of Fremont Hills	25	1	Sinkhole/land subsidence			
1.3	Increase, promote, establish, and maintain participation in citizen preparedness activities	City of Fremont Hills	29		All			
1.1	Use local traditional and social media platforms to raise awareness of mitigation activities	Village of Saddlebrooke	35	1	All			
1.3	Promote the use of NOAA weather radios by all residents and businesses	Village of Saddlebrooke	36	1	Tornado, tstorm, flood, winter weather, drought, heat			
1.4	Promote local severe weather alert applications for mobile devices	Village of Saddlebrooke	36	1	Tornado, tstorm, flood, winter weather, drought, heat			
1.3	Encourage community organization programs to provide winter weatherization for at risk pop	CC Ambulance District	42	1	Extreme temperatures	✓	✓	
1.1	Promote homeowner purchase of flood insurance and Missouri FAIR Plan sinkhole loss policies	City of Clever	36	1	Land subsidence, Flood			
1.1	Promote/expand education programs regarding hazard mitigation in school newsletter and curriculum	Ozark School District	39	1	Severe t-storm, hail, lightning, severe winter weather, tornado, wildfire			
1.4	Create/update tornado/severe storm plans and identify refuge areas	Ozark School District	36	1	Tornado, high wind events	✓	✓	
1.1	Continue to promote education programs regarding natural hazards in school newsletter and curriculum	Nixa School District	36	1	Severe t-storm, hail, lightning, severe winter weather, tornado, wildfire			
1.1	Host an expo with community leaders and experts to provide education about hazards	City of Sparta	41	1	All			

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.1	Continue to promote education programs regarding natural hazards in school newsletter and curriculum	Spokane School District	34	1	Severe t-storm, hail, lightning, severe winter weather, tornado, wildfire			
1.4	Create/update tornado/severe storm plans and identify refuge areas	Spoke School District	28	1	Tornado, high wind events	✓	✓	
1.3	Promote purchase of flood insurance and Missouri FAIR Plan sinkhole loss policies	City of Ozark	42	1	Sinkhole, flood			
2.7	Continue to monitor and identify funding from state and federal programs	Christian County	33	2	All		✓	
2.1	Continue development of GIS database	City of Nixa	35	2	All			
2.1	Continue to monitor and identify funding from state and federal programs	City of Nixa	32	2	All		✓	
3.3	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	Christian County	34	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.5	Identify debris disposal and burning locations in the county to facilitate recovery from large scale hazard events	Christian County	33	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	City of Nixa	37	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.4	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities	Village of Saddlebrooke	43	3	All		✓	
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	City of Clever	42	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	CC Ambulance District	38	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	Billings Special Road District	42	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.3	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities	Billings Special Road District	41	3	All		✓	
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	Ozark School District	42	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	Nixa School District	39	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	City of Fremont Hills	20	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	City of Ozark	30	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			

PREREQUISITES

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

This plan has been reviewed by and adopted with resolutions or other documentation of adoption by all participating jurisdictions and schools/special districts. The documentation of each adoption is included in Appendix D, and a model resolution is included on the following page.

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

- Unincorporated Christian County
- City of Clever
- City of Fremont Hills
- City of Highlandville
- City of Nixa
- City of Ozark
- Village of Saddlebrooke
- City of Sparta
- Nixa School District
- Ozark School District
- Sparta School District
- Spokane School District
- Ozark Technical Community College – Richwood Valley
- Billings Special Road District
- Christian County Ambulance District

Model Resolution

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

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

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

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

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

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

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

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

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

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

By (Sig): _____
Print name: _____

ATTEST:
By (Sig.): _____
Print name: _____

APPROVED AS TO FORM:
By (Sig.): _____
Print name: _____

1 INTRODUCTION AND PLANNING PROCESS

1	INTRODUCTION AND PLANNING PROCESS	1.1
1.1	Purpose.....	1.1
1.2	Background and Scope	1.2
1.3	Plan Organization.....	1.3
1.4	Planning Process	1.4
1.4.1	Multi-Jurisdictional Participation.....	1.8
1.4.2	The Planning Steps	1.9

1.1 PURPOSE

Hazard mitigation is a process of planning and preparing for the impact of disasters to reduce the impacts on property and reduce the loss of life. Mitigation is any action taken to reduce or eliminate the long-term risk to human life, and property from hazards. Mitigation planning becomes effective and reduces financial consequences by analyzing risk, reducing that risk, then implementing measures against risk. Effective mitigation includes understanding local risk, hard decisions will occur, and long-term planning and preparedness in community wellbeing is essential. Mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs. Disasters are increasing every year and, in more places, regardless only 50 percent meet the standard for Federal assistance. Therefore, FEMA mitigation efforts and planning allows for local communities to depend less on tax payers and the treasury. (<https://www.fema.gov/what-mitigation>).

Resources for communities on developing mitigation plans are cited as [FEMA's Local Mitigation Planning Handbook, March 2013](#) and [FEMA's Local Mitigation Plan Review Guide, October 1, 2011](#).

In order to receive FEMA assistance, the (CFR) Code of Federal Regulations has set forth provisions for mitigation planning requirements for local and Tribal governments as the condition according to 44 CFR Part 201 and 206. (<https://www.fema.gov/pdf/help/fr02-4321.pdf>)

Grant eligibility standards for local governments, schools or other public funded districts, under 44 CFR 201.6, must adopt a FEMA-approved local hazard mitigation plan and put in place to be able to apply for grant assistance. As stated in the Robert T. Stafford Relief and Emergency act "As a condition of receipt of an increased Federal share for hazard mitigation measures under subsection (e) of this section, a State, local, or tribal government shall develop and submit for approval to the President a mitigation plan that outlines processes for identifying the natural hazards, risks, and vulnerabilities of the area under the jurisdiction of the government." Then under the identified risk the recipients establish a strategy to implement those actions.

([https://www.fema.gov/media-library-data/1582133514823-be4368438bd042e3b60f5cec6b377d17/Stafford June 2019 508.pdf](https://www.fema.gov/media-library-data/1582133514823-be4368438bd042e3b60f5cec6b377d17/Stafford_June_2019_508.pdf))

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 2020 Christian County Multi-Jurisdictional Natural Hazard Mitigation Plan, from here on referred to as the Plan, is a revision for the previous five-year update approved on the 24th March 2016.

The Plan is an update of the 2016 Plan that reflects changes in priorities and development, and the continued commitment of local governments to mitigate the impact of natural hazards in Christian County. Local jurisdictions that participated in the 2016 Plan and are continuing in the 2020 Plan include:

- Unincorporated Christian County
- City of Clever
- City of Fremont Hills
- City of Nixa
- City of Ozark
- Nixa School District
- Ozark School District
- Sparta School District
- Spokane School District
- Ozark Technical Community College – Richwood Valley
- Billings Special Road District
- Christian County Ambulance District

Local jurisdictions that did not participate in the 2016 update, but did participate in the 2020 update include:

- [City of Highlandville](#)
- [City of Sparta](#)
- [Village of Saddlebrooke](#)

Local jurisdictions that were invited but did not participate in the Plan include:

- [City of Billings](#)
- [City of Chadwick](#)
- [City of Spokane](#)
- [Billings School](#) District
- Chadwick School District
- [Clever School](#) District
- [Billings Fire Protection](#) District
- Christian County 911
- [Chadwick Fire Protection District](#)
- [Clever Fire Protection District](#)

- [Garrison Road District](#)
- [Highlandville Fire Protection District](#)
- Logan Rogersville Fire Protection District
- [Nixa Fire Protection District](#)
- [Ozark Fire Protection District](#)
- [Ozark Road District](#)
- [Selmore Road District](#)
- [South Sparta Road District](#)
- [Sparta Fire Protection District](#)
- [Stoneshire Road District](#)

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

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 updated to conform to the local hazard mitigation plan outline template released by SEMA November 2019. The Plan chapters include:

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

Table 1.1. Changes Made in Plan Update

Plan Section	Summary of Updates
Chapter 1 - Introduction and Planning Process	• Updated members of the Mitigation Planning Committee (MPC) and participating jurisdictions formally adopted the MPC. • Added roles for participating MPC members in Table 1.2 • Added table of contents • Added Table 1.3 – MPC Capability with Six Mitigation Categories • Conducted 5 meetings with MPC members instead of 4 • Added 5th meeting, documented donated time, and adoption resolution columns to table 1.4 • An online community survey was conducted regarding hazard threats and mitigation activities in the community • Eliminated objective statements from the goals

Chapter 2 - Planning Area Profile and Capabilities	• Added table of contents • Updated table 2.5 with more detailed information • Added table 2.6 – FEMA PA Grants in County from 2002-2017
Chapter 3 - Risk Assessment	• Added table of contents • Combined extreme heat and extreme cold into one hazard: extreme temperatures • Added table 3.12 – Agriculture-Related Jobs in Christian County • Included information on previous development to the vulnerability assessment sections • Included Community Comments on Hazard section for each hazard, based off of the community survey responses • Changed the ordering of the hazards • Included a paragraph about the Mill Pond Dam located in Ozark, even though it is not included in the National Inventory of Dams
Chapter 4 - Mitigation Strategy	• Added table of contents • Added table 4.1 – Action Status Summary • Split the summary of completed and deleted actions table into two separate tables – one for complete and one for deleted • Mitigation action worksheet was reworked • Action/Project Number was reworked to reflect the change in Goal numbering • The mitigation category of each action was added to the action worksheets. • Each jurisdiction was given it's own action sheet for each one of its actions (multiple jurisdictions could be listed on the same action in the last plan) • Mitigation action matrix was added to this plan
Chapter 5 - Plan Implementation and Maintenance	• Table of contents added • Added Table 5.1 – Planning Mechanisms Identified for Integration of Hazard Mitigation Plan

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 Christian 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). Potential meeting locations and schedule were discussed as well as strategies for including the public. Also discussed was previous plan maintenance and any updates made since 2016.

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 and coordinating with the Missouri State Emergency Management Agency (SEMA) and FEMA plan reviews.

Specific information about agenda items for the MPC meetings are presented in Section 1.4.2. SMCOG was also responsible for soliciting public involvement in the planning process by creating a community survey. Notification of the MPC meetings on August 7, 2019, October 2, 2019, December 11, 2019, February 5, 2020, and June 10, 2020 were sent via press release to the Christian County Headliner, the newspaper of widest distribution in the County. Meeting dates and items to be discussed for all meetings, including the kick-off meeting on August 7, 2019, were posted on the SMCOG website in advance and a draft was also posted on the website for public comment during the drafting of the Plan and prior to the Plan being submitted for approval. Appendix B provides documentation of the planning process including public involvement solicitations and meeting notices.

The preliminary draft of the plan was posted on the SMCOG website for public review and comment on October 5th, 2020. A public notice was published in the Christian County Headliner seeking public input on the draft plan on Wednesday, October 13th, 2020. A final draft of the Plan was posted on the SMCOG website October 30th, 2020 before the Plan was submitted for SEMA/FEMA approval. Input from city and county 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.

Neighboring jurisdictions were notified via email and letters, a notification was sent to adjacent county Emergency Management Directors, Chambers of Commerce, local and regional agencies, such as; OACAC, and the University of Missouri Extension office. A complete listing of neighboring 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 represented, along with their titles. Local jurisdictions, school districts, and special districts were included, as well as stakeholders. The MPC is not a formally adopted commission, but rather serves as an advisory capacity during the plan update process.

Table 1.2. Jurisdictional Representatives of Christian County Mitigation Planning Committee

Name	Title	Department	Jurisdiction/Agency/Organization
Mike Robertson	Christian County Commissioner	Commission	Christian County
Todd Weisehan	Director	Resource Management	Christian County
Mike Lawton	Deputy Director	Emergency Services	Christian County
Cheryl Mitchell	EMA Administrator	Emergency Management	Christian County
Linda Barger	Assistance EMA Director	Emergency Management	Christian County

Miranda Beale	Administrator	Highway Department	Christian County
Thomas Kock	Captain Sheriff	Police	Christian County
Phil Amtower	EMD	Emergency Management	Christian County
Valeria Carr	Senior Planner	Planning	Christian County
Amy Vorn	Mapper	Assessor's Office	Christian County
Ralph Phillips	Presiding Commissioner	Commission	Christian County
Shawny Phillips	Operations Specialist	Police	Christian County
Kimberly Foster	CERT Supervisor	Health	Christian County
Christie Thompson	Administrator	Ambulance District	Christian County Ambulance District
Kristy Keithley	City Clerk	Administration	City of Clever
Jeanette Curtis	City Clerk	Administration	City of Fremont Hills
Madrid Hill	E.M.C	Emergency Management	City of Highlandville
Clint Ellingsworth	Mayor	Elected Official	City of Highlandville
Jackie Weeks	Chief	Police	City of Highlandville
Chris Russell	CEO	Chamber of Commerce	City of Nixa
Scott Godbey	City Planner	Planning	City of Nixa
Whitney Weaver	Assistance Chief	Fire	City of Nixa
Jason Fleetwood	Operation Lieutenant	Police	City of Nixa
Chad Tennis	Major	Police	City of Nixa
Amber Ryan	Floodplain Manager	Planning and Development	City of Ozark
Tim Augtung	MS4 Coordinator	Public Works	City of Ozark
Justin Arnold	Interim Chief	Police	City of Ozark
Jenni Davis	Mayor	Elected Official	City of Sparta
Zac Rants	Chief Communication Officer & Safety Coordinator	Administration	Nixa School District
Casey Owens	Director of Communication	Administration	Ozark School District
Mark Deed	Captain	School Police	Ozark School District
Jerome Ransom	Security Supervisor	Security	Ozarks Technical Community College
Rocky Valentine	Superintendent	Sparta Schools	Sparta School District
Della Bell-Freeman	Superintendent	Administration	Spokane School District
Gail Hingham	Board Member	Board of Trustees	Village of Saddlebrooke

Table 1.3. MPC Capability with Six Mitigation Categories

Community Department/Office	Prevention	Structure and Infrastructure Projects		Natural Systems Protection	Education and Awareness Programs	Emergency Services
		Property Protection	Structural Flood Control Projects			
Christian County Commission	X	X	X	X	X	X
Christian County Resource Management	X	X	X	X	X	
Christian County Emergency Services	X				X	X
Christian County Highway Department	X	X	X	X	X	X
Christian County Police Department	X	X		X	X	X
Christian County Emergency Management	X			X	X	X
Christian Planning & Zoning	X	X	X	X	X	X
City of Nixa Chamber		X	X	X	X	X
City of Nixa Police Department	X	X		X	X	X
City of Nixa Planning & Zoning	X	X	X	X	X	X
Nixa Fire District	X	X	X	X	X	X
City of Ozark Police Dept	X	X		X	X	X
Ozark Schools	X				X	X
Ozark School Police	X				X	X
City of Fremont Finance	X	X	X	X		X
OTC	X	X	X	X	X	X
OTC Security	X				X	X
Sparta R-III District	X	X	X	X	X	X
Rogersville Fire District	X	X	X	X	X	X
City of Clever Administration					X	X
MU Emergency	X	X	X	X	X	X
Show-Me Christian County President	X	X	X		X	X
Spokane Administration	X	X			X	X
Christian County CERT	X	X	X	X	X	X
City of Highlandville E.M.C	X	X	X	X	X	X
City of Highlandville Police	X		X	X	x	X
City of Highlandville Official					X	X

City of Highlandville Public Information	X				X	
Saddlebrooke Board of Trustees		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 the successful implementation of this plan. Each jurisdiction must have its governing body adopt the updated plan.

SMCOG collaborated with the local governments in Christian County to assure participation in the planning process and the development of a plan that represents the needs and interests of Christian County and 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 a kick-off meeting for the Plan update on August 7, 2019. A list of contacts invited to the kick-off meeting is included in Appendix B. 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 include the following:

- Participation in at least two (2) MPC meetings, by either direct participation or authorized representation, or make alternate appointments with SMCOG staff;
- Each participating jurisdiction must provide to the MPC sufficient information to support plan development by completion and return of Data Collection Questionnaires.
- Review and comment on plan drafts;
- Provide documentation to show time donated to the planning effort;
- All participants should formally adopt the mitigation plan prior to submittal to SEMA and FEMA for final approval

If, however, a representative was not able to attend at least two meetings they were encouraged to arrange for a one-to-one meeting with SMCOG staff or contact the SMCOG offices to obtain information presented at any of the planning meetings. 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. Meeting sign-in sheets are in Appendix B

Table 1.4. Jurisdictional Participation in Planning Process

Jurisdiction	Kick-off Meeting	Meeting #2	Meeting #3	Meeting #4	Meeting #5	Data Collection Questionnaire	Documented Donated Time	Adoption Resolution
Christian County	X	X	X	X	X	X	X	X
Clever	X		X		X	X	X	X
Fremont Hills	X	X	X	X	X	X	X	X
Highlandville		X	X		X	X	X	
Nixa	X	X	X	X	X	X	X	X
Ozark	X	X	X		X	x	X	X
Sparta				X	X	X	X	X
Saddlebrooke			X	X		X	X	X
Nixa Public Schools	X		X			X	X	X
Ozark Schools	X	X				X	X	X
Sparta School District	X	X		X	X	X	X	X
Spokane Schools		X	X			X	X	X
Ozark Technical Community College-Richwood Valley	X	X	X	X	X	X	X	X
Billings Special Road District		X	X	X		X	X	X
Christian County Ambulance District			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 shows how the CRS process aligns with the Nine Task Process outlined in the 2013 Local Mitigation Planning Handbook

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

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

On January 18, 2019 SMCOG entered into cooperative agreements with SEMA and Christian County to prepare this multi-jurisdictional plan for public entities in Christian County. Discussions on the development of the Christian County Multi-Jurisdictional Natural Hazard Mitigation Plan began on April 4, 2019 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 August 7, 2019 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 mailing an invitation letter to 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, utility providers, Missouri University Extension staff, EMDs from adjacent counties, and volunteer organizations. A complete list of invitees is in Appendix B.

The MPC met on several occasions from August 2019 through June 2020 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
EMD Scoping Meeting	- Created timeline and (MPC) Mitigation Committee - How planning has been done in the past and who is responsible for implementation, identified strategies, and plan maintenance - Create schedule for process - Assess whether there was adherence to the process set forth in the previously approved plan for maintenance (example, did the MPC meet regularly as specified in the previously approved plan), and explain how adherence occurred, and/or why it did not occur. - Identify other stakeholders	April 4, 2019
Kick-off Meeting	- Introduction to Hazard Mitigation - The Planning Process and review schedule and importance - Participation Requirements, selecting a representative that need to meet the minimum requirements, progress reports, meetings, and review for their jurisdiction - How the MPC wants to solicit public input - Future Meeting Dates - Distribute data collection questionnaire, some were distributed prior to the meeting	August 7, 2019
Planning Meeting #2	- Facilitated Risk Assessment Discussion - Identify and profile hazards - Review vulnerability of each jurisdiction - Review data collection from received questionnaire - Assess progress - Questions	October 2, 2019
Planning Meeting #3	- Review Goals, Objectives, & Mitigation strategies - Mitigation strategy implementation - Review STAPLEE - Mitigation action ideas	December 11, 2019
Planning Meeting #4	- STAPLEE Scoring of Mitigation Strategies - Discuss agencies and funding for each action - Rank and prioritize revised actions according to STAPLEE scores - Discuss posting draft of Plan for public and MPC - Questions	February 5, 2020

Planning Meeting #5	• Re-cap process • Explain the MPC should meet once a year to monitor and evaluate progress • Plan Maintenance • Conclude MPC	June 10, 2020
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Step 2: Plan for Public Involvement (Handbook Task 3)

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

Options for soliciting public input on the Plan were discussed with the MPC at the kick-off meeting held on August 7, 2019. SMCOG staff explained the importance of public involvement during the planning process. It was determined that SMCOG staff would advertise MPC meetings through press releases to the Christian County Headliner. In addition, meeting dates and invitations were posted on the SMCOG website along with the drafts of the Plan for public comment during the drafting stage and prior to submission of the Plan to SEMA for approval. Press releases were sent to local news publications, and a legal notice published in the Christian County Headliner when the draft of the Plan was posted to the SMCOG website for public comment on October 5th, 2020. A final draft of the Plan was posted on the SMCOG website on October 30th, 2020 prior to being submitted to SEMA for approval. Copies of the affidavit of publication for legal notice, screen captures of the SMCOG website, and copies of press releases are included in Appendix B.

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.

The MPC decided that SMCOG staff would assist in developing an online community survey. The survey was advertised via press release, the Christian County Emergency Management Facebook page, and the MPC members providing to residents. Four hundred and fifty-three responses were received in the three-week time period the survey was open. A summary of responses to the survey include:

- Eighty-eight (19%) of the 453 respondents have been impacted by a disaster;
- 71%, of respondents felt it was highly likely their community would be impacted by a severe thunderstorm. 44% felt that a tornado is highly likely;
- Respondents are mostly concerned about tornados, severe thunderstorms, and severe winter weather;
- Respondents felt that a tornado would have the highest magnitude impact on their community;
- Mitigation actions most supported include structural retrofitting of existing buildings to add tornado safe rooms, new safe room construction, and minor localized flood reduction projects.

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

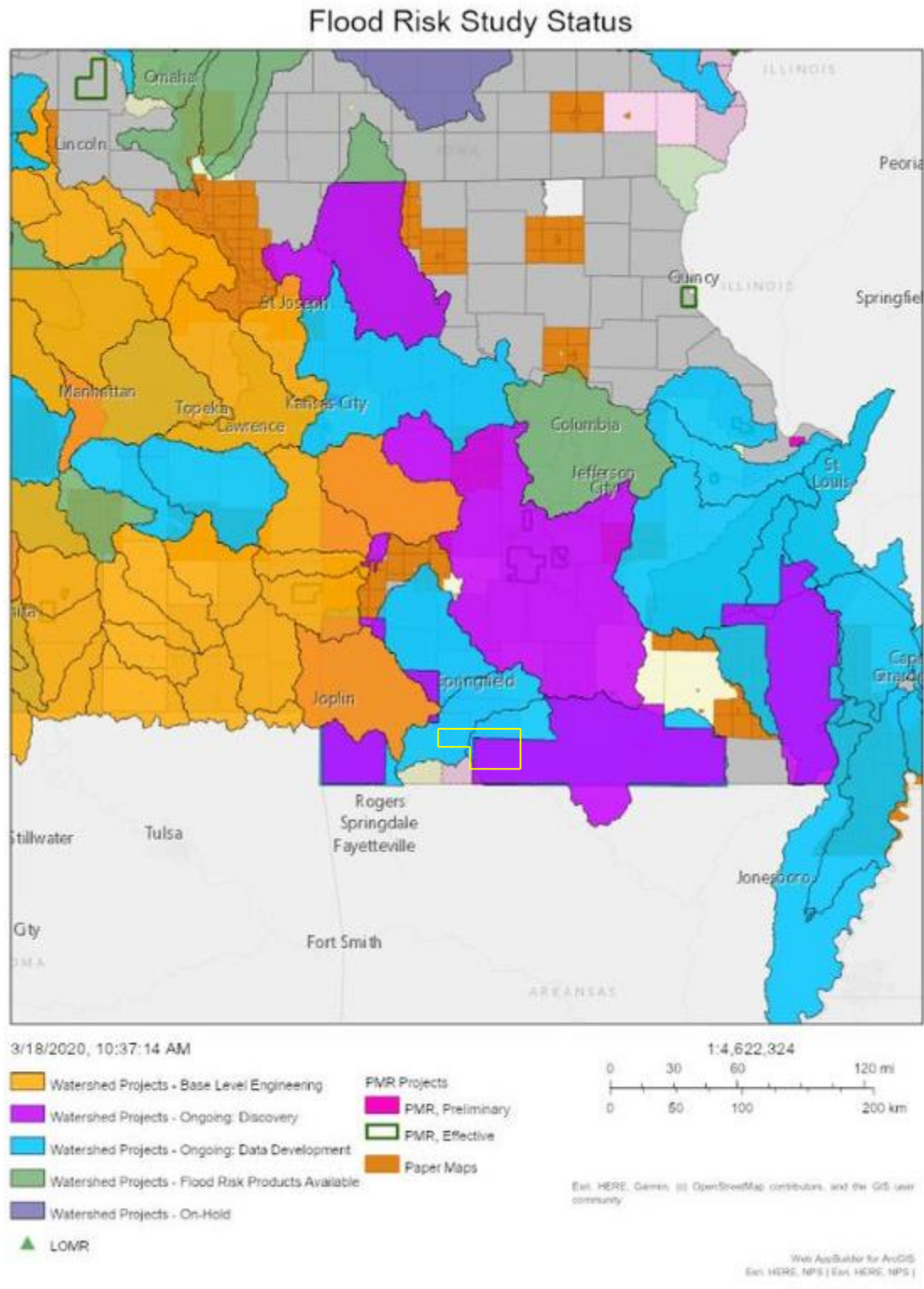
44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (2) An opportunity for neighboring communities, local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

As stated in Section 1.4, neighboring communities, businesses, academia, and other non-profit interests were notified via email and letters. A notification as sent to adjacent county Emergency Management Directors, 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.

Coordination with FEMA Risk MAP Project

There was no coordination with FEMA RiskMAP projects during the update of this plan as SMOG staff were unsure of the update status at the beginning of the Plan update process. **Figure 1.1** displays locations of RiskMAP deployed watersheds and current projects in Missouri. Christian County is outlined in yellow.

Figure 1.1. RiskMAP Study Status Map



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

- 2013/2018 Missouri State Hazard Mitigation Plan
- State Department of Natural Resources (DNR) dam information, the National Inventory of Dams (NID)
- Missouri Department of Conservation (MDC) wildfire statistics
- Wildland/Urban Interface and Intermix areas from the SILVIS Lab - Department of Forest Ecology and Management - University of Wisconsin

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

At the second MPC meeting on 2 October 2019 profiles of identified hazards from the 2016 Plan were presented. Storm event data from the National Centers for Environmental Information for the (5) five-year period since the adoption of the 2016 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.

Hazards identified were dam failures, drought, earthquakes, extreme temperatures, land subsidence/sinkholes, riverine and flash floods, severe thunderstorm/high winds/lightning/hail, tornado, wildfire, and severe winter weather.

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

Identified assets in the planning area include population, structures, critical facilities and infrastructure, and other important assets that may be at risk to hazards. The inventory of assets for each jurisdiction was derived from parcel data from the Christian County Assessor, the Christian County Structures GIS dataset from MISDIS, 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 county assessor's 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.

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

The MPC conducted a discussion session during their third meeting on December 11, 2019 to review and update the Plan goals. The MPC also reviewed the goals from current surrounding county plans. In the 2016 Plan, the organization of the actions included broad goals and a set of objectives linking the actions to the goals. The MPC opted to keep the goals from the 2016 Plan and eliminate the objective statements, moving forward with broad goals and specific mitigation actions. Objectives seemed to add a layer of complication and potential confusion. During this update process, the intent was to provide a usable set of actions that each jurisdiction was able to work towards partial or full implementation, and objectives seemed unnecessary.

The Plan update goals are discussed in more detail in Chapter 4 and are as follows:

- Goal 1: Protect lives and livelihood of the population.
- Goal 2: Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.
- Goal 3: Ensure continued operation of government and emergency functions and critical infrastructure in a disaster.

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

In addition to discussing the overall goals at the December 11, 2019 meeting, 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
- The FEMA's publication, *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* (January 2013).

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 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, but a hardcopy was brought and discussed as well. 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. Much of the discussion surrounded making actions SMART: specific, measurable, achievable, relevant, and time bound. MPC members were given the task of reviewing and recommending any new actions for STAPLEE scoring prior to the next meeting.

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

At the third MPC meeting November 14, 2019 representatives were provided with blank STAPLEE scoring sheet. 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. Actions were eliminated due to non-applicability or low feasibility scores.

At the fourth MPC meeting January 15, 2020 MPC members who had returned completed STAPLEE sheets prior to the meeting were provided with pre-populated Action sheets. Other MPC members were provided with blank actions sheets to complete. 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, and local planning mechanisms for implementation. The action plans are listed for each jurisdiction in chapter 4, Mitigation Strategy.

Step 9: Adopt the Plan (Handbook Task 8)

The final meeting on June 10, 2020 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 (Handbook Tasks 7 & 9)

At the final MPC meeting on June 10, 2020, SMCOG staff discussed the options for tracking mitigation action progress. The MPC also briefly reviewed potential funding sources for mitigation projects, and the process for reviewing and monitoring the plan. Christian 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 chapter 5, Plan Maintenance.

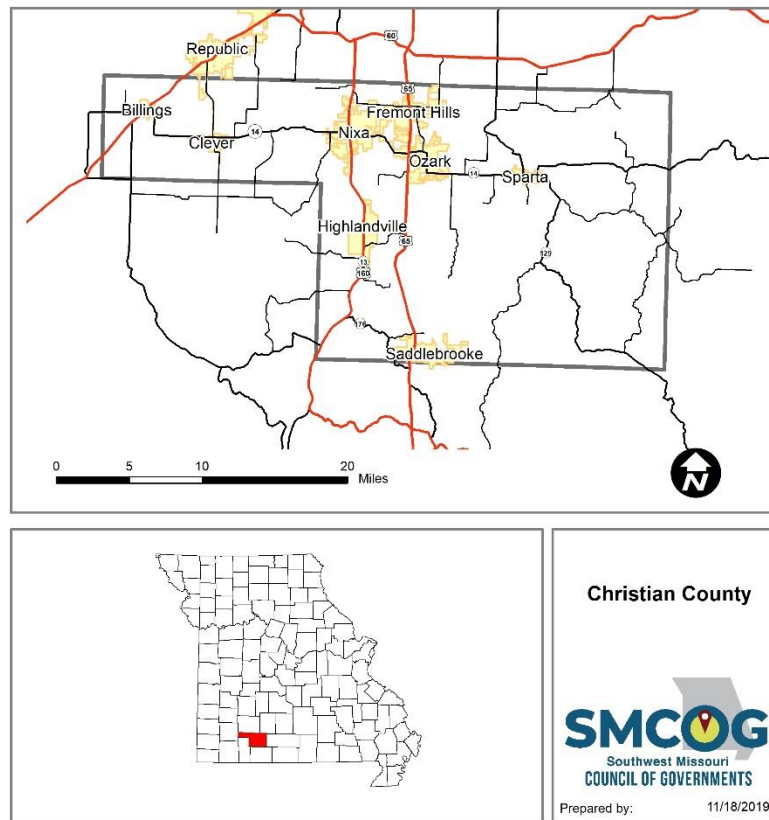
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2.1 CHRISTIAN COUNTY PLANNING AREA PROFILE

Christian County is bordered by Greene, Lawrence, Stone, Taney, Douglas, and Webster Counties in Southwest Missouri. Christian County is one of the fastest growing counties in the State of Missouri and is considered part of the Springfield Metropolitan Statistical Area. Incorporated communities include the cities of Billings, Clever, Fremont Hills, Highlandville, Nixa, Ozark, Sparta and the Village of Saddlebrooke. Of these cities, Nixa and Ozark are the largest with estimated 2018 populations of 21,113 and 19,418. The Village of Saddlebrooke, which incorporated in 2002, is the smallest community with an estimated population of 218. Figure 2.1 is a map of the county's location in Missouri.

Figure 2.1. Map of Christian County



According to the U.S. Bureau of the Census July 1, 2018 Population Estimates, the population of Christian County was 86,983. At the time of the 2000 U.S. Census, the county had a population of 54,285. Between 2000 and 2018 the county experienced a 60.2% increase in population compared to a statewide increase of 9.49% and a nationwide increase of 16.25% within those same years.

American Community Survey estimates median household income in Christian County in 2018 had risen to \$56,717 from \$47,671 in 2010. The percent growth experienced over this period was 19.0%, compared to 23.0% statewide and 23.8% nationwide. In 2018, ACS estimates the median housing value in Christian County at \$177,500, an increase from 2010 where the median housing value was \$146,800. This represents a growth of 20.9%, compared to a growth of 17.0% statewide and a growth of 27.7% nationwide.

2.1.1 Geography, Geology and Topography

Christian County comprises 564 square miles in southwest Missouri. Of the total square miles, 99.998% is land area and .002% is water area. The county is in the southwest portion of the Ozark Highlands ecoregion in Missouri. According to Nature Conservancy, the Ozark Highlands is diverse biologically and geographically with rugged hills, prairies, savannas, and open woodlands. The predominant underlying bedrock is carbonate (limestone and dolomite), giving rise to karst topographic features such as caves, underground streams, springs and sinkholes (The Nature Conservancy, 2003. Ozarks Ecoregional Conservation Assessment).

Christian County lies within the Osage River Basin, the Upper White River Basin, and the Spring River Basin. A small portion of the western panhandle of Christian County, including the City of Billings, lies within the Sac River watershed, which drains northwest to the Osage River. Also, a small portion of the panhandle area west of MO Highway 13 and south of the City of Billings lies within the Spring River Basin. Most of the county lies within the James River Basin and the Bull Shoals Lake Basin, sub-basins of the Upper White River Basin.

The northern third of the county is located in the James River Basin. From its headwaters in Webster County, the James traverses nearly ninety-nine miles through southern Greene County and Christian County, flowing in a southerly direction to where it is impounded in Table Rock Lake in Stone County. Major tributaries to the James flowing in Christian County include Finley Creek, Flat Creek, Terrell Creek, and Wilson's Creek.

Figure 2.2 Missouri Watersheds



There are four intermittent streams with permanent pools located in the Christian County portion of the James River Basin. "Intermittent" refers to a stream that has intervals of flow interspersed with intervals of no flow. These streams include Stewart Creek, Terrell Creek, and two unnamed laterals to Finley Creek. There are also 62 losing stream reaches. Losing stream reaches, a feature of karst

topography, means the surface water goes underground (Kiner, Lisa K. and Chris Vitello, (n.d). James River Watershed Inventory and Assessment. Springfield: Missouri Department of Conservation.)

The Ozarks Highlands are divided into subsections of ecological land types that have a similar geology, topography, climate, and vegetation patterns (Nigh TA, Schroeder WA (2002) Atlas of Missouri ecoregions. Missouri: Missouri Department of Conservation Publication. 212 p.). Christian County straddles the Springfield Plain and White River Hills Subsections of the Ozarks Highlands. Characteristics of these land types are described in The Atlas of Missouri Ecoregions:

Springfield Plain

Topography – gently undulating plain with generally low relief.

Substrate – Extensive Missippian aged Burlington Limestones with abundant chert; soils are primarily cherty silt loams and loams with a loess component; there are localized clay fragipan soils.

Ecological System – Extensive tall grass prairie areas in the higher flat regions with open savannas and oak woodlands, some on the high-base substrates, in dissected terrain and embedded limestone glades.

White River Hills

Topography – Deeply dissected basin with extensive bedrock exposures and high-relief, steep slopes.

Substrate – Thick-bedded, shaley and cherty Ordovician dolomites with localized areas of Ordovician sandstones; high-base clayey or loamy soils derived from dolomite and some weathered acidic soils on uplands.

Ecological System – Extensive dolomite glades and high-base woodland complexes with stranded mesophytic woodlands on cherty ridges; pine, oak, and acid deciduous woodland complexes on sandstone derived substrates.

Much of Christian County is considered a sensitive karst region. Karst topography occurs in regions underlain by calcium-rich limestone or dolomite bedrock. Calcium is easily dissolved by carbonates in the air and surface waters that enter fractures and joints in the bedrock. Sinkholes, caves and losing streams are produced, which after time form a vast underground drainage network connecting surface water with underlying groundwater. Karst features represent a threat to groundwater quality as surface pollutants can easily enter the groundwater system with little filtration.

2.1.2 Climate

Christian County lies within a temperate continental climate region. This region is characterized by warm summers and moderately cool winters with heavy precipitation distributed throughout the year. Snow and ice accumulate nearly every winter, but the snow cover usually lasts for only a few days.

Based on information from the Midwest Regional Climate Center, Christian County area has an average annual temperature of 58° Fahrenheit. The highest average monthly temperature of 78°F occurs in July, and the lowest average monthly temperature of 38°F occurs in January. The average annual precipitation accumulation is 44.5 inches.

Christian County currently has The National Flood Hazard Layer (NFHL). This is a geospatial database that contains current effective flood hazard data. FEMA provides the flood hazard data to support the National Flood Insurance Program. This information can be used to better understand the level of flood risk and type of flooding. (<https://msc.fema.gov/portal>)

2.1.3 Population/Demographics

Table 2.1 provides the total county population and the populations for each city, village, and the unincorporated county for 2000, 2010, and 2018 with the number and percentage change from 2010 to 2018.

During this time period, the County grew to 86,983 in 2018 from 77,825 in 2010. The population percent change provides an indication of the rate of growth, overall the county grew 11.7% during this timeframe. The city of Clever was the fastest growing community in the county, reported as having a population of 2,592 which grew 57.3% from 2010 to 2018. Other communities that experienced significant growth in population were Ozark and Nixa with population percentage change of 16.8% and 17.2%, respectively.

The Village of Saddlebrooke was incorporated in 2002 with an estimated population of 72. Portions of Saddlebrooke are located in Taney County but much of its population reside in Christian County. The Saddlebrooke population living outside of Christian County was not estimated for 2018 or subtracted from in unincorporated population total for that year and may not be completely accurate.

Table 2.1 Christian County Population 2000-2018 by Jurisdiction

Jurisdiction	2000 Population	2010 Population	2018 Annual Population Estimate or ACS Population	# Change (2010-2018)	% Change (2010-2018)
Christian County	54,285	77,825	86,983	9,158	+11.7%
Clever	1,010	1,647	2,592	945	+57.3%
Fremont Hills	597	826	907	40	+9.8%
Highlandville	872	911	1,037	126	+13.8%
Nixa	12,124	18,021	21,113	3,092	+17.2%
Ozark	9,655	16,622	19,418	2,796	+16.8%
Sparta	1,144	1,747	1,642	105	-6.0%
Saddlebrooke*	N/A	202	241	39	+19.3%

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

Christian County's most at-risk populations are very similar and on par with state and national averages. Children under 5 in the county represent 6.5% of the population, similar when compared to 6.0%, both the state and national average. Likewise, above age 65, the average in Christian County is 15.5%, compared to the state average of 16.8% and nationwide average of 16%. The median age is 38 across the board for Christian County, Missouri, and the United States, with a only a decimal of difference between the state median and county/nationwide medians, which share the same value of 38.2.

Table 2.2 provides the number of Christian County residents within specific age groups and a comparison of percentages with the state of Missouri and the United States.

Table 2.2 Christian County Population Age Composition, Missouri, United States Comparison

Age Group	# of People	Percent	Missouri Percent	United States Percent
Persons under 5 years old	5,642	6.5%	6.0%	6.0%
Persons 5 to 9 years old	6,998	8.0%	6.1%	6.1%
Persons 10 to 14 years old	6,327	7.3%	6.5%	6.5%

Persons 15 to 19 years old	5,893	6.8%	6.4%	6.6%
Persons 20 to 24 years old	4,588	5.3%	6.6%	6.6%
Persons 25 to 34 years old	10,845	12.5%	13.4%	13.9%
Persons 35 to 44 years old	11,283	13.0%	12.1%	12.7%
Persons 45 to 54 years old	11,024	12.7%	12.3%	12.7%
Persons 55 to 59 years old	4,791	5.5%	6.8%	6.6%
Persons 60 to 64 years old	6,168	7.1%	6.7%	6.3%
Persons 65 to 74 years old	7,994	9.2%	9.7%	9.3%
Persons 75 to 84 years old	3,539	4.1%	5.1%	4.8%
Persons 85 and older	1,891	2.2%	2.0%	1.9%
Total	86,983	-	-	-
Median Age	38.2	-	38.8	38.2

Source: 5-Year American Community Survey 2018

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 difference 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.

Christian County is listed as medium low vulnerability in the 2018 State Plan and has a SoVI ® score of -2.309999943, placing it in the 18.3 percentile when compared to the rest of the nation. This score means that 18.3 percent of the nation is more resilient to hazards and disasters. 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. Unemployment, Poverty, Education, and Language Percentage Demographics, Christian County, Missouri

Jurisdiction	Total in Labor Force	Percent of Population Unemployed	Percent of Families Below the Poverty Level	Percentage of Population (High School graduate)	Percentage of Population (Bachelor's degree or higher)	Percentage of population with spoken language other than English
Christian County	66,749	2.8%	5.6%	91.9%	28.2%	3.3%
Clever	1838	2.8%	5.8%	90.1%	18.0%	2.4%
Fremont Hills	916	2.6%	0%	94.9%	57.7%	1.7%
Highlandville	843	4.7%	9.1%	88.1%	15.2%	1.7%
Nixa	16080	5.0%	6.9%	94.0%	31.6%	4.8%
Ozark	14536	3.4%	7.0%	92.2%	32.9%	5.1%
Sparta	1248	2.0%	16.9%	86.6%	12.9%	1.3%
Saddlebrooke	228	-	0%	92.2%	38.3%	13.2%
Missouri	4864065	2.4%	8.8%	89.6%	28.6%	6.3%
United States	257754872	2.9%	8.6%	87.7%	31.5%	21.9%

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

2.1.4 History

When the first European trappers and hunters entered the Southwest Missouri region in the early 1800s, the Christian County area was occupied by the Osage Indians. The region passed from the control of the Osage to the Spanish and French until it became a territory of the United States through the Louisiana Purchase of 1803 (Christian County Centennial, 1959, p. 1). Henry Rowe Schoolcraft explored the region in 1819 and the first permanent settlers arrived within two years. The area's rivers served as the avenues for exploration and focal point for the development of the first permanent communities, such as the City of Ozark, which developed along the banks of Finley Creek. Created from territories of Greene, Taney and Webster counties, Christian County was formally organized as a county by an act of the Missouri Legislature on March 8, 1859 (Christian County Centennial, 1959). Ozark was selected as the county seat because of its central location and accessibility.

Trade roads and the advent of the railroads brought new settlement patterns and economic growth to Christian County in the later 1800s. The railroad utilized the area's timber reserves for tie production and industry. While Chadwick and Ozark became shipping centers for agricultural products to and from southern Missouri and northern Arkansas, Sparta became a center for shipping railroad ties and timber. Growth of the City of Billings, located in the fertile agricultural area in the western panhandle of Christian County, was also spurred by the extension of the St. Louis and San Francisco railroad through the area. The communities of Nixa and Clever developed along road/trade routes. Nixa developed at the intersection of the Wilderness Road leading south from Springfield and a road leading west (currently Missouri Highway 14) from the Ozark area. Clever developed as a trading post along the Old Wire road, a principal road west of the Mississippi River running from St. Louis to the southwest United States.

Rapid industrial growth in the Springfield area during the 1960s and 1970s provided employment opportunities within commuting distance for Christian County residents. During the 1980s, the county continued to attract new residents, many who desired to live in a more rural atmosphere but within proximity to the amenities of the Springfield metropolitan area. The growth of the tourism and recreation economy in the Branson area since 1990 has served as a catalyst for rapid population growth and new residential and commercial development. Transportation system improvements to the Springfield-Branson corridor have also spurred the in-migration of residents who are within commuting distance of employment centers in Springfield and the Branson area. Overall, Christian county has been one of the fastest growing counties in Missouri since 2000. Northern Christian County continues to urbanize while the southern portions of the county remain relatively undeveloped, due principally to large acreages in the Busiek State Forest and the Mark Twain National Forest.

2.1.5 Occupations

Occupation information for the Christian County labor force comes from ACS 5-year estimates 2013-2018. 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 Christian county.

Christian County's supplies most of its occupations in the fields of Management, Business, Science, and Arts. This is the case for all cities within the county except for Clever; this applies especially to Fremont Hills, where 54.2% of occupations are in these fields. Clever instead has its highest percentage in the Sales and Office Occupations, however Fremont Hills has the greatest number of jobs in this category of the surveyed cities. Highlandville supplies the largest number of jobs in both the Service and Natural Resources, Construction, and Maintenance professions. Clever also beats all other cities in percentage of occupations in Production, Transportation, and Material Moving occupations.

Table 2.4. Occupation Statistics, Christian County, Missouri

Place	Management, Business, Science, and Arts Occupations	Service Occupations	Sales and Office Occupations	Natural Resources, Construction, and Maintenance Occupations	Production, Transportation, and Material Moving Occupations
Christian County	37.3%	16.8%	23.1%	7.5%	15.4%
Clever	30.6%	6.2%	32.8%	8.6%	21.8%
Fremont Hills	54.2%	6.1%	34.9%	0.4%	4.4%
Highlandville	28.5%	22.5%	20.2%	14.3%	14.5%
Nixa	40.4%	18.4%	22.1%	7.9%	11.2%
Ozark	36.3%	18.9%	28.5%	5.8%	10.5%
Sparta	25.3%	12.7%	23.7%	10.5%	27.8%
Saddlebrooke	38.8%	16.4%	28.4%	8.6%	7.8%

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

2.1.6 Agriculture

According to the USDA 2017 Agricultural Census, there were 1,169 farms covering 153,936 acres in Christian County. The average farm size was 132 acres, which was less than half of the average farm size in Missouri at 291 acres, with a market value of \$28,859,000 of agricultural products sold. Of the total, \$5,194,620 were crop, nursery, and greenhouse products and \$23,664,380 were livestock, poultry, and their products. The Christian county agriculture census of 2017 reports that 82% of farms were in livestock, poultry, and products and 18% of farms yielded crops. The production of cattle and calves held the majority of farm activities. In 2018, there were an estimated 164 people employed in agriculture, fishing and hunting, and mining, making up 4% of the civilian population employed 16 years and above.

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

From 2006 – 2019, local governments in Christian County have been awarded \$20,328,042.30 in Hazard Mitigation Assistance grant projects. Hazard Mitigation Assistance in the county has been used to fund the construction of FEMA Safe room in schools and Acquisition of Private Real Property. **Table 2.5** lists information on Hazard Mitigation Assistance projects completed in the county.

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

Disaster Declaration	Grant Type	Project Type	Sub-Grantee	Date Approved	Project Total
N/A	PDM	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	Ozarks Technical Community College	2007-09-28	\$1,484,453
N/A	PDM	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	City of Ozark Safe Room	2008-03-26	\$926,000
1635	HMGP	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	CHADWICK R-1 SCHOOL DISTRICT	2008-10-22	\$817,482
N/A	RFC	200.1: Acquisition of Private Real Property (Structures and Land) - Riverine	Christian County Commission	2009-09-24	\$1,029,216.30

1822	HMGP	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	CLEVER DISTRICT 5	2011-06-22	\$648,896
1773	HMGP	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	NIXA R-II SCHOOL DISTRICT	2011-06-28	\$734,580
1822	HMGP	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	NIXA R-II SCHOOL DISTRICT	2011-07-27	\$1,563,577
1934	HMGP	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	CLEVER DISTRICT 5	2012-06-28	\$1,803,752
1980	HMGP	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	NIXA R-II SCHOOL DISTRICT	2012-10-22	\$3,208,374
1980	HMGP	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	Christian (County)	2012-10-16	\$1,258,544
1980	HMGP	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	NIXA R-II SCHOOL DISTRICT	2012-10-22	\$2,486,668
4238	HMGP	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	BILLINGS SCHOOL DISTRICT	2016-09-26	\$1,500,000
1238	HMGP	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	HIGHLANDVILLE SCHOOL	2016-09-08	\$922,500
N/A	PDM	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	Sparta R-III School District	2019-02-11	\$1,944,000
Total					\$20,328,042.30

Source: Federal Emergency Management Agency, 2020

2.1.8 FEMA Public Assistance (PA) Grants in Planning Area

Since 2002, jurisdictions in Christian County has received over \$8,716,092.67 million in public assistance due to natural hazard damages. **Table 2.6** shows all public assistance payouts received by jurisdiction and for project type since 2002 to 2017. Data was retrieved from the FEMA public assistance dataset.

Table 2.6. FEMA PA Grants in County from 2002-2017

Disaster Declaration	Project Type	Project Size	Applicant	Project Total
1412	Roads and Bridges	Small	Christian	\$15,695.00
1412	Roads and Bridges	Small	Christian	\$1,928.51
1412	Roads and Bridges	Small	Christian	\$36,602.00
1412	Public Buildings	Small	Christian	\$18,640.82

1412	Roads and Bridges	Small	Christian	\$4,902.50
1412	Roads and Bridges	Small	Christian	\$16,423.84
1412	Recreational or Other	Small	Christian	\$35,975.56
1463	Debris Removal	Small	Christian	\$11,533.48
1463	Protective Measures	Small	Christian	\$5,240.63
1463	Protective Measures	Small	Christian	\$4,188.42
1631	Protective Measures	Small	Christian	\$9,259.65
1631	Debris Removal	Small	Christian	\$5,119.15
1631	Protective Measures	Small	Christian	\$-200.84
1631	Protective Measures	Small	Christian	\$1,046.00
1631	Protective Measures	Small	Christian	\$5,626.75
1631	Protective Measures	Small	Christian	\$15,127.94
1631	Debris Removal	Large	Christian	\$-17,670.75
1631	Protective Measures	Small	Christian	\$9,892.78
1631	Protective Measures	Small	Christian	\$5,269.06
1631	Debris Removal	Large	Christian	\$66,501.66
1631	Protective Measures	Small	Christian	\$2,328.00
1631	Protective Measures	Small	Christian	\$1,756.35
1631	Protective Measures	Small	Christian	\$1,624.47
1631	Debris Removal	Large	Christian	\$85,664.67
1631	Debris Removal	Large	Christian	\$101,584.61
1631	Protective Measures	Large	Christian	\$87,297.05
1631	Protective Measures	Small	Christian	\$1,875.58
1676	Protective Measures	Small	Christian	\$6,781.01
1676	Public Utilities	Small	Christian	\$972.94
1676	Protective Measures	Small	Christian	\$2,260.33
1676	Protective Measures	Small	Christian	\$9,481.64
1676	Protective Measures	Small	Christian	\$39,620.92
1676	Protective Measures	Small	Christian	\$41,628.14
1676	Debris Removal	Large	Christian	\$60,774.57
1676	Debris Removal	Large	Christian	\$141,600.00
1676	Public Utilities	Large	Christian	\$7,180.85
1676	Public Utilities	Large	Christian	\$207,152.91
1676	Debris Removal	Large	Christian	\$2,976,316.29
1676	Protective Measures	Small	Christian	\$41,561.69
1676	Public Utilities	Large	Christian	\$110,627.00
1676	Debris Removal	Small	Christian	\$27,392.92
1676	Debris Removal	Small	Christian	\$15,398.51
1676	Debris Removal	Large	Christian	\$-1,365.53
1676	Debris Removal	Small	Christian	\$3,195.98
1676	Debris Removal	Large	Christian	\$23,777.10
1676	Debris Removal	Large	Christian	\$5,654.91
1676	Protective Measures	Small	Christian	\$5,115.83
1676	Protective Measures	Small	Christian	\$40,214.21
1676	Protective Measures	Small	Christian	\$1,216.04
1748	Debris Removal	Large	Christian	\$-393,085.92
1748	Debris Removal	Large	Christian	\$752,347.90
1748	Protective Measures	Small	Christian	\$49,332.88
1748	Protective Measures	Large	Christian	\$61,155.21
1748	Protective Measures	Small	Christian	\$3,451.49
1748	Protective Measures	Small	Christian	\$173.40
1748	Protective Measures	Small	Christian	\$2,078.10
1748	Public Buildings	Small	Christian	\$500.00
1748	Protective Measures	Large	Christian	\$90.00
1748	Debris Removal	Small	Christian	\$6,020.00
1748	Debris Removal	Small	Christian	\$4,392.24
1748	Protective Measures	Small	Christian	\$19,100.59
1748	Protective Measures	Small	Christian	\$26,749.17
1748	Public Utilities	Small	Christian	\$46,559.41
1748	Public Buildings	Small	Christian	\$3,077.29

1748	Debris Removal	Small	Christian	\$8,345.92
1748	Debris Removal	Large	Christian	\$133,362.73
1748	Debris Removal	Large	Christian	\$-429.45
1748	Protective Measures	Small	Christian	\$481.10
1749	Public Utilities	Small	Christian	\$16,655.52
1749	Roads and Bridges	Small	Christian	\$3,950.49
1749	Roads and Bridges	Small	Christian	\$3,837.52
1749	Protective Measures	Small	Christian	\$3,127.06
1749	Roads and Bridges	Small	Christian	\$5,502.08
1749	Debris Removal	Small	Christian	\$3,795.00
1749	Protective Measures	Small	Christian	\$1,384.45
1749	Protective Measures	Small	Christian	\$1,809.10
1749	Protective Measures	Small	Christian	\$1,737.59
1749	Protective Measures	Small	Christian	\$10,497.51
1749	Protective Measures	Small	Christian	\$5,785.00
1749	Recreational or Other	Small	Christian	\$17,016.91
1749	Debris Removal	Small	Christian	\$2,085.71
1749	Roads and Bridges	Small	Christian	\$8,157.49
1749	Roads and Bridges	Large	Christian	\$84,867.54
1749	Roads and Bridges	Small	Christian	\$44,155.83
1749	Roads and Bridges	Large	Christian	\$3,069.80
1749	Roads and Bridges	Large	Christian	\$799.83
1749	Roads and Bridges	Small	Christian	\$29,582.57
1749	Roads and Bridges	Large	Christian	\$218,976.22
1749	Roads and Bridges	Small	Christian	\$-2,600.30
1749	Roads and Bridges	Small	Christian	\$38,527.20
1749	Roads and Bridges	Small	Christian	\$35,277.05
1749	Roads and Bridges	Small	Christian	\$-3,914.50
1749	Roads and Bridges	Small	Christian	\$11,775.34
1749	Roads and Bridges	Small	Christian	\$13,824.84
1749	Roads and Bridges	Small	Christian	\$-1,256.00
1749	Roads and Bridges	Small	Christian	\$1,770.51
1749	Roads and Bridges	Small	Christian	\$21,184.08
1749	Roads and Bridges	Small	Christian	\$1,944.33
1749	Roads and Bridges	Small	Christian	\$-1,356.75
1773	Debris Removal	Small	Christian	\$1,193.18
1773	Roads and Bridges	Large	Christian	\$157,632.61
1773	Roads and Bridges	Small	Christian	\$17,556.81
1773	Roads and Bridges	Small	Christian	\$50,709.89
1809	Debris Removal	Small	Christian	\$1,949.73
1809	Debris Removal	Small	Christian	\$8,350.31
1809	Recreational or Other	Small	Christian	\$1,799.04
1809	Protective Measures	Small	Christian	\$1,245.20
1809	Public Utilities	Small	Christian	\$3,902.77
1809	Debris Removal	Small	Christian	\$22,377.16
1809	Roads and Bridges	Large	Christian	\$88,063.58
1809	Roads and Bridges	Small	Christian	\$34,913.42
1809	Debris Removal	Large	Christian	\$72,080.79
1809	Debris Removal	Large	Christian	\$-951.31
1809	Debris Removal	Small	Christian	\$17,884.60
1809	Roads and Bridges	Large	Christian	\$-1,004.88
1809	Roads and Bridges	Large	Christian	\$66,508.85
1809	Roads and Bridges	Small	Christian	\$3,973.24
1809	Roads and Bridges	Small	Christian	\$1,049.22
1809	Roads and Bridges	Small	Christian	\$3,101.40
1980	Roads and Bridges	Small	Christian	\$1,131.53
1980	Protective Measures	Small	Christian	\$3,299.09
1980	Roads and Bridges	Small	Christian	\$12,859.06
1980	Roads and Bridges	Small	Christian	\$5,295.52
1980	Roads and Bridges	Small	Christian	\$33,818.63

1980	Protective Measures	Small	Christian	\$2,912.60
1980	Roads and Bridges	Small	Christian	\$15,754.19
1980	Roads and Bridges	Small	Christian	\$3,383.22
1980	Roads and Bridges	Small	Christian	\$8,942.51
1980	Roads and Bridges	Small	Christian	\$7,001.12
1980	Debris Removal	Small	Christian	\$1,821.19
1980	Roads and Bridges	Small	Christian	\$3,520.26
1980	Roads and Bridges	Small	Christian	\$14,071.58
1980	Roads and Bridges	Small	Christian	\$7,138.34
1980	Roads and Bridges	Small	Christian	\$4,746.46
1980	Roads and Bridges	Small	Christian	\$8,893.99
1980	Roads and Bridges	Small	Christian	\$12,867.85
1980	Protective Measures	Small	Christian	\$1,298.75
1980	Roads and Bridges	Small	Christian	\$11,295.15
1980	Roads and Bridges	Large	Christian	\$-31,914.29
1980	Roads and Bridges	Large	Christian	\$65,998.15
3232	Protective Measures	Small	Christian	\$1,249.99
4238	Public Utilities	Small	Christian	\$500.00
4238	Public Utilities	Small	Christian	\$2,609.00
4238	Roads and Bridges	Small	Christian	\$5,669.00
4238	Public Utilities	Small	Christian	\$3,457.27
4238	Public Utilities	Small	Christian	\$7,825.00
4238	Debris Removal	Small	Christian	\$4,265.00
4238	Roads and Bridges	Small	Christian	\$10,212.48
4238	Roads and Bridges	Small	Christian	\$21,632.50
4238	Recreational or Other	Small	Christian	\$28,176.12
4238	Public Buildings	Small	Christian	\$18,887.42
4238	Roads and Bridges	Large	Christian	\$9,879,910.00
4238	Roads and Bridges	Small	Christian	\$20,574.05
4238	Roads and Bridges	Small	Christian	\$28,156.50
4238	Roads and Bridges	Small	Christian	\$62,439.78
4238	Roads and Bridges	Small	Christian	\$39,361.67
4238	Roads and Bridges	Small	Christian	\$20,184.90
4238	Roads and Bridges	Small	Christian	\$96.96
4238	Roads and Bridges	Small	Christian	\$19,272.79
4238	Roads and Bridges	Small	Christian	\$64,914.56
4238	Roads and Bridges	Small	Christian	\$5,089.16
4238	Roads and Bridges	Large	Christian	\$161,291.48
4238	Roads and Bridges	Small	Christian	\$3,999.97
4238	Public Utilities	Small	Christian	\$74,897.66
4238	Roads and Bridges	Small	Christian	\$43,010.02
4238	Roads and Bridges	Small	Christian	\$66,801.50
4238	Roads and Bridges	Small	Christian	\$44,198.51
4238	Roads and Bridges	Small	Christian	\$13,394.95
4238	Roads and Bridges	Small	Christian	\$20,631.69
4317	Debris Removal	Small	Christian	\$7,657.02
4317	Debris Removal	Small	Christian	\$6,345.00
4317	Protective Measures	Small	Christian	\$5,389.16
4317	Roads and Bridges	Small	Christian	\$44,472.76
4317	Roads and Bridges	Small	Christian	\$3445.00
4317	Protective Measures	Small	Christian	\$10,474.11
4317	Public Buildings	Small	Christian	\$36,576.64
4317	Public Utilities	Small	Christian	\$5,000.00
4317	Recreational or Other	Small	Christian	\$8,678.67
4317	Roads and Bridges	Small	Christian	\$23,720.64
4317	Public Utilities	Small	Christian	\$6,851.60
4317	Roads and Bridges	Small	Christian	\$3,701.81
4317	Roads and Bridges	Large	Christian	\$415,431.24
4317	Roads and Bridges	Small	Christian	\$5,220.00

Total	-	-	-	\$8,716,092.67
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Source: Federal Emergency Management Agency, 2019

2.2 JURISDICTIONAL PROFILES AND MITIGATION CAPABILITIES

This section includes profiles for each participating jurisdiction. In those summaries are previous mitigation initiatives and the capabilities of each jurisdiction. The unincorporated county is profiled first, followed by the incorporated communities, the special districts, and public-school districts.

2.2.1 Unincorporated Christian County

Christian County's jurisdiction includes all unincorporated areas within the county boundaries. On January 1, 2015 Christian County became a first-class county without a charter form of government. The governing body of Christian County is the County Commission. The Commission consists of a presiding Commissioner, a western Commissioner and an eastern Commissioner.

The County's elected governing body, the Board of County Commissioners directs the general administration of County Government. The Commission sets broad operating policies, enacts ordinances and establishes budgets as mandated by State law. The County enters 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 departments of the County government include:

- Board of Commissioners
- County Assessor
- County Attorney
- County Auditor
- County Recorder
- County Collector
- County Treasurer
- County Coroner
- County Clerk
- Emergency Management
- Health Department
- Planning and Development
- Road Districts

Mitigation Initiatives/Capabilities

Staff capabilities to mitigate the impact of natural hazards include the planning and zoning administrator and the building code inspector and enforcement officer. There is a Certified Floodplain Manager in the planning and development, and zoning regulations in the county prohibit development in SFHAs with violations enforced under the adopted floodplain ordinance. The building inspector is responsible for the enforcement of IBC 2012 building codes.

The roles and responsibilities of the County Emergency Management Department include coordinating with local government officials and cooperating private organizations to: 1) prevent avoidable disasters and reduce the vulnerability of the residents to any disaster that may strike; 2) establish capabilities for protecting citizens from the effects of disasters; 3) respond effectively to the actual occurrence of disasters; and 4) provide for recovery in the aftermath of any emergency involving extensive damage within the county. The EMD is responsible for the development and maintenance of the Local Emergency Operations Plan.

Additional capabilities include:

- Seventeen (17) sirens
- Swift 911
- Mutual Aid Agreements
- Public Awareness Programs
- Public Acquisition

Table 2.7 provides information about the mitigation capabilities and policies for the unincorporated county based on responses from the Data Collection Questionnaire.

Table 2.7. Unincorporated Christian County Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Yes Adopted Comp. Plan 21 SEP 2009
Builder's Plan	NA
Capital Improvement Plan	NA
City Emergency Operations Plan	Clever, Nixa, Ozark, Sparta have adopted county plan and county EMD as their EMD. Billings and Highlandville have not
County Emergency Operations Plan	Yes JUL 2018
Local Recovery Plan	NA
County Recovery Plan	Yes JUL 2017 / In EOP
City Mitigation Plan	NA
County Mitigation Plan	Yes 2015
Debris Management Plan	Yes JUL 2017 / In EOP
Economic Development Plan	Yes MAR 2013 Economic Development Plan
Transportation Plan	Yes AUG 2016
Land-use Plan	Yes SEP 2019
Flood Mitigation Assistance (FMA) Plan	NA
Watershed Plan	NA
Firewise or other fire mitigation plan	NA
School Mitigation Plan	NA
Critical Facilities Plan (Mitigation/Response/Recovery)	NA
Policies/Ordinance	
Zoning Ordinance	Yes
Building Code	Yes 2012 IBC and 2012 IRC
Floodplain Ordinance	Yes 15 MAR 1999 / Located in Stormwater Regs
Subdivision Ordinance	Yes 2018
Tree Trimming Ordinance	No
Nuisance Ordinance	Part of zoning regulations 2019
Stormwater Ordinance	Yes 2017
Drainage Ordinance	No
Site Plan Review Requirements	Yes / Addressed in Zoning and Regulations
Historic Preservation Ordinance	NA
Landscape Ordinance	NA
Seismic Construction Ordinance	NA
Program	
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	Yes
Hazard Awareness Program	No
National Flood Insurance Program (NFIP)	Yes

NFIP Community Rating System (CRS) program	NA
National Weather Service (NWS) Storm Ready	Yes
Firewise Community Certification	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	NA
Economic Development Program	Yes
Land Use Program	NA
Public Education/Awareness	CERT
Property Acquisition	NA
Planning/Zoning Boards	Yes
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	NA
Hazard Analysis/Risk Assessment (County)	Yes / Missouri Hazard Mitigation 2018
Flood Insurance Maps	Yes
FEMA Flood Insurance Study (Detailed)	Yes / 4 NOV 2017 data.gov
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	Yes
Land Use Map	Yes / In Comprehensive Plan
Staff/Department	
Building Code Official	Yes / PT
Building Inspector	Yes / 2 inspectors PT / 2.5 FTE
Mapping Specialist (GIS)	No
Engineer	Yes / Full
Development Planner	Yes / Full
Public Works Official	Yes / Full
Emergency Management Director	Yes / Full
NFIP Floodplain Administrator	Yes / Full
Emergency Response Team	Yes / CERT
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	Yes
Sanitation Department	No
Transportation Department	No
Economic Development Department	NA
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	Yes
Salvation Army	Yes
Veterans Groups	Yes
Local Environmental Organization	No
Homeowner Associations	Multiple
Neighborhood Associations	Multiple
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes
Local Funding Availability	
Apply for Community Development Block Grants	Yes
Fund projects through Capital Improvements	NA
Authority to levy taxes for a specific purpose	Yes

Fees for water, sewer, gas, or electric services	No
Impact fees for new development	NA
Ability to incur debt through general obligation bonds	NA
Ability to incur debt through special tax bonds	NA
Ability to incur debt through private activities	NA
Withhold spending in hazard prone areas	NA

Source: Data Collection Questionnaire, 2019

2.2.2 Clever

Clever is located in the western panhandle of Christian County along State Highway 14. The governing body of Clever includes the Mayor and Board of four (4) Alderman. Clever has been the fastest growing city in Christian County in terms of percent change since 2000. Since last update in 2016 two (2) new subdivisions and one (1) major commercial building have developed in jurisdiction. At the time of the 2018 (5) year ACS census the population in Clever was 2,592, representing 18% growth in population since 2010 to 2018. City departments include:

- Mayor/Board of Alderman
- City/Municipal Court Clerk
- Utilities Department
- Parks Department
- Animal Control
- City Maintenance
- Police Department
- Planning and Zoning Commission

According to the American Community Survey 2013 – 2018 profile report, 41% of housing units in Clever were constructed in 2000 or later. Additionally, 11% of the population were over 65, median household income was \$49,485, and 10.6% of the residents of Clever were living below the poverty level. Mitigation capabilities/activities in Clever include:

- Two (2) outdoor warning siren active by Police Department
- Mutual aid agreements with local governments/law enforcement
- One (1) full time building inspector/code official
- Swift 911
- Two community safe rooms in Clever schools

Table 2.8. The City of Clever Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Yes 2017
Builder's Plan	NA
Capital Improvement Plan	NA
City Emergency Operations Plan	Have a mutual aid agreement with Christian County EMA
County Emergency Operations Plan	Have a mutual aid agreement with Christian County EMA
Local Recovery Plan	Have a mutual aid agreement with Christian County EMA
County Recovery Plan	Have a mutual aid agreement with Christian County EMA
City Mitigation Plan	Part of the Multi-Jurisdiction Plan
County Mitigation Plan	Part of the Multi-Jurisdiction Plan

Debris Management Plan	Have a mutual aid agreement with Christian County EMA
Economic Development Plan	NA
Transportation Plan	NA
Land-use Plan	NA
Flood Mitigation Assistance (FMA) Plan	NA
Watershed Plan	NA
Firewise or other fire mitigation plan	NA
School Mitigation Plan	NA
Critical Facilities Plan (Mitigation/Response/Recovery)	NA
Policies/Ordinances	
Zoning Ordinance	Yes Updated 2019
Building Code	Version: IBC 2000 / Currently working on updating to the 2018 minimum.
Floodplain Ordinance	Yes
Subdivision Ordinance	2019
Tree Trimming Ordinance	2011 / Only over sidewalks
Nuisance Ordinance	2019
Stormwater Ordinance	2017
Drainage Ordinance	2017
Site Plan Review Requirements	2019
Historic Preservation Ordinance	NA
Landscape Ordinance	NA
Seismic Construction Ordinance	NA
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	NA
National Weather Service (NWS) Storm Ready	NA
Firewise Community Certification	NA
Building Code Effectiveness Grading (BCEGs)	NA
ISO Fire Rating	NA
Economic Development Program	NA
Land Use Program	NA
Public Education/Awareness	NA
Property Acquisition	NA
Planning/Zoning Boards	Yes
Stream Maintenance Program	NA
Tree Trimming Program	NA
Engineering Studies for Streams (Local/County/Regional)	NA
Mutual Aid Agreements	NA
Hazard Analysis/Risk Assessment (Local)	NA
Hazard Analysis/Risk Assessment (County)	NA
Flood Insurance Maps	NA
FEMA Flood Insurance Study (Detailed)	NA
Evacuation Route Map	NA
Critical Facilities Inventory	NA
Vulnerable Population Inventory	NA
Land Use Map	YES
Staff	
Building Code Official	Yes PT
Building Inspector	Yes PT

Mapping Specialist (GIS)	No
Engineer	Yes Contract
Development Planner	NA
Public Works Official	Yes Full
Emergency Management Director	Yes Full
NFIP Floodplain Administrator	Yes Full
Emergency Response Team	NA
Hazardous Materials Expert	NA
Local Emergency Planning Committee	NA
County Emergency Management Commission	NA
Sanitation Department	Yes Contract
Transportation Department	NA
Economic Development Department	NA
Housing Department	NA
Historic Preservation	NA
American Red Cross	No
Salvation Army	No
Veterans Groups	Yes
Local Environmental Organization	No
Homeowner Associations	Yes
Neighborhood Associations	No
Chamber of Commerce	No / In Progress
Community Organizations (Lions, Kiwanis, etc.)	No
Local Funding Availability	
Apply for Community Development Block	Yes
Fund projects through Capital	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	Yes
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	NA
Withhold spending in hazard prone areas	Yes

Source: Data Collection Questionnaire, 2019

2.2.3 Fremont Hills

The City of Fremont Hills was incorporated in 1986 and is located between Nixa and Ozark along Highway CC in north central Christian County. There are three wards, with two aldermen from each ward on the City Council, a Mayor, Deputy Clerk, and Project Manager. In 2000 a Planning and Zoning Commission were appointed and a set of building codes was adapted. The City operates and maintains its own Wastewater Treatment Plant that was upgraded in 2009/2010. The population of Fremont Hills has grown 35% from 2000 to 2018 from 597 to 907 people. City departments include:

- Mayor/Board of Alderman
- Deputy Clerk
- Project Manager
- Planning and Zoning Board

According to the American Community Survey 2013 – 2018 profile report, 60% of housing units in Fremont Hills were constructed in 1999 or later. Additionally, 27% of the population were ages 65 years and over. The median household income was \$106,875, and 0% of the residents of Fremont

Hills were living below the poverty level. Mitigation capabilities/activities in Fremont Hills include:

- Zero (0) outdoor warning sirens
- Full time contract building inspector/code official with the County
- 2011 CERT Training
- SWIFT 911

Table 2.9 provides information on The City of Fremont Hills mitigation capabilities based on the Data Collection Questionnaire.

Table 2.9. Fremont Hills Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Yes Christian County Plan
Builder's Plan	NA
Capital Improvement Plan	NA
City Emergency Operations Plan	NA
County Emergency Operations Plan	NA
Local Recovery Plan	NA
County Recovery Plan	NA
City Mitigation Plan	NA
County Mitigation Plan	NA
Debris Management Plan	NA
Economic Development Plan	NA
Transportation Plan	NA
Land-use Plan	Yes Adopted 2000 P&Z Codes on Website
Flood Mitigation Assistance (FMA) Plan	NA
Watershed Plan	Yes Christian County Plan
Firewise or other fire mitigation plan	NA
School Mitigation Plan	NA
Critical Facilities Plan (Mitigation/Response/Recovery)	NA
Policies/Ordinance	
Zoning Ordinance	Yes Adopted 2000
Building Code	2012 IGA with County
Floodplain Ordinance	09-16-2010 Ordinance #211-2010
Subdivision Ordinance	Yes
Tree Trimming Ordinance	Yes
Nuisance Ordinance	Yes
Stormwater Ordinance	No
Drainage Ordinance	No
Site Plan Review Requirements	Yes
Historic Preservation Ordinance	No
Landscape Ordinance	No
Seismic Construction Ordinance	NA
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	Yes
National Weather Service (NWS) Storm Ready	No
Firewise Community Certification	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	4 Ozark Fire District
Economic Development Program	No
Land Use Program	Yes
Public Education/Awareness	Yes
Property Acquisition	Yes
Planning/Zoning Boards	Yes
Stream Maintenance Program	No
Tree Trimming Program	Yes Liberty Utilities Vegetation Mgmt.
Engineering Studies for Streams (Local/County/Regional)	N/A
Mutual Aid Agreements	NA
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	Yes Hazard Mitigation 2005
Hazard Analysis/Risk Assessment (County)	NA
Flood Insurance Maps	NA
FEMA Flood Insurance Study (Detailed)	NA
Evacuation Route Map	No
Critical Facilities Inventory	Yes
Vulnerable Population Inventory	NA
Land Use Map	Yes
Staff/Department	
Building Code Official	Yes FT
Building Inspector	Yes FT
Mapping Specialist (GIS)	Yes FT
Engineer	Yes PT Contract
Development Planner	Yes PT BOA & P&Z Commission
Public Works Official	Yes PT WWTP Contract
Emergency Management Director	Yes
NFIP Floodplain Administrator	Yes PT
Emergency Response Team	Yes FT
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	Yes
Sanitation Department	NA
Transportation Department	NA
Economic Development Department	NA
Housing Department	NA
Historic Preservation	NA

Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	No
Veterans Groups	No
Local Environmental Organization	No
Homeowner Associations	Yes 2- 12th & 14th Additions
Neighborhood Associations	Yes Social Interact Network
Chamber of Commerce	No
Community Organizations (Lions, Kiwanis, etc.	No
Local Funding Availability	
Apply for Community Development Block Grants	Yes
Fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	Yes
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	Yes

Source: Data Collection Questionnaire, 2019

2.2.4 Highlandville

Highlandville is along U.S. Highway 160, approximately 12 miles south of the southern corporate limits of Springfield, Missouri. The government is structured with a Mayor and four Alderman. Highlandville population has grown 16% from 2000 to 2018. At the time of the 2000 census the population was 872 people compared to the U.S. Census population estimate for 2018 of 1037. City Departments include:

- Mayor/Board of Alderman
- City Clerk
- Public Works
- Police
- Emergency Management
- Building Insp.

According to the MCDC American Community Survey 2013 – 2018 profile report, 69% of housing units in Highlandville were constructed in 1999 or later. Additionally, 15% of the population were over 65, median household income was \$100,268, and 0% of the residents of Ozark were living below the poverty level. Mitigation capabilities/activities in Ozark include:

- Zero (0) outdoor warning sirens
- Public education programs
- Reverse 911 / SWIFT 911
- Designated FEMA tornado shelter

Table 2.10. Highlandville Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	Yes 2016
County Emergency Operations Plan	Yes 2015
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	NA
County Mitigation Plan	Yes
Debris Management Plan	No
Economic Development Plan	No
Transportation Plan	Yes
Land-use Plan	Yes
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	Yes 2010
Building Code	Yes Version 2006
Floodplain Ordinance	Yes 2010
Subdivision Ordinance	Yes 2010
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes 2010
Stormwater Ordinance	Yes
Drainage Ordinance	Yes
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
Seismic Construction Ordinance	NA
Program	
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	Yes
Hazard Awareness Program	No
National Flood Insurance Program (NFIP)	Yes
NFIP Community Rating System (CRS) program	NA
National Weather Service (NWS) Storm Ready	In Progress
Firewise Community Certification	NA
Building Code Effectiveness Grading (BCEGs)	NA
ISO Fire Rating	NA
Economic Development Program	No
Land Use Program	Yes
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	Yes
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No

Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	No
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	Yes
Vulnerable Population Inventory	No
Land Use Map	Yes
Staff/Department	
Building Code Official	Yes PT
Building Inspector	Yes PT
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Director	Yes
NFIP Floodplain Administrator	Yes
Emergency Response Team	Fire District
Hazardous Materials Expert	Fire District
Local Emergency Planning Committee	Yes
County Emergency Management Commission	Yes
Sanitation Department	No
Transportation Department	Yes
Economic Development Department	No
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	No
Veterans Groups	No
Local Environmental Organization	No
Homeowner Associations	Yes
Neighborhood Associations	Yes
Chamber of Commerce	No
Community Organizations (Lions, Kiwanis, etc.)	No
Local Funding Availability	
Apply for Community Development Block	Yes
Fund projects through Capital	No
Authority to levy taxes for a specific purpose	No
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	Yes
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	Yes
Withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire

2.2.5 Nixa

Nixa is located six miles south of Springfield, Missouri, and 30 miles north of Branson, Missouri, on Highway 160, just four miles west of U.S. Hwy 65. In April of 2010, Nixa citizens voted to become a home rule charter city. The city is governed by a Mayor and six (6) City Council members. As one of

the fastest growing cities in Missouri, according to the 2010 U.S. Census, Nixa's population has grown from 12,124 in 2000 to 21,113 in 2018, equating to a percent change of 43%. City Departments include:

- Mayor/City Council
- City Administrator
- City Clerk
- Customer Service
- Economic Development
- Finance
- Human Resources
- Municipal Court
- Parks & Recreation
- Planning and Development
- Police Department
- Public Works
- Recycling Center
- Purchasing
- Utilities

Nixa is a full-utility-service City, providing all electrical distribution, delivery of water, sanitary sewer treatment and all levels of recycling. The City purchases its electricity from Springfield City Utilities and Southwest Power Administration. All of Nixa's water is pumped from the underground Ozark aquifer. Its state of the art, 4-million gallon/day sanitary sewer treatment facility accommodates all existing and near-term future demands.

- Eight (8) outdoor warning sirens
- Reverse 911 / SWIFT 911
- Designated FEMA Tornado shelters
- Mutual aid agreements with local governments/law enforcement
- Full time contract building inspector/code official with the County

Table 2.11 provides information on The City of Nixa mitigation capabilities based on the Data Collection Questionnaire.

Table 2.11. Nixa Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Yes 2003 / Updated 2006 / New Plan in Progress / Nixa.com
Builder's Plan	NA
Capital Improvement Plan	Yes / Nixa.com
City Emergency Operations Plan	NA
County Emergency Operations Plan	Yes Christian County Plan
Local Recovery Plan	NA
County Recovery Plan	Yes Christian County Plan
City Mitigation Plan	NA
County Mitigation Plan	Yes Christian County Plan
Debris Management Plan	NA
Economic Development Plan	Yes / May 2013 / Nixa.com

Transportation Plan	Yes December 2015 / Nixa.com
Land-use Plan	Yes Part of Comp. Plan
Flood Mitigation Assistance (FMA) Plan	NA
Watershed Plan	Part of Stormwater Management Plan
Firewise or other fire mitigation plan	NA
School Mitigation Plan	NA
Critical Facilities Plan (Mitigation/Response/Recovery)	NA
Policies/Ordinance	
Zoning Ordinance	Yes
Building Code	Yes ICC International Building Code Version 2018
Floodplain Ordinance	Yes
Subdivision Ordinance	Yes
Tree Trimming Ordinance	Yes
Nuisance Ordinance	Yes
Stormwater Ordinance	Yes
Drainage Ordinance	Yes
Site Plan Review Requirements	Yes
Historic Preservation Ordinance	No
Landscape Ordinance	Yes
Seismic Construction Ordinance	NA
Program	
Zoning/Land Use Restrictions	Yes Zoning Ordinance
Codes Building Site/Design	NA
Hazard Awareness Program	NA
National Flood Insurance Program (NFIP)	Yes
NFIP Community Rating System (CRS) program	NA
National Weather Service (NWS) Storm Ready	NA
Firewise Community Certification	NA
Building Code Effectiveness Grading (BCEGs)	NA
ISO Fire Rating	3
Economic Development Program	Yes / Nixa Chamber & Show Me C.C.
Land Use Program	Yes / Zoning
Public Education/Awareness	Yes
Property Acquisition	Yes / Voluntary Annexation
Planning/Zoning Boards	Yes / Nixa.com
Stream Maintenance Program	Yes / Stormwater Management Plan (Ch. 8)
Tree Trimming Program	Yes
Engineering Studies for Streams (Local/County/Regional)	NA
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	NA
Hazard Analysis/Risk Assessment (County)	NA
Flood Insurance Maps	NA
FEMA Flood Insurance Study (Detailed)	NA
Evacuation Route Map	NA
Critical Facilities Inventory	Yes
Vulnerable Population Inventory	NA
Land Use Map	Yes / Nixa.com
Staff/Department	
Building Code Official	Yes FT
Building Inspector	Yes FT
Mapping Specialist (GIS)	Yes FT
Engineer	No
Development Planner	Yes FT

Public Works Official	Yes FT
Emergency Management Director	Yes County
NFIP Floodplain Administrator	Yes FT
Emergency Response Team	NA
Hazardous Materials Expert	NA
Local Emergency Planning Committee	NA
County Emergency Management Commission	Yes County
Sanitation Department	Yes FT
Transportation Department	Yes FT
Economic Development Department	Yes FT
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	No
Veterans Groups	Yes American Legion Post 434
Local Environmental Organization	No
Homeowner Associations	Yes
Neighborhood Associations	No
Chamber of Commerce	Yes / Nixachamber.com
Community Organizations (Lions, Kiwanis, etc.)	Yes / Lions Club, Rotary Club
Local Funding Availability	
Apply for Community Development Block	Yes
Fund projects through Capital	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	Yes
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	Yes
Withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire

2.2.6 Ozark

Ozark is along U.S. Highway 65, approximately one mile south of the southern corporate limits of Springfield, Missouri in north central Christian County. Ozark is the county seat and second largest city in Christian County. Ozark is governed by a Mayor and a Board of six (6) Alderman. Ozarks population has grown 46% from 2000 to 2018. At the time of the 2000 census the population was 9,665 people compared to the U.S. Census population estimate for 2018 of 19,418. City Departments include:

- Mayor/Board of Alderman
- City Administrator
- Human Resources
- City Clerk
- Parks and Recreation
- Public Works
- Police Department
- Planning and Development
- Municipal Court
- Finance Department

According to the MCDC American Community Survey 2013 – 2018 profile report, 52% of housing units in Ozark were constructed in 1999 or later. Additionally, 12% of the population were over 65, median household income was \$54,031, and 7.3% of the residents of Ozark were living below the poverty level. Mitigation capabilities/activities in Ozark include:

- Eight (8) outdoor warning sirens
- Reverse 911 and Swift 911
- FEMA tornado shelter

Table 2.12 provides information on The City of Ozark mitigation capabilities based on the Data Collection Questionnaire.

Table 2.12. Ozark Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Yes 2019 https://ozarkmissouri.com/DocumentCenter/View/4430/Ozark-Comprehensive-Plan-Final
Builder's Plan	NA
Capital Improvement Plan	Yes
City Emergency Operations Plan	Yes 2014 Represented on LEPC
County Emergency Operations Plan	
Local Recovery Plan	Yes Christian County Plan
County Recovery Plan	NA
City Mitigation Plan	Yes 2016
County Mitigation Plan	NA
Debris Management Plan	No
Economic Development Plan	Yes 2013 Christian County Economic Development Plan
Transportation Plan	Yes OTO Technical Committee
Land-use Plan	Yes
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	Yes
Firewise or other fire mitigation plan	NA
School Mitigation Plan	NA
Critical Facilities Plan (Mitigation/Response/Recovery)	Yes Internal procedures
Policies/Ordinance	
Zoning Ordinance	Yes
Building Code	Yes 2017 NEC Version: 2018
Floodplain Ordinance	Yes 2009 https://ecode360.com/28910919
Subdivision Ordinance	Yes https://ecode360.com/28910633
Tree Trimming Ordinance	Yes https://ecode360.com/28908662#28908668
Nuisance Ordinance	Yes https://ecode360.com/28908328
Stormwater Ordinance	Yes https://ecode360.com/28911355
Drainage Ordinance	Yes https://ecode360.com/28911355
Site Plan Review Requirements	Yes https://ecode360.com/28910749
Historic Preservation Ordinance	Yes https://ecode360.com/28911165
Landscape Ordinance	Yes https://ecode360.com/28910105
Seismic Construction Ordinance	NA
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	NA
National Weather Service (NWS) Storm Ready	No
Firewise Community Certification	No
Building Code Effectiveness Grading (BCEGs)	Yes provided through Fire Dept.
ISO Fire Rating	NA
Economic Development Program	Yes Partner with Christian Co., Nixa, & SREP
Land Use Program	Yes
Public Education/Awareness	Yes
Property Acquisition	Yes
Planning/Zoning Boards	Yes
Stream Maintenance Program	Yes
Tree Trimming Program	Yes
Engineering Studies for Streams	Yes
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	Yes
Hazard Analysis/Risk Assessment (County)	Yes
Flood Insurance Maps	Yes
FEMA Flood Insurance Study (Detailed)	Yes
Evacuation Route Map	Yes Internal evacuation procedures for critical facilities
Critical Facilities Inventory	Yes
Vulnerable Population Inventory	Yes
Land Use Map	Yes
Staff/Department	
Building Code Official	Yes FT
Building Inspector	Yes FT
Mapping Specialist (GIS)	Yes FT
Engineer	Yes PT & Contract
Development Planner	Yes FT
Public Works Official	Yes FT
Emergency Management Director	Yes FT
NFIP Floodplain Administrator	Yes FT
Emergency Response Team	Yes
Hazardous Materials Expert	Yes Certified Hazmat Team
Local Emergency Planning Committee	Yes FT
County Emergency Management Commission	N/A
Sanitation Department	No
Transportation Department	Yes FT
Economic Development Department	Yes FT
Housing Department	No
Historic Preservation	Yes PT
Non-Governmental Organizations (NGOs)	
American Red Cross	Yes
Salvation Army	Yes
Veterans Groups	Yes
Local Environmental Organization	Yes JRBP
Homeowner Associations	Yes
Neighborhood Associations	Yes
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes
Local Funding Availability	

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

Source: Data Collection Questionnaire

2.2.7 The Village of Saddlebrooke

Saddlebrooke is along US Highway 65, approximately 28 miles south of the southern corporate limits of Springfield, Missouri in south Christian County. Saddlebrooke's government is organized under RSMO, Title VII, Chapter 80. The population has grown 218% from 2000 to 2018.

According to the MCDC American Community Survey 2013 – 2018 profile report, 13% of housing units in Saddlebrooke were constructed in 1999 or later. Additionally, 27% of the population were over 65 and the median household income was \$100,268.

Table 2.13. The Village of Saddlebrooke Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
Local Emergency Plan	No
County Emergency Plan	No
Local Recovery Plan	No
County Recovery Plan	No
Local Mitigation Plan	No
County Mitigation Plan	No
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	No
Economic Development Plan	No
Transportation Plan	No
Land-use Plan	Yes Ordinance 2012-14 on Website
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	NA
Critical Facilities Plan (Mitigation/Response/Recovery)	NA
Policies/Ordinance	
Zoning Ordinance	Yes Ordinance 2012-14 on Website
Building Code	Yes Use County Standards
Floodplain Ordinance	Yes June 27, 2012 Ordinance 2012-15-Website
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes Ordinance 2012-13-Website
Storm Water Ordinance	No
Drainage Ordinance	No
Seismic Construction Ordinance	NA
Capability	

Capability	Status Including Date of Document or Policy
Site Plan Review Requirements	Yes Ordinance 2012-14-Website
Historic Preservation Ordinance	Yes Ordinance 2012-14-Website
Landscape Ordinance	Yes Ordinance 2012-14-Website
Iowa Wetlands and Riparian Areas Conservation Plan	NA
Debris Management Plan	NA
Program	
Zoning/Land Use Restrictions	Yes Ordinance 2012-14-Website
Codes Building Site/Design	Yes Ordinance 2012-14-Website
National Flood Insurance Program (NFIP) Participant	Yes
NFIP Community Rating System (CRS) Participating Community	NA
Hazard Awareness Program	Yes By Procedures
National Weather Service (NWS) Storm Ready	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	NA
Economic Development Program	No
Land Use Program	Yes Ordinance 2012-14-Website
Public Education/Awareness	No By Procedures
Property Acquisition	No
Planning/Zoning Boards	Yes Ordinance 2012-14-Website
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	Yes Palmerton Parrish Hydrology Study
Mutual Aid Agreements	No
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	Yes
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	Yes zoning map
Staff/Department	
Building Code Official	Yes
Building Inspector	Yes
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Coordinator	No
NFIP Floodplain Administrator	Yes
Emergency Response Team	No
Hazardous Materials Expert	No
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)	
American Red Cross	Yes
Salvation Army	Yes
Veterans Groups	Yes
Environmental Organization	Yes
Homeowner Associations	Yes
Neighborhood Associations	Yes
Chamber of Commerce	Yes

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

Source: Data Collection Questionnaire

2.2.8 The City of Sparta

Sparta is located approximately 3 miles east of Ozark. The city is situated at the intersection of highways 14 and 125. The government is led by a mayor and four city council members. The city currently has one inactive outdoor warning siren that, when working, is hand-wound by the mayor.

According to the MCDC American Community 2018, 52% of housing units in Sparta were constructed in 2000 or later. Additionally, 13% of the population are over 65, and the median household income is \$39,917. Mitigation capabilities/activities in Sparta include:

Table 2.14. City of Sparta Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
Local Emergency Plan	No
County Emergency Plan	No
Local Recovery Plan	No
County Recovery Plan	No
Local Mitigation Plan	No
County Mitigation Plan	No
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	No
Economic Development Plan	No
Transportation Plan	No
Land-use Plan	Yes Ordinance 2012-14 on Website
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	NA
Critical Facilities Plan (Mitigation/Response/Recovery)	NA
Policies/Ordinance	
Zoning Ordinance	No
Building Code	Yes, 2018
Floodplain Ordinance	Yes
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	Yes

Capability	Status Including Date of Document or Policy
Drainage Ordinance	No
Seismic Construction Ordinance	NA
Site Plan Review Requirements	Yes
Historic Preservation Ordinance	No
Landscape Ordinance	No
Iowa Wetlands and Riparian Areas Conservation Plan	NA
Debris Management Plan	NA
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant	Yes
NFIP Community Rating System (CRS) Participating Community	NA
Hazard Awareness Program	No
National Weather Service (NWS) Storm Ready	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	NA
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	No
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	No
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	Yes, mayor part-time
Building Inspector	Yes, 2 part-time staff
Mapping Specialist (GIS)	No
Engineer	Yes, contracted Anderson Engineering
Development Planner	No
Public Works Official	Yes, 2 full-time
Emergency Management Coordinator	No
NFIP Floodplain Administrator	Yes, mayor
Emergency Response Team	No
Hazardous Materials Expert	No
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)	
American Red Cross	No
Salvation Army	No
Veterans Groups	No
Environmental Organization	No
Homeowner Associations	No

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

2.2.9 Summary of Jurisdictional Capabilities

Table 2.15. Mitigation Capabilities Summary Table

CAPABILITIES	Christian County	Clever	Fremont Hills	Highlandville	Nixa	Ozark	Saddlebrooke	Sparta
Planning Capabilities								
Comprehensive Plan	Yes	Yes	Yes	No	Yes	Yes	No	No
Builder's Plan	NA	NA	NA	No	NA	NA	No	No
Capital Improvement Plan	NA	NA	NA	No	Yes	Yes	No	No
Local Emergency Plan	NA	Yes	NA	Yes	NA	Yes	No	No
County Emergency Plan	Yes	Yes	NA	Yes	Yes	Yes	No	No
Local Recovery Plan	NA	Yes	NA	No	NA	Yes	No	No
County Recovery Plan	Yes	Yes	NA	No	Yes	Yes	No	No
Local Mitigation Plan	NA	Yes	NA	No	NA	Yes	No	No
County Mitigation Plan	Yes	Yes	NA	Yes	Yes	Yes	No	No
Local Mitigation Plan (PDM)	NA	Yes	NA	No	NA	Yes	No	No
County Mitigation Plan (PDM)	Yes	Yes	NA	No	Yes	Yes	No	No
Debris Management Plan	Yes	Yes	NA	No	NA	No	No	No
Economic Development Plan	Yes	NA	NA	No	Yes	Yes	No	No
Transportation Plan	Yes	NA	NA	Yes	Yes	Yes	No	No
Land-use Plan	Yes	NA	Yes	Yes	Yes	Yes	Yes	No
Flood Mitigation Assistance (FMA) Plan	NA	NA	NA	No	NA	No	No	No
Watershed Plan	NA	NA	Yes	No	Yes	Yes	No	No
Firewise or other fire mitigation plan	NA	NA	NA	No	NA	No	No	No
School Mitigation Plan	NA	NA	NA	No	NA	Yes	NA	No
Critical Facilities Plan (Mitigation/Response/Recovery)	NA	NA	NA	No	NA	Yes	NA	No
Policies/Ordinance								
Zoning Ordinance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Building Code	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Floodplain Ordinance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Subdivision Ordinance	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Tree Trimming Ordinance	No	Yes	No	No	Yes	Yes	No	No
Nuisance Ordinance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Storm Water Ordinance	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Drainage Ordinance	No	Yes	Yes	Yes	Yes	Yes	No	No
Site Plan Review Requirements	Yes	Yes	NA	No	Yes	Yes	Yes	Yes
Historic Preservation Ordinance	NA	NA	NA	No	No	Yes	Yes	No
Landscape Ordinance	NA	NA	NA	No	Yes	Yes	Yes	No
Seismic Construction Ordinance	NA	NA	NA	NA	NA	Yes	NA	No

CAPABILITIES	Christian County	Clever	Fremont Hills	Highlandville	Nixa	Ozark	Saddlebrooke	Sparta
Program								
Zoning/Land Use Restrictions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Codes Building Site/Design	Yes	Yes	Yes	Yes	NA	Yes	Yes	No
National Flood Insurance Program (NFIP) Participant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NFIP Community Rating System (CRS) Participating Community	Yes	NA	Yes	NA	NA	NA	NA	No
Hazard Awareness Program	No	Yes	Yes	No	NA	Yes	Yes	No
National Weather Service (NWS) Storm Ready	Yes	NA	No	In Progress	NA	No	No	No
Building Code Effectiveness Grading (BCEGs)	NA	NA	No	NA	NA	Yes	No	No
ISO Fire Rating	NA	NA	4	NA	3	NA	NA	No
Economic Development Program	Yes	NA	No		Yes	Yes	No	No
Land Use Program	NA	NA	Yes	Yes	Yes	Yes	Yes	No
Public Education/Awareness	Yes	NA	Yes	No	Yes	Yes	No	No
Property Acquisition	Yes	NA	Yes	No	Yes	Yes	No	No
Planning/Zoning Boards	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Stream Maintenance Program	No	NA	No	No	Yes	Yes	No	No
Tree Trimming Program	No	NA	Yes	No	Yes	Yes	No	No
Engineering Studies for Streams (Local/County/Regional)	No	NA		No	NA	Yes	Yes	No
Mutual Aid Agreements	Yes	NA	NA	Yes	Yes	Yes	Yes	No
Studies/Reports/Maps								
Hazard Analysis/Risk Assessment (Local)	NA	NA	Yes	No	NA	Yes	No	No
Hazard Analysis/Risk Assessment (County)	Yes	NA	NA	No	NA	Yes	Yes	No
Flood Insurance Maps	Yes	NA	NA	No	NA	Yes	No	No
FEMA Flood Insurance Study (Detailed)	Yes	NA	NA	No	NA	Yes	No	No
Evacuation Route Map	No	NA	No	No	NA	Yes	No	No
Critical Facilities Inventory	No	NA	Yes	Yes	Yes	Yes	No	No
Vulnerable Population Inventory	Yes	NA	NA	No	NA	Yes	no	No
Land Use Map	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Staff/Department								
Building Code Official	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Building Inspector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mapping Specialist (GIS)	No	No	Yes	No	Yes	Yes	No	No
Engineer	Yes	Yes	Yes	No	No	Yes	No	Yes
Development Planner	Yes	NA	Yes	No	Yes	Yes	No	No
Public Works Official	Yes	Yes	Yes	No	Yes	Yes	No	Yes

CAPABILITIES	Christian County	Clever	Fremont Hills	Highlandville	Nixa	Ozark	Saddlebrooke	Sparta
Emergency Management Coordinator	Yes	Yes	Yes	Yes	Yes	Yes	No	No
NFIP Floodplain Administrator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Emergency Response Team	Yes	No	Yes	Yes	NA	Yes	No	No
Hazardous Materials Expert	No	No	No	Yes	NA	Yes	No	No
Local Emergency Planning Committee	Yes	No	No	Yes	NA	Yes	No	No
County Emergency Management Commission	Yes	No	Yes	Yes	Yes	NA	No	No
Sanitation Department	No	Yes	NA	No	Yes	No	No	No
Transportation Department	No	Na	NA	Yes	Yes	Yes	No	No
Economic Development Department	No	Na	NA	No	Yes	Yes	No	No
Housing Department	No	Na	NA	No	No	No	No	No
Historic Preservation	No	Na	NA	No	No		No	No
Non-Governmental Organizations (NGOs)								
American Red Cross	Yes	No	No	No	No	Yes	Yes	No
Salvation Army	Yes	No	No	No	No	Yes	Yes	No
Veterans Groups	Yes	Yes	No	No	Yes	Yes	Yes	No
Environmental Organization	No	No	No	No	No	Yes	Yes	No
Homeowner Associations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Neighborhood Associations	Yes	No	Yes	Yes	No	Yes	Yes	No
Chamber of Commerce	Yes	No	No	No	Yes	Yes	Yes	No
Community Organizations (Lions, Kiwanis, etc.	yes	No	No	No	Yes	Yes	Yes	No

Financial Resources								
Apply for Community Development Block Grants	Yes	Yes	yes	Yes	No	Yes	Yes	Yes
Fund projects through Capital Improvements funding	Na	Yes	Yes	No	Yes	Yes	Yes	Yes
Authority to levy taxes for specific purposes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Fees for water, sewer, gas, or electric services	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Impact fees for new development	Na	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Incur debt through general obligation bonds	Na	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Incur debt through special tax bonds	Na	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Incur debt through private activities	Na	NA	Yes	Yes	Yes	No	Yes	Yes
Withhold spending in hazard prone areas	Na	Yes	Yes	No	No	NA	NA	Yes

Source: Data Collection Questionnaire

2.2.10 Billings Special Road District

The Billings Special Road District service area includes approximately 48 square miles in the western Christian County panhandle and includes the City of Billings and portions of the City of Clever. The district is responsible for maintaining county roads within its service area. The District is governed by three road commissioners elected by voters within the district. The District is funded by a combination of state motor fuel tax, assessed rural land valuation and vehicle license fees distributed to road districts by the county commission, based in part by road mileage. The District's exposure includes:

- Two Buildings (One office/storage, one maintenance shop/storage)
- 92.4 miles of road (53 miles hot mix overlay, 39 miles chip & seal, and 0.4 miles gravel)
- 292 culverts, 35 box culverts, six bridges, and two low water crossings

Responsibilities of the Special Road Districts include, but are not limited to, providing for debris removal, making emergency road repairs, and coordinating restoration of utility services, especially for critical and essential facilities. They also assist with search and heavy rescue operations, survey public works damage and report information to the County EMD. The District owns and operates snow plowing equipment for road clearing during severe winter weather events. The District also implements a road improvements program for addressing maintenance of District roads. The improvements program is considered a mechanism for incorporating hazard mitigation activities. The District is currently working on projects to increase the dimensions of two box culverts, at 2016 Terrill Rd. and 2017 Vermule Rd. The projects aim to lessen flooding in the area as well as water overtopping issues on nearby roadways. The total cost of both of these projects would total out to \$333,716.00. The district also participated in a docu-drama with MO State Hwy Patrol, Billings Fire & Police Depts., Cox Ambulance Service, and Christian County Sheriff's & Coroner's Office showing high school students the dangers of drinking and driving on roadways. Mitigation capabilities include:

- Major road planning
- Ability to fund projects through Capital Improvements Funding
- Vegetation management program
- Snow and ice removal plan
- Representation on the LEPC
- Culvert Capacity/Threshold analysis
- Road signage with high intensity facing

2.2.11 Christian County Ambulance District

Christian County Ambulance District (CCAD) is an advanced life support property tax-based Ambulance District that services all but the western portion of Christian County, Missouri. The District's service area covers 562 square miles and serves a population of 79,824. CCAD is licensed by the Missouri Bureau of Emergency Medical Services and currently contracts EMS to Cox Health, which is a hospital-based EMS system. CCAD is very active in public education programs and contributes to the community in various forms from working with the local school districts for community education programs, partnering with local business organizations for public health issues and planning. CCAD is governed by six-elected board members for the Board of Directors and day to day operations are overseen by the District Executive Administrator. The District's exposure includes:

- Six (6) permanent base stations
- Twelve (12) Ambulances
- Miscellaneous equipment and contents

The Christian County Ambulance District is currently headed by a board of directors composed of 6 directors. The District provides free and discounted CPR certifications and First Aid courses. They also provide free “Stop the Bleed” training and education. Mitigation Capabilities include:

- On-site warning sirens
- Weather radios
- Mutual aid agreements in place
- Ability to fund projects through Capital Improvements planning
- Community outreach programs
- Financial Resources from Impact fees for new development
- EMT training and public education/safety training

2.2.12 Public School District Profiles and Mitigation Capabilities

This section provides general information about participating school districts in the Plan. There are seven school districts with facilities in Christian County. Other school district boundaries include areas of Christian County but do not have any facilities within the county. The Logan-Rogersville and Republic school districts participate in the Greene County Natural Hazard Mitigation Plan while the Bradleyville school district participates in the Taney County Natural Hazard Mitigation Plan. Clever, Nixa, and Spokane school district boundaries include areas of adjacent counties, but all school district facilities are located within Christian County.

2.2.13 Ozark Technical Community College – Richwood Valley

Ozarks Technical Community College was founded April 3, 1990 when the residents of Springfield and thirteen surrounding public-school districts voted to establish a community technical college. The OTC main campus is located in Springfield, Missouri. OTC also has satellite campuses in Christian, Laclede, Pulaski, and Taney counties in Missouri. To keep pace with demands for program offerings, facility needs, and projected continued, rapid population growth, OTC purchased a 78-acre site for development of a South Campus, located north of Highway 14 and west of U.S. Highway 65 in Ozark. Now known as the Richwood Valley Campus. The Richwood Valley Campus has grown into the second largest in the OTC system. The campus consists of the Life Science and Technology Center located at 3369 W. Jackson St. in Ozark a FEMA saferoom, and a greenway trail segment. Campus exposure includes:

- Student amenities include a full-service Student Services facility, Cashier, Library, Tutoring and Learning center, Proctored and COMPASS testing and a student café.
- A 1.5-mile trail system is available for the use of our students, faculty, and staff. The general public is also welcome to use our trail system during normal hours of operation.
- Campus enrollment, faculty, and staff (1,075 people)
- A FEMA tornado shelter provides a safe environment for students and community members should severe weather threaten the area.

The college is governed by the OTC Board of Trustees. The Board consists six (6) trustees. OTC has recently constructed a new Agriculture Training Center as well as a Greenhouse on campus. They are also currently working to improve their drills and emergency alarms systems for fires and tornadoes. Mitigation capabilities for OTC include:

- Master Plan
- Capital Improvement Plan
- Emergency Plan
- Weapons Policy

- Full Time Building Official (Campus President)
- Administrative Services
- Commissioned and non-commissioned security officers, including a Public Information Officer
- NOAA radios
- FEMA saferoom

Table 2.16 provides mitigation capabilities for the district based on response data from the Data Collection Questionnaire.

Table 2.16. OTC Richwood Valley Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Elements	
Master Plan/Date	Yes, same as Springfield Campus
Capital Improvement Plan/Date	Yes, same as Springfield Campus
School Emergency Plan	Yes, 2012
Capability	
Weapons Policy/Date	Yes, 2012
Personnel Resources	
Full-Time Building Official	Yes – President
Emergency Manager	No
Grant Writer	Yes
Public Information Officer	Yes – Marketing/Media
Financial Resources	
Status Including Date of Document or Policy	
Capital Improvements Project Funding	Yes
Local Funds	Yes
General Obligation Bonds	No
Special Tax Bonds	No
Private Activities Donations	Yes
State and Federal Grant Funds	Yes
Other	
Status Including Date of Document or Policy	
Fire Evacuation Training	Yes
Tornado Sheltering Exercises	Yes
Public Address/Emergency Alert System	Yes
NOAA Weather Radios	Yes
Tornado Shelter/Saferoom	1 FEMA Shelter
Campus Police	Yes

2.2.14 Nixa School District

Building Name	Address	Building Enrollment
Century Elementary	732 North Street	492
Early Childhood Center	301 South Main Street	90
Early Learning Center	301 South Main Street	179
Espy Elementary	220 South Gregg Road	412
High Point Elementary	900 North Cheyenne Road	521
John Thomas School of Discover	312 North Market Street	490
Mathews Elementary	605 South Gregg Road	504
Nicholas A. Inman	1300 North Nicholas Road	412

Intermediate		
Nixa High	514 South Nicholas Road	1748
Nixa Junior High	205 North Street	963
Summit Intermediate School	890 North Cheyenne Road	578

Nixa R-II Schools are governed by Board of Education consisting of the Board President and eight (8) Board members. The District serves 6,000 students and employs approximately 400 teachers and staff. District departments include:

- Business Office
- Communication
- Custodial/Maintenance
- Education Office
- Food Service
- Health Services
- Human Resources
- Special Services
- Technology
- Transportation

The District has constructed four (4) community and one (1) school based saferoom locations. **Table 2.17** provides mitigation capabilities for the district based on response data from the Data Collection Questionnaire.

Table 2.17. Nixa Public Schools Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Elements	
Master Plan/Date	Yes, 2019
Capital Improvement Plan/Date	Yes, 2019
School Emergency Plan	Yes, 2019
Capability	Status Including Date of Document or Policy
Weapons Policy/Date	Yes, 2019
Personnel Resources	
Full-Time Building Official	Yes – Building Principal
Emergency Manager	Yes – Chief Communication Officer/Safety Coordinator
Grant Writer	Yes - Advertising Sales
Public Information Officer	Yes – Chief Communication Officer/Safety Coordinator
Financial Resources	Status Including Date of Document or Policy
Capital Improvements Project Funding	Yes
Local Funds	Yes
General Obligation Bonds	Yes – Depends on Bond
Special Tax Bonds	Yes
Private Activities Donations	Yes
State and Federal Grant Funds	Yes
Other	Status Including Date of Document or Policy
Fire Evacuation Training	Yes
Tornado Sheltering Exercises	Yes
Public Address/Emergency Alert System	Yes
NOAA Weather Radios	Yes

Tornado Shelter/Saferoom	4 Community and 1 School-Based
Campus Police	Yes

2.2.15 Ozark School District

Ozark R-VI Schools are governed by Board of Education consisting of the Board President and six (6) Board members. The District serves 5,787 students and employs 880 teachers and staff. District departments include:

- Business Office
- Communication
- Custodial/Maintenance
- Education Office
- Food Service
- Health Services
- Human Resources
- Special Services
- Technology
- Transportation

The District has constructed five school based saferoom locations. **Table 2.18** provides mitigation capabilities for the district based on response data from the Data Collection Questionnaire.

Building Name	Address	Building Enrollment
East Elementary	2449 E Hartley	705
North Elementary	3608 N Highway Nn	661
Ozark High	1350 W Bluff Drive	1310
Ozark Junior High	1109 W Jackson	884
Ozark Middle School	3600 N Highway Nn	934
Ozark Tigerpaw Early Child Center	302 N 4th Avenue	147
South Elementary	1250 W South St.	641
West Elementary	3105 W State Highway Cc	652

Table 2.18. Ozark School District Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Elements	
Master Plan/Date	N/A
Capital Improvement Plan/Date	Yes, 2017
School Emergency Plan	Yes, 2018
Capability	Status Including Date of Document or Policy
Weapons Policy/Date	Yes, 2009
Personnel Resources	
Full-Time Building Official	Yes – Administration
Emergency Manager	Yes – Superintendent
Grant Writer	Yes – Assistant Superintendent
Public Information Officer	Yes – Director of Communications
Financial Resources	Status Including Date of Document or Policy
Capital Improvements Project Funding	Yes
Local Funds	N/A
General Obligation Bonds	N/A

Special Tax Bonds	N/A
Private Activities Donations	N/A
State and Federal Grant Funds	N/A
Other	Status Including Date of Document or Policy
Fire Evacuation Training	Yes
Tornado Sheltering Exercises	Yes
Public Address/Emergency Alert System	Yes
NOAA Weather Radios	Yes
Tornado Shelter/Saferoom	Yes – 5
Campus Police	Yes

2.2.16 Sparta School District

Sparta R-III Schools are governed by Board of Education consisting of the Board President and six (6) Board members. The District serves 752 students and employs 69 teachers and staff. District departments include:

- Business Office
- Custodial/Maintenance
- Education Office
- Food Service
- Human Resources
- Special Services
- Technology
- Transportation

The District participates in annual staff training for emergencies and to reduce disaster losses. **Table 2.19** provides mitigation capabilities for the district based on response data from the Data Collection Questionnaire.

Building Name	Address	Building Enrollment
Sparta Elementary	522 State Highway 125 N	272
Sparta High	8520 State Hwy14e	182
Sparta Middle	217 Division St	246
Sparta Pk Center	113 Division St	52

Table 2.19. Sparta School District Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Elements	
Master Plan/Date	N/A
Capital Improvement Plan/Date	Yes, 2018
School Emergency Plan	Yes, 2019
Capability	Status Including Date of Document or Policy
Weapons Policy/Date	Yes, 2006
Personnel Resources	
Full-Time Building Official	Yes – Central Office/Superintendent
Emergency Manager	N/A
Grant Writer	N/A
Public Information Officer	N/A
Financial Resources	Status Including Date of Document or Policy

Capital Improvements Project Funding	Yes
Local Funds	Yes
General Obligation Bonds	Yes
Special Tax Bonds	Yes
Private Activities Donations	Yes
State and Federal Grant Funds	Yes
Other	Status Including Date of Document or Policy
Fire Evacuation Training	Yes
Tornado Sheltering Exercises	Yes
Public Address/Emergency Alert System	Yes
NOAA Weather Radios	Yes
Tornado Shelter/Saferoom	No
Campus Police	No – Sparta P.D. and Christian County Sheriff

2.2.17 Spokane School District

Building Name	Address	Building Enrollment
Highlandville Elementary	223 Kentling Avenue	373
Spokane High	1123 Spokane Road	212
Spokane Middle	1130 Spokane Road	170

Spokane R-VII Schools are governed by a Board of Education consisting of the Board President and six (6) Board members. The District serves 775 students and employs approximately 400 teachers and staff. District departments include:

- Superintendent's Office
- Health Services
- Food Service
- Human Resources
- Transportation
- Curriculum

District administrators participate in NIMS training and certification. **Table 2.20** provides mitigation capabilities for the district based on response data from the Data Collection Questionnaire.

Table 2.20. Spokane School District Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Elements	
Master Plan/Date	Yes, 2011
Capital Improvement Plan/Date	Yes, 2014
School Emergency Plan	Yes – FEMA HES
Capability	Status Including Date of Document or Policy
Weapons Policy/Date	Yes, 2006
Personnel Resources	
Full-Time Building Official	Yes – Principal
Emergency Manager	Yes – Superintendent
Grant Writer	No
Public Information Officer	Yes – Superintendent
Financial Resources	Status Including Date of Document or Policy
Capital Improvements Project Funding	N/A

Local Funds	Yes
General Obligation Bonds	Yes
Special Tax Bonds	No
Private Activities Donations	No
State and Federal Grant Funds	Yes
Other	Status Including Date of Document or Policy
Fire Evacuation Training	Yes
Tornado Sheltering Exercises	Yes
Public Address/Emergency Alert System	Yes – P.A. System
NOAA Weather Radios	Yes
Tornado Shelter/Saferoom	Yes – FEMA building at Highland Elementary
Campus Police	No – Christian County P.D./ Sheriff

Table 2.21. Summary of Mitigation Capabilities – Nixa R-II, Ozark R-VI, Sparta R-III, Spokane R-VII

Capability	Nixa R-II	Ozark R-VI	Sparta R-III	Spokane R-VII	OTC – Richwood Valley
Planning Elements					
Master Plan/ Date	Yes	N/A	N/A	Yes	Yes
Capital Improvement Plan/Date	Yes	Yes	Yes	Yes	Yes
School Emergency Plan / Date	Yes	Yes	Yes	Yes	Yes
Weapons Policy/Date	Yes	Yes	Yes	Yes	Yes
Personnel Resources					
Full-Time Building Official (Principal)	Yes	Yes	Yes	Yes	Yes
Emergency Manager	Yes	Yes	N/A	Yes	No
Grant Writer	Yes	Yes	N/A	No	Yes
Public Information Officer	Yes	Yes	N/A	Yes	Yes
Financial Resources					
Capital Improvements Project Funding	Yes	Yes	Yes	Yes	Yes
Local Funds	Yes	N/A	Yes	Yes	Yes
General Obligation Bonds	Yes	N/A	Yes	Yes	No
Special Tax Bonds	Yes	N/A	Yes	No	No
Private Activities/Donations	Yes	N/A	Yes	No	Yes
State and Federal Funds/Grants	Yes	N/A	Yes	Yes	Yes
Other					
Public Education Programs	N/A	N/A	N/A	N/A	N/A
Privately or Self- Insured?	N/A	N/A	N/A	N/A	N/A
Fire Evacuation Training	Yes	Yes	Yes	Yes	Yes
Tornado Sheltering Exercises	Yes	Yes	Yes	Yes	Yes
Public Address/Emergency Alert System	Yes	Yes	Yes	Yes	Yes
NOAA Weather Radios	Yes	Yes	Yes	Yes	Yes
Lock-Down Security Training	Yes	Yes	Yes	Yes	Yes
Mitigation Programs	Yes	Yes	Yes	Yes	Yes
Tornado Shelter/Saferoom	Yes	Yes	No	Yes	Yes
Campus Police	Yes	Yes	No	No	Yes

Source: Data Collection Questionnaire

3 RISK ASSESSMENT

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

The goal of the risk assessment is to estimate the potential loss in Christian County, Missouri, 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 Christian County 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 plan is an update of the previous Christian County Hazard Mitigation Plan approved in March of 2016. According to the U.S. Census Bureau July 1, 2018 population estimate, the population of Christian County grew to 86,983 from 77,417 at the time of the 2010 decennial census. The population has experienced steady growth over the last several decades and has increased by approximately 4,882 people since the Christian County Hazard Mitigation Plan was adopted in 2016.

- **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 Christian County. The natural hazards that can affect the county have been identified in the 2020 Christian County Plan and the 2018 Missouri State Plan. Natural hazards are naturally occurring climatological, hydrological, or geologic events that have a negative effect of 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 Plan profiles all natural hazards that affect Christian County. The hazards identified in the 2020 Christian County Plan are identified in the 2018 Missouri State Plan. 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 Christian 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. It was determined to include only natural hazards. 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. The THIRA was referenced during the update in order to assist SMOG staff in understanding the risk structure within Christian County.

3.1.1 Review Disaster Declaration History

Since 1976, FEMA has announced 20 disaster declarations that include Christian County. Examples of these disasters include the following: severe storms, tornadoes, flooding, severe winter storms, a pandemic, and a hurricane evacuation. Federal and/or state declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. If the disaster is so severe that both the local and state governments' capacities are exceeded; a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

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 damages and institutions or industrial sectors affected. (<https://www.fema.gov/declaration-process>)

The most recent disaster declaration occurred on March 26, 2020. **Table 3.1** lists the federal FEMA disaster declarations that included Christian County.

Table 3.1. FEMA Disaster Declarations that included Christian County, Missouri, 1976-Present

Disaster Number	Description	Declaration Date Incident Period	Individual Assistance (IA) / Public Assistance (PA)
4490	MISSOURI COVID-19 PANDEMIC	3/26/2020 1/20/2020 and continuing	Individual & Public Assistance
4317	SEVERE STORMS, TORNADOES, STRAIGHT-LINE WINDS AND FLOODING	6/2/2017	Public Assistance
3374	SEVERE STORMS, TORNADOES, STRAIGHT-LINE WINDS AND FLOODING	1/2/2016	Public Assistance
4238	SEVERE STORMS, TORNADOES, STRAIGHT-LINE WINDS AND FLOODING	8/7/2015	Public Assistance
1980	SEVERE STORMS, TORNADOES, AND FLOODING	5/9/2011	Public Assistance
3317	SEVERE WINTER STORM	2/3/2011	Public Assistance
1847	SEVERE STORMS, TORNADOES, AND FLOODING	6/19/2009	Public Assistance
3303	SEVERE WINTER STORM	1/30/2009	Public Assistance
1809	SEVERE STORMS, FLOODING, AND A TORNADO	11/13/2008	Public Assistance
1773	SEVERE STORMS AND FLOODING	6/25/2008	Individual & Public Assistance

1749	SEVERE STORMS AND FLOODING	3/19/2008	Individual & Public Assistance
1748	SEVERE WINTER STORMS AND FLOODING	3/12/2008	Public Assistance
3281	SEVERE WINTER STORMS	12/12/2007	Public Assistance
1676	SEVERE WINTER STORMS AND FLOODING	1/15/2007	Public Assistance
1631	SEVERE STORMS, TORNADOES AND FLOODING	3/16/2006	Individual & Public Assistance
3232	HURRICANE KATRINA EVACUATION	9/10/2005	Public Assistance
1463	SEVERE STORMS, TORNADOES AND FLOODING	5/6/2003	Individual & Public Assistance
1412	SEVERE STORMS, TORNADOES AND FLOODING	5/6/2002	Individual & Public Assistance
995	SEVERE STORMS & FLOODING	7/9/1993	Individual & Public Assistance
3017	DROUGHT	9/24/1976	Public Assistance

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

3.1.2 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 Christian County include:

- Missouri Hazard Mitigation Plans (2013 and 2018)
- Previously approved planning area Hazard Mitigation Plan (2016)
- 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 from January 1950 to March 2020, as entered by the NWS. Due to changes in the data collection and processing procedures over time, there are unique periods of record available depending on the event type. The following timelines show the different time spans for each period of unique data collection and processing procedures.

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

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

3.1.3 Hazards Identified

The natural hazards that may impact or have affected Christian 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
Unincorporated Christian County	X	X	X	X	X	X	X	X	X	X
City of Clever	-	X	X	X	X	X	X	X	X	-
City of Fremont Hills	-	X	X	X	X	X	X	X	X	-
City of Highlandville	-	X	X	X	X	X	X	X	X	-
City of Nixa	-	X	X	X	X	X	X	X	X	X
City of Ozark	-	X	X	X	X	X	X	X	X	X
Village of Saddlebrooke		X	X	X	X	X	X	X	X	-
City of Sparta		X	X	X	X	X	X	X	X	-
Nixa R-II School District	-	-	X	X	X	X	X	X	X	X
Ozark R-VI School District	-	-	X	X	X	X	X	X	X	X
Ozarks Technical Community College – Richwood Valley	-	-	X	X	-	X	X	X	X	-
Sparta R-III School District	-	-	X	X	X	X	X	X	X	X
Spokane R-VII School District	-	-	X	X	X	X	X	X	X	X
Billings Special Road District	-	-	X	X	X	X	X	X	X	-
Christian Co. Ambulance District	-	-	X	X	-	X	X	X	X	-

3.1.4 Multi-Jurisdictional Risk Assessment

The risk assessment assesses each participating jurisdiction's vulnerability to each hazard that can affect the planning area. Many of the hazards identified in the risk assessment have the same probability of occurrence throughout the planning area. The hazards that vary across the planning area in terms of risk include dam failure, flash flood, grass or wildland fire, river flood, and sinkholes/land subsidence. These differences are detailed in each hazard profile under geographic location and vulnerability.

Christian County is fairly uniform in terms of climate, however, topography and building construction characteristics vary within the county. Christian County has experienced rapid growth in population and development from 2000 to the present. Most of this growth has occurred in the north central portion of the county and western panhandle due to its proximity to the Springfield metropolitan area. As these areas have urbanized, the capability to manage growth has increased as well. Mitigation capabilities of each jurisdiction are profiled in section 2.2.

The urbanized areas within the planning area, which have more assets at a greater density, have greater vulnerability to weather-related hazards, however, the vulnerability to future development can be mitigated through updated building codes and code enforcement as well as land use planning. These capabilities and resources to mitigate the impact of natural hazards vary across jurisdictions in the planning area. These differences will be discussed in greater detail in the vulnerability sections of each hazard.

3.2 ASSETS AT RISK

This section assesses Christian County 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 Christian County Assessor, the Christian County 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 (MSDIS) data was used for structure points and paired with Christian County Assessors data for values.

Unincorporated County and Incorporated Cities

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

not be current. In addition, government-owned properties are usually taxed differently or not at all, and so may not be an accurate representation of true value. Note that public school district assets and special districts assets are included in the total exposure tables assets by community and county.

Table 3.3 shows the total population, building count, estimated value of buildings, estimated value of contents and estimated total exposure to parcels for the unincorporated county and each incorporated city. For multi-county communities, the population and building data may include data on assets located outside the planning area. **Table 3.4** that follows provides the building value exposures for the county and each city in the planning area broken down by usage type. Finally, **Table 3.5** provides the building count total for the county and each city in the planning area broken out by building usage types (residential, commercial, industrial, and agricultural).

Table 3.3. Maximum Population and Building Exposure by Jurisdiction

Jurisdiction	2018-2019 Annual Population Estimate	Building Count	Building Exposure (\$)	Contents Exposure (\$)	Total Exposure (\$)
Unincorporated County	37,410	51,557	\$3,875,310,000.00	\$2,954,269,050.00	\$6,829,579,050.00
Clever	1,010	1,669	\$191,581,500.00	\$145,961,750.00	\$337,543,250.00
Fremont Hills	907	352	\$209,042,500.00	\$157,379,400.00	\$366,421,900.00
Highlandville	1,037	1,349	\$66,228,900.00	\$51,036,600.00	\$117,265,500.00
Nixa	21,113	10,304	\$2,181,368,000.00	\$1,669,048,600.00	\$3,850,416,600.00
Ozark	19,418	10,814	\$1,793,385,000.00	\$1,402,403,650.00	\$3,195,788,650.00
Saddlebrooke	241	168	\$88,322,500.00	\$66,745,900.00	\$155,068,400.00
Sparta	1,642	1,278	\$104,805,800.00	\$80,968,300.00	\$185,774,100.00
Totals	84,005	79,018	\$8,591,016,500.00	\$6,591,413,150.00	\$15,182,429,650.00

Source: U.S. Bureau of the Census, Annual population estimates/ 5-Year American Community Survey 2018-2019; Building Count and Building Exposure, Missouri GIS Database from SEMA Mitigation Management; Contents Exposure derived by applying multiplier to Building Exposure based on Hazus MH 2.1 standard contents multipliers per usage type as follows: Residential (50%), Commercial (100%), Industrial (150%), Agricultural (100%). For purposes of these calculations, government, school, and utility were calculated at the commercial contents rate.

Table 3.4. Building Values/Exposure by Usage Type

Jurisdiction	Residential	Commercial	Industrial	Agricultural	Total
Unincorporated	\$ 1,842,081,900.00	\$ 2,000,736,600.00	0	\$ 32,491,500.00	\$ 3,875,310,000.00
Clever	\$ 91,239,500.00	\$ 100,261,000.00	0	\$ 81,000.00	\$ 191,581,500.00
Fremont Hills	\$ 103,326,200.00	\$ 105,716,300.00	0	\$ -	\$ 209,042,500.00

Highlandville	\$ 30,384,600.00	\$ 35,382,200.00	0	\$ 462,100.00	\$ 66,228,900.00
Nixa	\$ 1,024,638,200.00	\$ 1,156,665,200.00	0	\$ 64,300.00	\$ 2,181,367,700.00
Ozark	\$ 781,962,500.00	\$ 1,011,175,500.00	0	\$ 246,900.00	\$ 1,793,384,900.00
Saddlebrooke	\$ 43,153,200.00	\$ 44,976,600.00	0	\$ 192,700.00	\$ 88,322,500.00
Sparta	\$ 47,675,000.00	\$ 57,106,900.00	0	\$ 23,900.00	\$ 104,805,800.00
Totals	\$ 3,999,205,900.00	\$ 4,558,083,700.00	0	\$ 33,726,500.00	\$ 8,591,016,100.00

Source: Missouri GIS Database, SEMA Mitigation Management Section

Table 3.5. Building Count by Type

Jurisdiction	Residential Counts	Commercial Counts	Industrial Counts	Agricultural Counts	Total
Unincorporated County	13,115	220	210	8170	21,715
Clever	867	33	0	29	929
Fremont Hills	326	0	0	0	326
Highlandville	308	17	0	195	520
Nixa	6,510	171	64	43	6,788
Ozark	6,877	405	23	76	7,381
Saddlebrooke	89	4	0	17	110
Sparta	565	35	3	12	615
Totals	29,143	937	313	8,561	38,954

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

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

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

Public School District	Enrollment	Building Count	Building Exposure (\$)	Contents Exposure (\$)	Total Exposure (\$)
Nixa Public Schools	6,389	13	\$153,246,904	\$24,947,865	\$178,194,769
Ozark R-VI	5,934	34	\$163,737,819.02	\$20,181,156.33	\$183,918,975.35
Spokane R-VII	755	10	\$31,745,471	\$11,859,747	\$43,605,218
Sparta R-III	752	9	\$30,449,702.72	\$7,650,970.66	\$ 8,100,673.38
OTC-Richwood Valley	1,031	4	\$13,500,000	\$6,785,000	\$20,289,674

Source: https://apps.dese.mo.gov/MCDS/Reports/SSRS_Print.aspx?Reportid=9cebc711-eb02-48bd-ae0e-47f11d8ef9f4, select the file for the most recent year called "20xx Building Enrollment PK-12", filter the spreadsheet by selecting only the public school districts in the planning area. The Building Exposure, Contents Exposure, and Total Exposure amounts come from the completed Data Collection Questionnaires from Public School Districts. In general, the school districts obtain this information from their insurance coverage amounts.

3.2.2 Critical and Essential Facilities and Infrastructure

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

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

Table 3.7 includes a summary of the inventory of critical and essential facilities and infrastructure in the planning area.

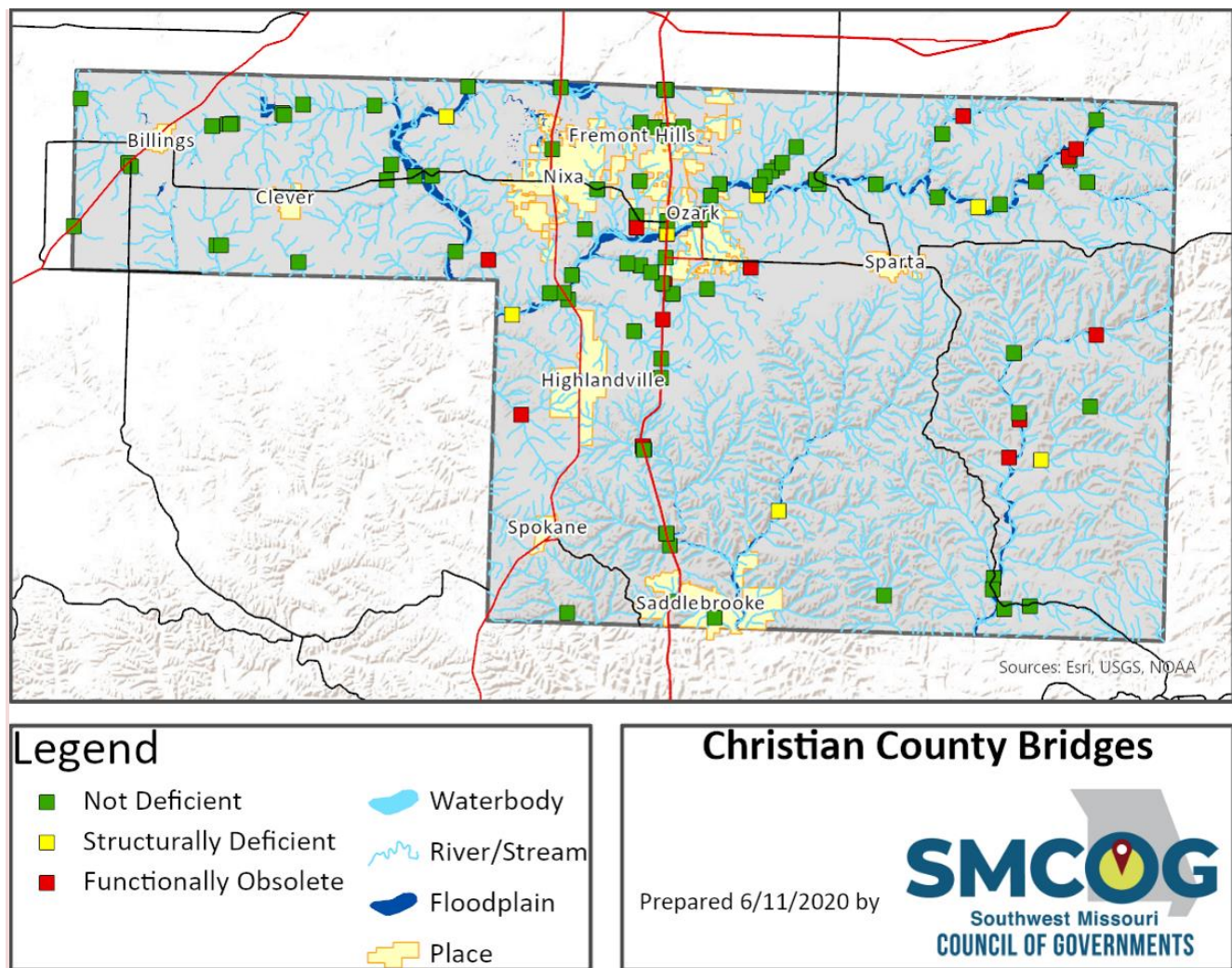
Table 3.7. Inventory of Critical/Essential Facilities and Infrastructure by Jurisdiction

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
Clever	0	0	2	2	0	0	1	2	1,025	0	0	0	0	0	0	1	2	Y	2	3	0	0	1	1,041
Fremont Hills	0	0	0	0	0	0	0	0	442	0	1	0	0	0	0	0	0	N	1	0	0	0	2	446
Highlandville	0	0	0	0	0	0	1	3	474	1	0	0	0	0	0	1	0	N	0	1	0	0	0	481
Nixa	0	0	4	1	4	0	2	9	8,757	1	0	4	1	0	6	1	9	N	15	8	0	0	1	8,823
Ozark	0	1	7	4	2	0	2	8	7,718	1	4	6	0	0	7	1	14	N	18	7	0	0	2	7,802
Saddlebrooke	0	0	0	0	0	0	0	1	105	0	2	0	0	0	0	0	0	N	0	0	0	0	0	108
Sparta	0	0	1	0	0	0	1	2	752	0	0	1	0	0	0	1	0	N	0	4	0	0	0	762
Unincorporated	4	0	4	33	10	0	9	7	34,792	0	71	0	7	9	0	0	0	Y	0	9	0	0	0	34,955
Totals	4	0	14	39	16	3	16	33	54,065	4	74	8	8	9	11	6	11	-	34	21	0	0	6	54,382

Source: Missouri 2018 State Hazard Mitigation Plan and Hazard Mitigation Viewer; : U.S. Bureau of the Census, Annual population estimates/ 5-Year American Community Survey 2018-2019, Data Collection Questionnaires; Hazus, etc.

Figure 3.1 is a map that shows the locations of bridges in the planning area included in the National Bridge Inventory data set. This data was extracted from FEMA HAZUS MH 2.2 software which reflects conditions from 2010. The HAZUS data contains a “scour index”, which is a number indicating the vulnerability of a bridge to scour during a flood. Bridges with a scour index between 1 and 3 are considered “scour critical”, or a bridge with a foundation determined to be unstable for the observed or evaluated scour condition. According to this information, there are no scour critical bridges identified in the planning area. Included on the map are local low water crossing locations within the county.

Figure 3.1. Christian County Bridges



3.2.3 Other Assets

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

- These types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- Knowing about these resources in advance allows for consideration immediately following a hazard event, which is when the potential for damages is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for

these types of designated resources.

- The presence of natural resources can reduce the impacts of future natural hazards, such as wetlands and riparian habitats which help absorb floodwaters.
- Losses to economic assets like these (e.g., major employers or primary economic sectors) could have severe impacts on a community and its ability to recover from disaster.

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

Table 3.8. Threatened and Endangered Species in Christian County

Common Name	Scientific Name	Status
Gray Bat	Myotis Grisescens	Endangered
Indiana Bat	Myotis Sodalis	Endangered
Northern Long-eared Bat	Myotis Septentrionalis	Threatened
Missouri Bladderpod	Physaria Filformis	Threatened
Running Buffalo Clover	Trifolium Stolonifereum	Endangered
Virginia Sneezeweed	Helenium Virginicum	Threatened

Source: U.S. Fish and Wildlife Service, <http://www.fws.gov/midwest/Endangered/lists/missouri-cty.html>; see also <https://ecos.fws.gov/ipac/> and select 'Get Started' > Step '1 Find Location', choose select by state or county and enter the county name, selecting the appropriate community > follow remaining on-screen instructions.

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 the planning area.

Table 3.9. Parks in Christian County

Park / Conservation Area	Address	City
Busiek SF and WA	Highlandville, MO 65669	Christian
Delaware Town Access	Nixa, MO 65714	Christian
Ozark (Jim Turner Public Fishing)	907 Riverside Rd Ozark, MO	Christian
Shelvin Rock Access	Clever, MO 65631 701 N Taylor Way	Christian
McMauley Park	701 N Taylor Way	Nixa
Rotary Park	Intersections of Fort St and Tower	Nixa
The Gardens at Woodfield	Truman Blvd., near McLean Ct.	Nixa
Finley River Park	601 N. 3rd Street	Ozark
Ozark Disc Golf Course	499 E. Parkview	Ozark
Billings City Park	101 E. Howard	Billings

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

Historic Resources: The National Register of Historic Places is the official list of registered cultural resources worthy of preservation. It was authorized under the National Historic Preservation Act of 1966 as part of a national program. The purpose of the program is to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. The National Register is administered by the National Park Service under the Secretary of the Interior. Properties

listed in the National Register include districts, sites, buildings, structures and objects that are significant in American history, architecture, archeology, engineering, and culture.

Properties in Christian county listed in the National Register of Historic Places are listed in **Table 3.10**

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

Property	Address	City	Date Listed
Smallin Cave Historic District	3575 N. Smallin Rd	Ozark	3/8/2018
Ozark Courthouse Square Historic	Portions of 2nd. Ave., Church, Elm, and 2nd Sts. on the Courthouse Square	Ozark	2/5/2009
Prehistoric Rock Shelter and Caves	N/A	N/A	10/24/1991
Wilsons's Creek National Battlefield	6424 W Farm Rd 182	Republic	10/15/1966

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

Economic Resources: Major non-government employers in Christian County are provided in **Table 3.11.**

Table 3.11. Major Non-Government Employers in Christian County

Employer Name	Main	Product or Service	Employees
OTC Richwood Valley Campus	Nixa	Education	500 – 999
Diversified Plastics Corp	Nixa	Plastic Products	250 – 499
Walmart Supercenter	Nixa	Retail	250 – 499
Walmart Supercenter	Ozark	Retail	250 – 499
Bass Pro Shops	Nixa	Sporting Goods Retail	100 – 249
Lambert Cafe	Ozark	Food Service	100 – 249
Southwest Materials	Ozark	Concrete Ready Mixed	100 – 249
Network Cable of Missouri Inc.	Nixa	Utility/Construction	100 – 249

Source: Data Collection Questionnaires; local Economic Development Commissions <https://missouriebs.weebly.com/employers.html>

Agriculture: Agriculture is a notable industry in Christian County with nearly 180,000 acres of farmland in 2012. **Table 3.12** provides a summary of the agriculture-related jobs in Christian.

Table 3.12. Agriculture-Related Jobs in Christian County

Category	2007	2012	Percent Change
Number of Farms	1,265	1,177	-7%
Land in Farms	189,177	179,468	-5%
Average Size of Farms	150	152	+1%
Market Value of Products Sold	\$37,616,000	\$24,272,000	-35%
Crop Sales	\$3,459,000 (14%)	N/A	N/A
Livestock Sales	\$20,813,000 (86%)	N/A	N/A
Government Payments	\$278,000	\$240,000	-14%

Avg. Gov. Payment Per Farm	\$2,500	\$2,852	+14%
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Source: USDA Census of Agriculture https://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Missouri

3.3 LAND USE AND DEVELOPMENT

3.3.1 Development Since Previous Plan Update

Table 3.13 provides population growth statistics for incorporated cities in Christian County as well as the county as a whole.

Table 3.13. County Population Growth, 2010-2018

Jurisdiction	Total Population 2010	Total Population 2018	2010-2018 # Change	2000-2018 % Change
Christian County	77,825	86,983	9,158	+8.5%
Clever	1,647	2,592	945	+57.3%
Fremont Hills	826	907	40	+4.8%
Highlandville	911	1,037	126	+13.8%
Nixa	18,021	21,113	3,092	+17.2%
Ozark	16,622	19,418	2,796	+16.8%
Saddlebrooke	202	241	39	+19.3%
Sparta	1,747	1,642	105	-6.0%

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

Population growth or decline is generally accompanied by increases or decreases in the number of housing units. Increases in population add to the built environment and increase risk and exposure to hazard events. **Table 3.14** provides the change in numbers of housing units in Christian County from 2010 to 2017. The totals for 2017 were taken from the American Community Survey 2017 estimates. It should be noted that there is a margin of error associated with these values.

Table 3.14. Change in Housing Units, 2010-2018

Jurisdiction	Housing Units 2010	Housing Units 2018	2010-2018 # Change	2000-2018 % Change
Christian County	30,504	34,792	4,288	+14.1%
Clever	674	1,025	351	+52.1%
Fremont Hills	376	442	66	+17.6%
Highlandville	348	474	126	+36.2%
Nixa	7,262	8,757	1,495	+20.6%
Ozark	7,034	7,718	684	+9.7%
Saddlebrooke	87	105	18	+20.7%
Sparta	796	752	44	-5.5%

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

From the 2010 U.S. Census data to the 2018 data, Christian County has seen an increasing population. The population has increased county-wide by 8.5% since 2010, and the rate of growth is expected to increase. The number of housing units in the county has also increased, accompanying the growing population, by about 14.1%. **Figures 3.2 and 3.3** are population density maps depicting block group population at the time of the 2010 census and 2016 census, respectively. Each dot on the map represents 20 people. The maps display much of the population as small groups of people.

Figure 3.2. Christian County Population Density (2010)

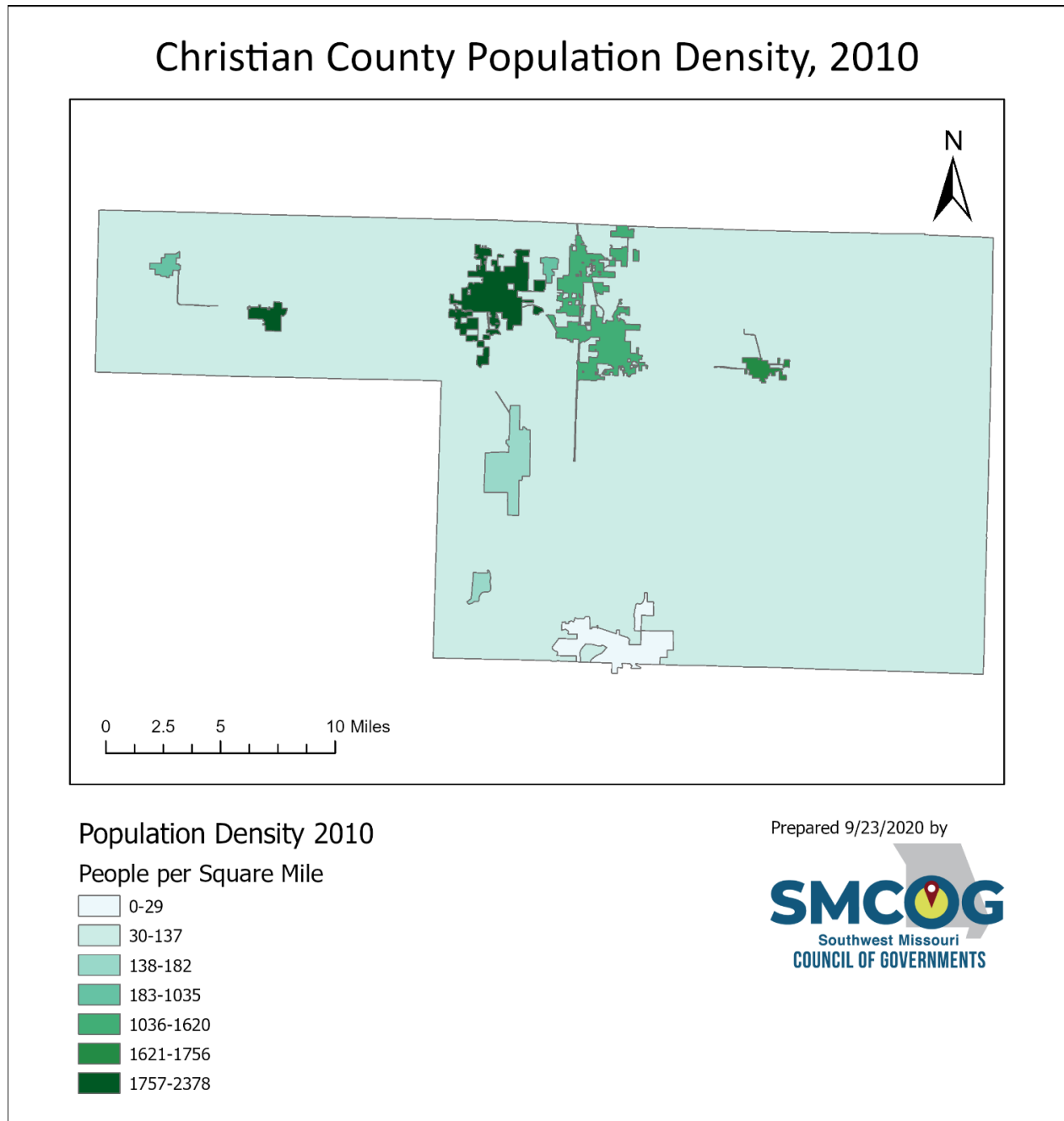
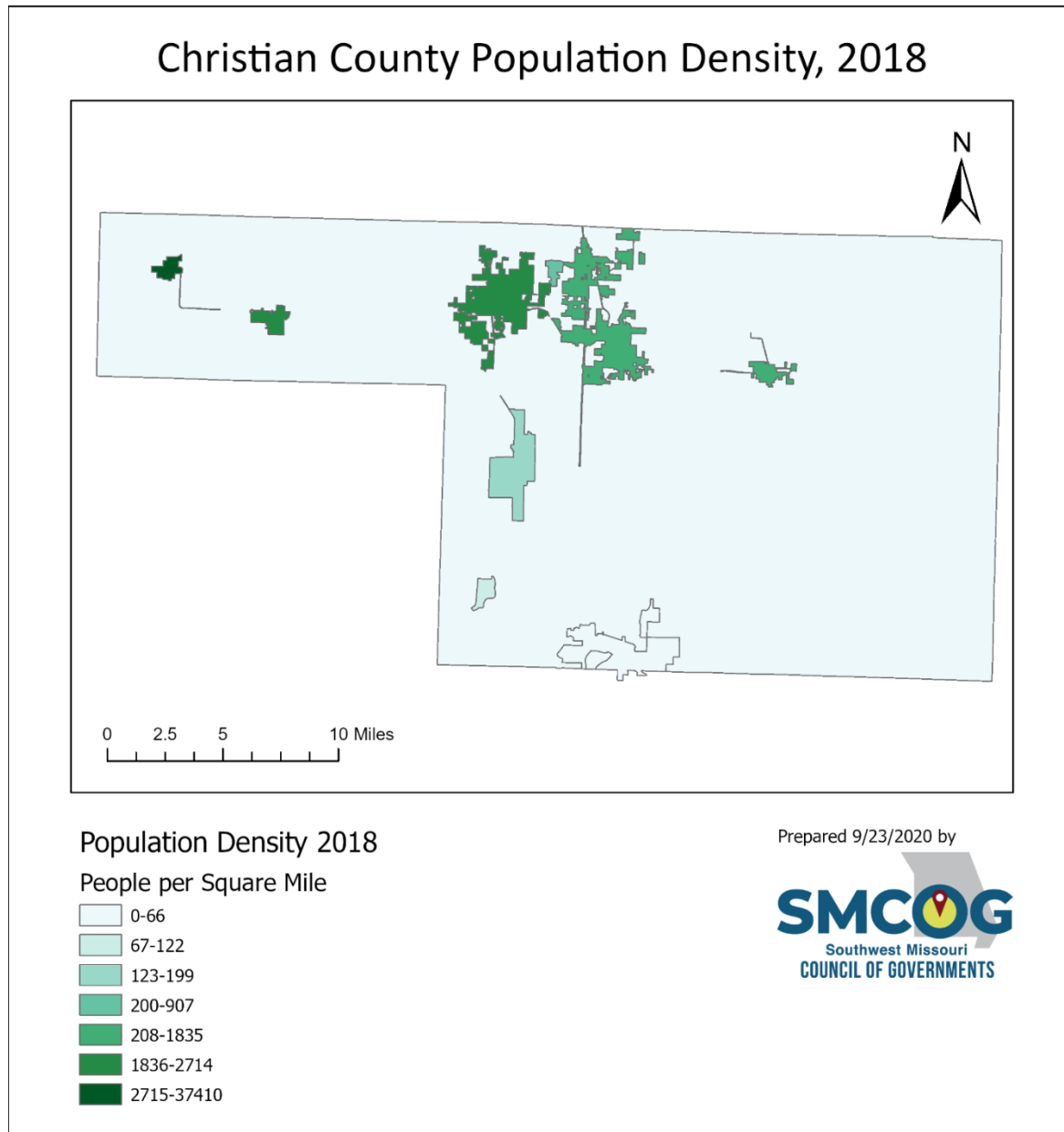


Figure 3.3. Christian County Population Density (2018)



Unincorporated Christian County

Unincorporated Christian County has recently committed to a flood buyout of the Riverside Inn Bridge area. The project is anticipated to be completed by the winter of 2020 and will bring back a vital river crossing for the community. The county's SFHA has also been recently re-mapped through FEMA/SEMA and is slated to be adopted mid 2020. Certain portions of the jurisdiction will be mapped in greater detail in the new plan. The County has also seen the addition of about 1,000 buildings, mostly residential additions.

Clever

Clever has updated its water towers to better prevent lightning strikes that would potentially put the water system and citizens at risk. The city is also working to on a similar project for its waste water treatment plant. Clever has also see the addition of two new subdivisions and one major commercial

building.

Fremont Hills

Fremont Hills has seen a 15% growth in its residential development since the last plan. They have also worked on stormwater runoff improvements on various streets.

Highlandville

Highlandville reports to have approximately 30 new housing starts and 3 commercial ventures.

Nixa

Nixa has seen the addition of numerous new residential subdivisions in various parts of the city.

Ozark

The city of Ozark has seen an additional 423 housing structures, 13 new commercial structures, and 8 new industrial structures added to the city.

Saddlebrooke

The Village of Saddlebrooke experienced no substantial changes in development since the previous plan. No changes have impacted the community's vulnerability.

Sparta

Major development changes to Sparta are unnoted due to a complete change in administration for the city of Sparta's government.

School District Past Development

Nixa Public Schools

Nixa R-II has had many changes since the last plan update. At the high school, a third-floor classroom was completed, as well as an additional wing was installed. A FEMA safe room was also added, and the wrestling room was remodeled into classrooms, as well. At Nixa Junior High, a new wing, new front and commons area, a FEMA safe room were added. The old cafeteria was also changed into classrooms. At Inman Intermediate, JTSD, and Mathews Elementary, FEMA saferooms were added. Mathews Elementary also received a new classroom. The Childhood Center and Summit Intermediate both received new buildings entirely. Main Street School was converted into the Fought Administration Center, and a house was converted into the Nixa Registration Center.

Ozark R-VI

Ozark schools saw the addition of tornado saferooms to four elementary schools and the junior high school. New classrooms were also added to the elementary schools.

Sparta R-III

Sparta R-III began taking bids in 2019 for completion of a preschool/early childhood learning center that would also serve as a tornado shelter. A mockup sketch has also been drawn to envision what the center will look like.

Spokane R-VII

In August 2013, Spokane Middle School was completed and began enrolling students. A new FEMA library at Highlandville Elementary was completed in 2017 as well.

OTC-Richwood Valley

The OTC campus in Richwood Valley has added an agriculture training center, a greenhouse, and a FEMA shelter on campus since the last update. They have also updated their notification and security

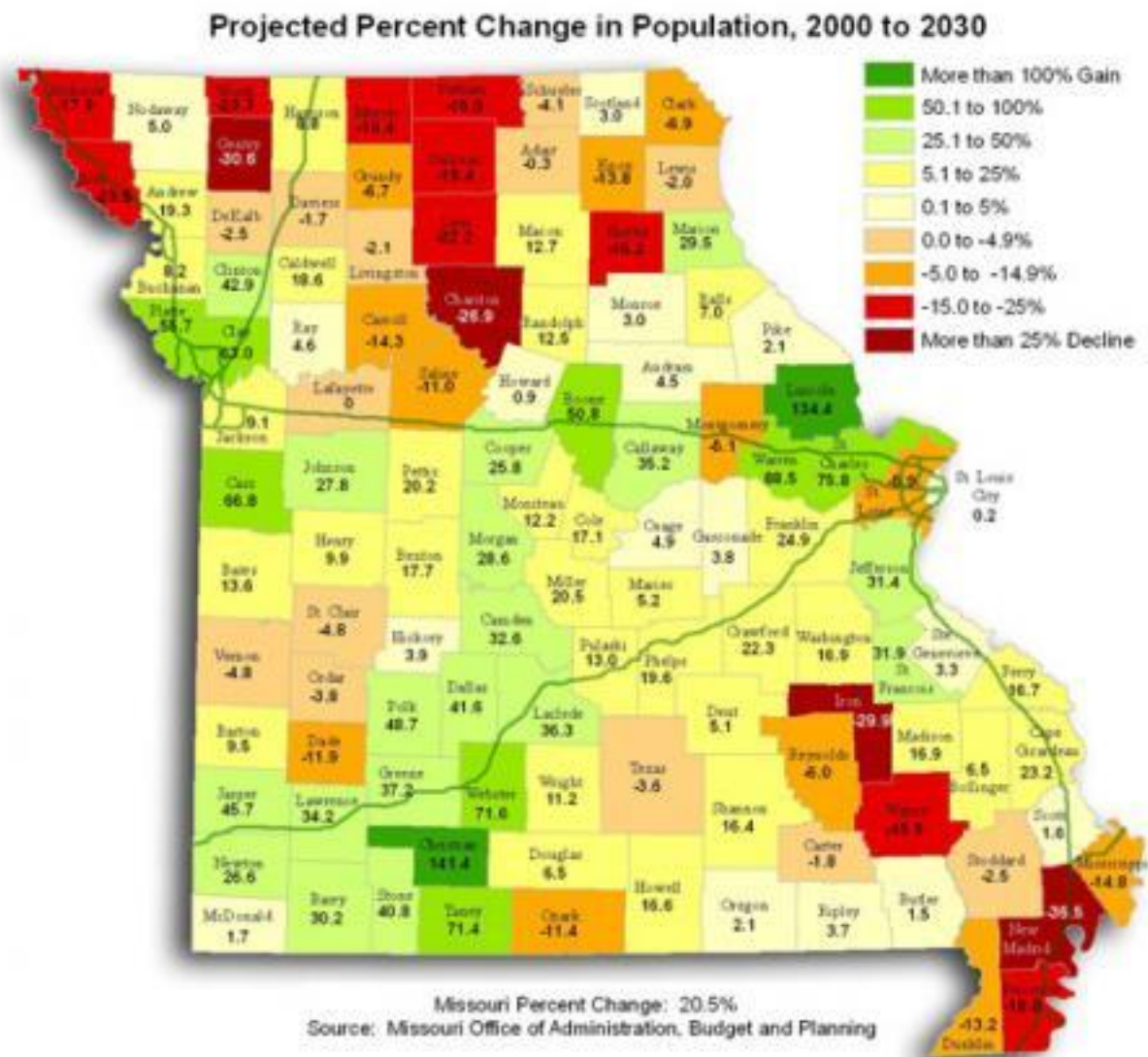
system, as well as their fire protection system and conduct fire and tornado drills on a regular basis.

3.3.2 Future Land Use and Development

Christian County anticipates substantial development and growth over the next five-years. According to the Missouri Office of Administration, Christian County is expected to more than double in size by 2030 and is in the top 10 fastest growing counties in Missouri. **Figure 3.4** shows the expected population change for each county in the state of Missouri. Christian County is the fastest growing county in the state of Missouri, at a projected growth of 141.4% from 2000 - 2030. The county has its own comprehensive and land use plans exclusive to the county.

This may be attributed to the growth of the Springfield region and the desire for people to live in neighboring communities, as well as an increase in birth rate within Missouri. Emigration from outside the area may see areas of Christian County as having prime real estate and nice subdivisions, while also being located relatively close to Springfield, the third biggest city in Missouri. The increase in birth rate will also boost the overall population of the county. This may be a net positive to the county, as more advanced housing and economic development will help the county to grow to its potential.

Figure 3.4. Projected Percent Change in Population in Missouri, 2000 - 2030



The remaining discussion in this section provides future growth and development information, where available, relative to each participating jurisdiction. Much of the information included is from the community data collection questionnaires, or where incomplete questionnaires were returned presumptions were made for future development based on past trends.

Clever

The City of Clever updated its last comprehensive plan in 2017 and is currently working to update 2018 building codes as well as making their street plan safer during hazards. The city has also seen a major population increase since the last plan - by 57.3%, an increase from 1,647 residents to 2,592 residents. Clever plans to build a new water tower and upgrade the current waste treatment plant.

Fremont Hills

Fremont Hill's plans are adopted from other county or city plans and are not independent due to the small nature of the city. The city has seen a minor growth in both residential development and population increase. The city is continually landlocked by both Nixa and Ozark and has approximately

40 lots of land remaining that is able to be developed. It is predicted that these lots will continue to be used for residential development.

Highlandville

The City of Saddlebrooke currently has no comprehensive plan. All decisions are made by the mayor and a board of 4 aldermen. The village has seen recent residential and slight commercial growth and broke the 1,000 population mark between 2010 to 2018, increasing from 911 to 1,037. The village currently has no major plans or changes in the next five years.

Nixa

Nixa has seen adequate growth in population since 2010, by about 17%. Its last major comprehensive plan update was in 2006, but its economic development and transportation plans were updated more recently – in 2013 and 2015, respectively. Nixa has seen a growth in residential subdivisions and also expect future growth to occur west of the city – potentially within 100-year floodplain areas. The city also plans to commence road improvements, including a widening of Hwy. 14 and particular intersection improvements. They also plan to add a new water tower by S. Norton Road.

Ozark

Ozark updated its comprehensive plan in 2019 and has updated its city mitigation plan the same year as the last hazard mitigation plan for Christian County in 2016. It also has relatively new updates to its city emergency operations plan in 2014. Ozark has seen an adequate increase in population, and has nearly doubled from 2000 to 2018, from 9,655 to 19,418. The city has seen a growth of 589 in residential structures since the last plan, as well as 13 new commercial structures and 8 industrial structures. There have also been 34 “infills” in which the major remodeling has been done to existing structures. Growth has occurred mostly North of Jackson St., while growth along the Finley River is at risk from flooding. All construction projects are outlined in the city’s Facilities, Sewer, and Thoroughfare Master plans.

Saddlebrooke

The Village of Saddlebrooke does not use major plans such as a comprehensive plan, recovery plans, a capital improvement plan, etc. most likely due to the small nature of the village. The village does have land use ordinances available publicly online at their website. There has been very little development in the last few years and no major plans are foreseen, except for changes to low water crossings within the village. The village conducted a hydrology study that recommended the installation/improvement of two bridges and a culvert at these crossings.

Sparta

The city of Sparta does not use major plans due to the smaller nature of the city. The city has ordinances for zoning, building, floodplains, nuisances, stormwater, and site plan review. However, their zoning ordinances are not ruled over by a board. The city of Sparta plans on building a new library within the next five years near their Dollar General. They are also in the process of building a FEMA shelter.

School District Future Development

Nixa Public Schools

Nixa R-II had an enrollment increase of 6.7% from 2016 to 2018. The district expects a growth of 5-10% in enrollment within the next 5 years. Nixa R-II hopes to soon remodel Eagle Stadium, as well as add additional classrooms at Century Elementary. They hope to both remodel the performing arts wing as well as add a new performing arts center at Nixa High School.

Ozark R-VI

Ozark R-VI had an enrollment increase of 8.2% from 2016 to 2018. Ozark R-VI expects a change of

11.8% in enrollment within the next five years. The middle school is being renovated and includes the recent addition of a tornado saferoom. They have also purchased a new facility that they plan to turn into an additional high school campus.

Sparta R-III

Sparta R-III expects a slight increase in projected enrollment within the next five years but did not provide an exact estimate. Plans for the pre-school and tornado shelter have been underway, as construction continues, and the \$2.1 million building is estimated to be completed by the 2020-2021 school year. Sparta R-III's high school also plans on constructing a new sports complex.

Spokane R-VII

Spokane R-VII had an enrollment decrease of 2.7% from 2016 to 2018. Based on U.S. Census data, the district projects a change of 1.4% in enrollment within the next five years. The installation of a FEMA building on the campus of Spokane High School is expected to be built within five years.

OTC-Richwood Valley

OTC – Richwood Valley plans to see an enrollment increase of 3% in the next five years. There are no major construction plans at OTC – Richwood Valley at this time.

Special District's Future Development

Billing Special Road District

The replacement of a 2-span box culvert into a 3-span culvert is underway at 2016 Terrill Road. Another culvert at 2017 Vermule Road is also being expanded in diameter. Both of these projects are being done to lessen flooding and water overtopping on roads, causing issues.

Christian County Ambulance District

The Christian County Ambulance District has begun the process to rebuild/update a facility in Nixa (built in 1992) and relocate a facility in Ozark to a more central location. The entire project is estimated to cost 2.5 million dollars and will take 36 months to complete.

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

- **Hazard Description:** This section consists of a general description of the hazard and the types

of impacts it may have on a community or school/special district.

- **Geographic Location:** This section describes the geographic areas in the planning area that are affected by the hazard. Where available, use maps to indicate the specific locations of the planning area that are vulnerable to the subject hazard. For some hazards, the entire planning area is at risk.
- **Strength/Magnitude/Extent:** This includes information about the strength, magnitude, and extent of a hazard. For some hazards, this is accomplished with description of a value on an established scientific scale or measurement system, such as an EF2 tornado on the Enhanced Fujita Scale. This section should also include information on the typical or expected strength/magnitude/extent of the hazard in the planning area. Strength, magnitude, and extent can also include the speed of onset and the duration of hazard events. Describing the strength/magnitude/extent of a hazard is not the same as describing its potential impacts on a community. Strength/magnitude/extent defines the characteristics of the hazard regardless of the people and property it affects.
- **Previous Occurrences:** This section includes available information on historic incidents and their impacts. Historic event records form a solid basis for probability calculations.
- **Probability of Future Occurrence:** The frequency of recorded past events is used to estimate the likelihood of future occurrences. Probability can be determined by dividing the number of recorded events by the number of years of available data and multiplying by 100. This gives the percent chance of the event happening in any given year. For events occurring more than once annually, the probability should be reported as 100% in any given year, with a statement of the average number of events annually. For hazards such as drought that may have gradual onset and extended duration, probability can be based on the number of months in drought in a given time-period and expressed as the probability for any given month to be in drought.
- **Changing Future Conditions Considerations:** Changing future conditions should also be considered, including the effects of long-term changes in weather patterns and climate on the identified hazards.

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

Vulnerability Assessments

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

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

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

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

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

Following the hazard profile for each hazard will be the vulnerability assessment. The vulnerability assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to damages from natural hazards. The vulnerability assessments should be based on the best available data. The vulnerability assessments can also be based on data that was collected for the 2018 State Hazard Mitigation Plan Update

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

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

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 types and numbers, of buildings 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 Christian

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 Christian County, and possible ways to resolve those problems. Jurisdiction-specific information in those cases where the risk varies across Christian 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. Riverine flooding is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt or ice melt. The areas adjacent to rivers and stream banks that carry excess floodwater during rapid runoff are called floodplains. A floodplain is defined as the lowland and relatively flat area adjoining a river or stream. The terms “base flood” and “100- year flood” refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Floodplains are part of a larger entity called a basin, which is defined as all the land drained by a river and its branches.

Flooding caused by dam failure is discussed 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 high probability, yet generally unpredictable nature of flash flooding in the planning area.

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

Geographic Location

Riverine flooding is most likely to occur in Special Flood Hazard Areas (SFHAs) where the 100- year floodplain has been mapped. Areas along the Finley and James Rivers, specifically, the city of Ozark and Nixa and developed parts of the unincorporated county experience the greatest impact of riverine flooding. According to NCEI storm event data from 1999 through 2019, there were 15 flood events recorded in the county during this period, with an additional 8 events in the areas of Clever, Ozark, Nixa, and Sparta (some of these events affected multiple areas). These events are typically regional in nature and affect rivers, streams, and tributaries across a wide area. **Figures 3.5** through **3.11** are mapped SFHAs for communities and unincorporated areas in Christian County.

Figure 3.5. Ozark SFHA

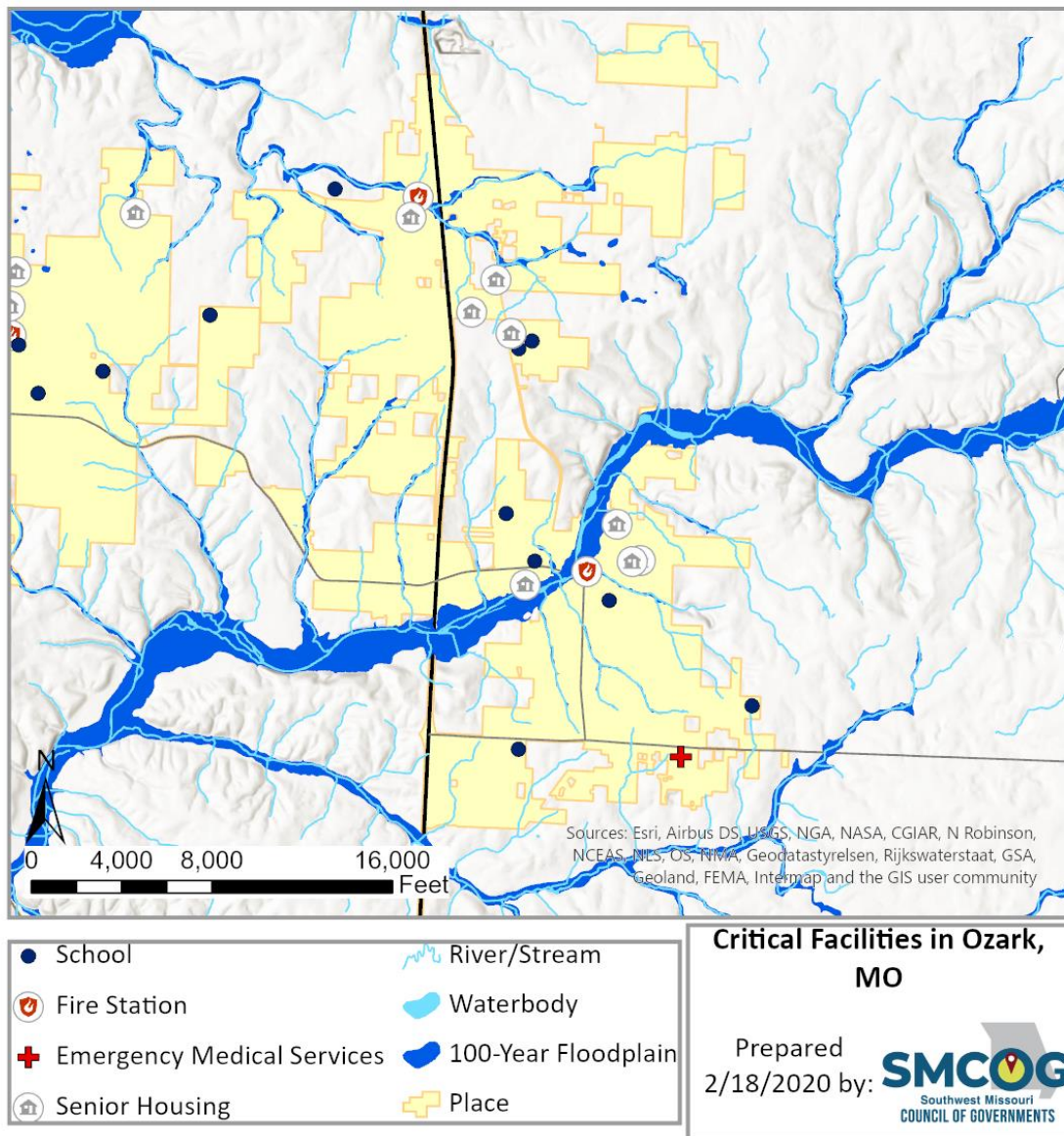


Figure 3.6. Nixa SFHA

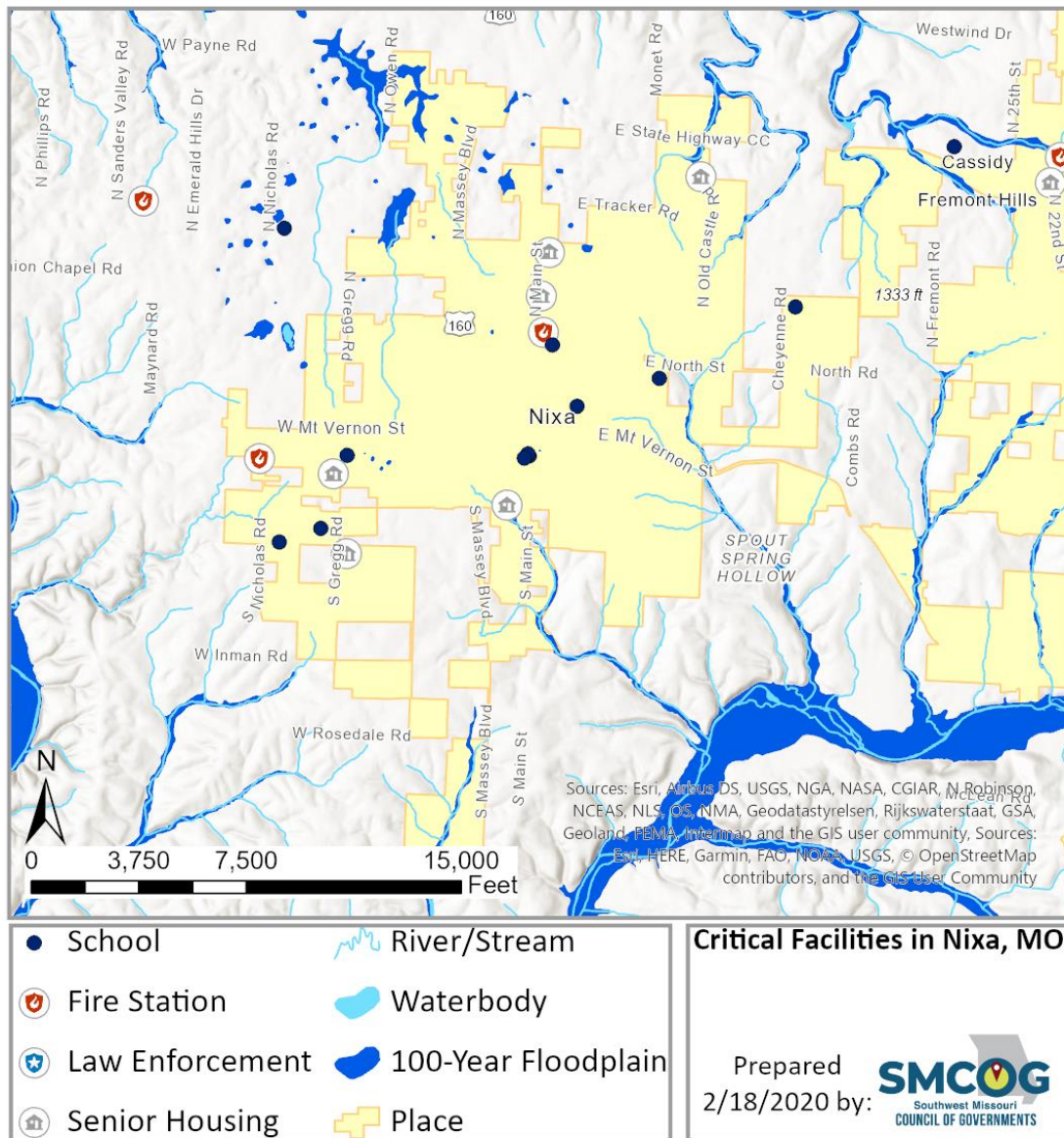


Figure 3.7. Clever SFHA

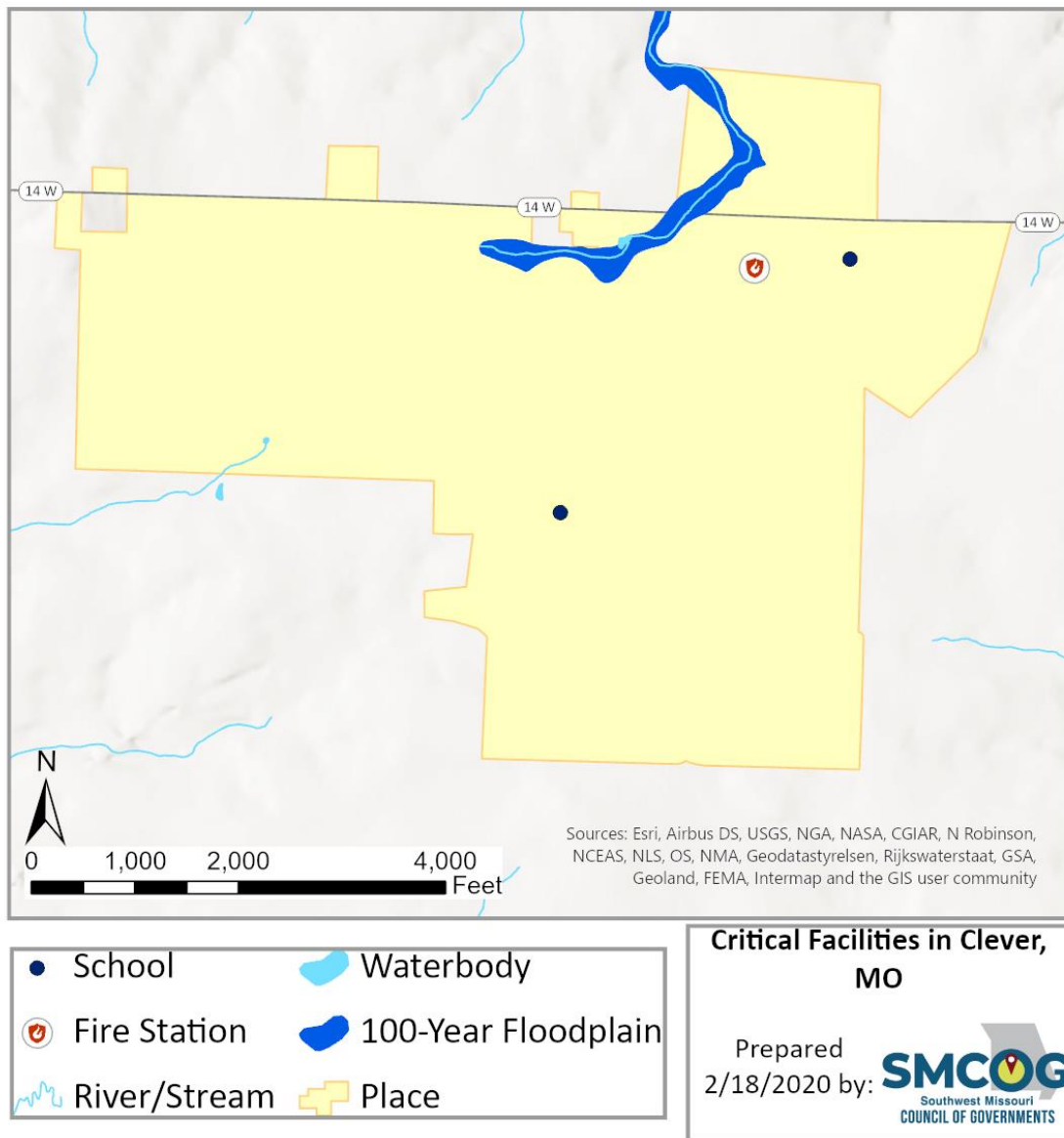


Figure 3.8. Fremont Hills SFHA

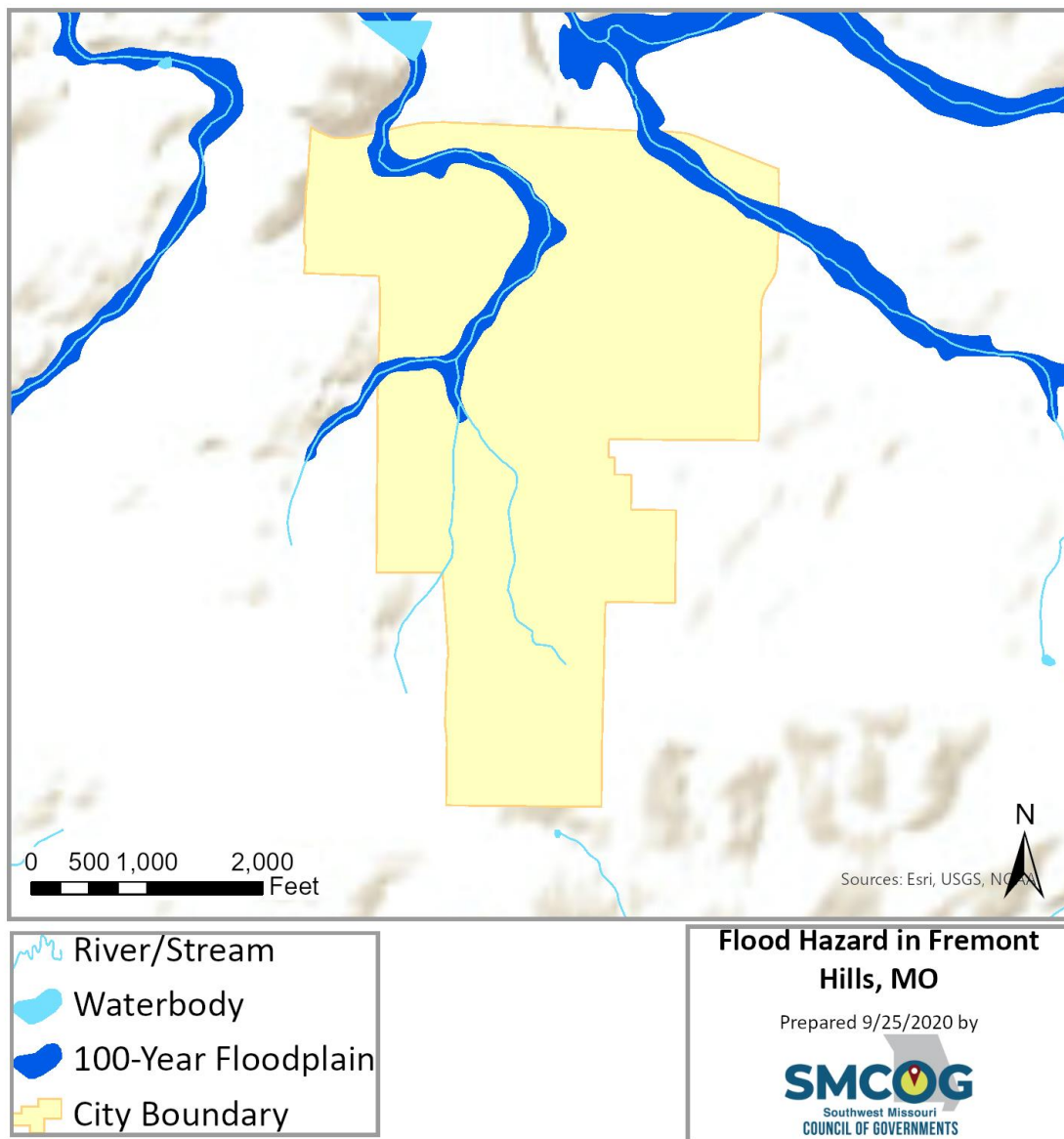


Figure 3.9. Highlandville SFHA

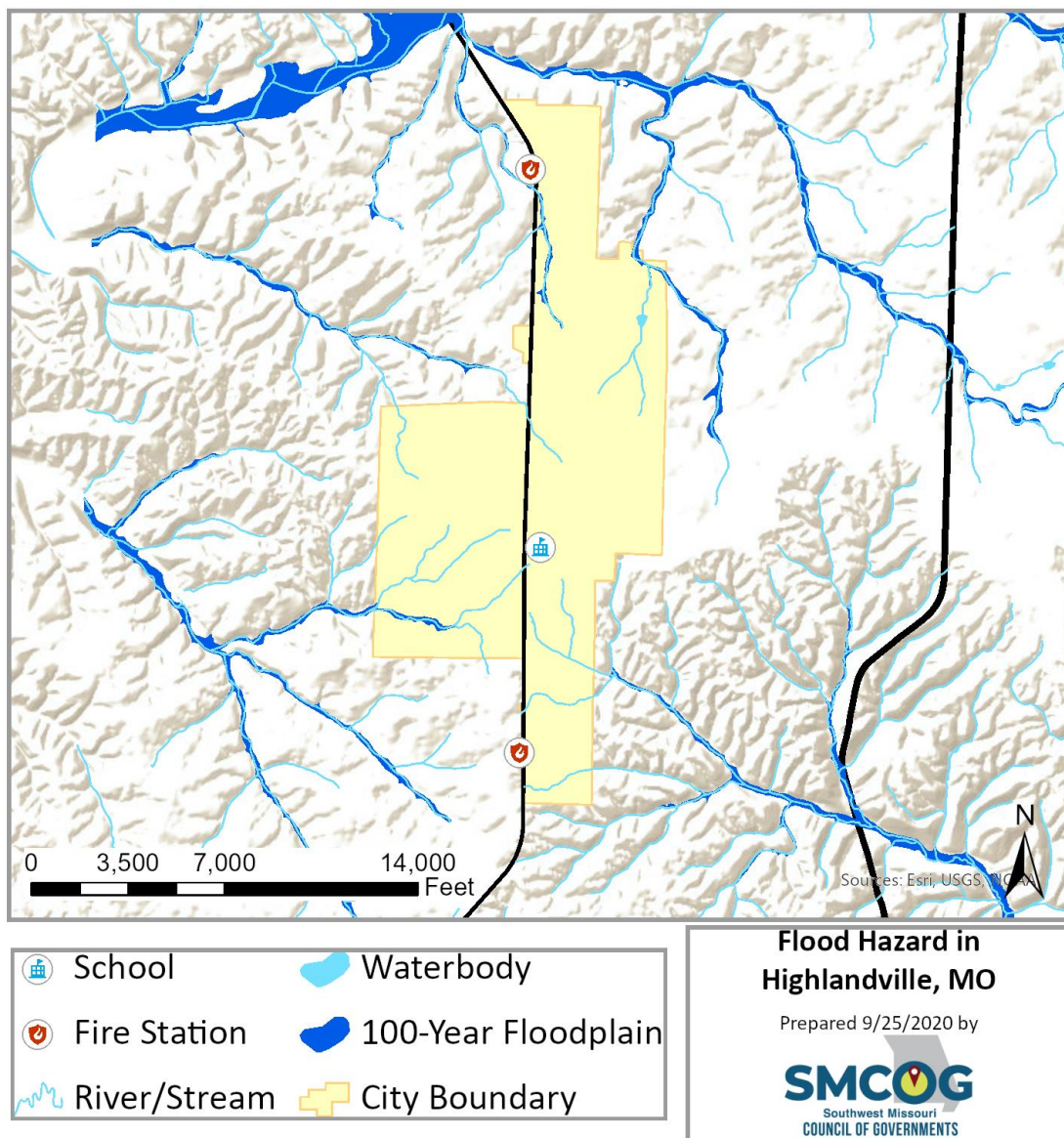


Figure 3.10. Saddlebrooke SFHA

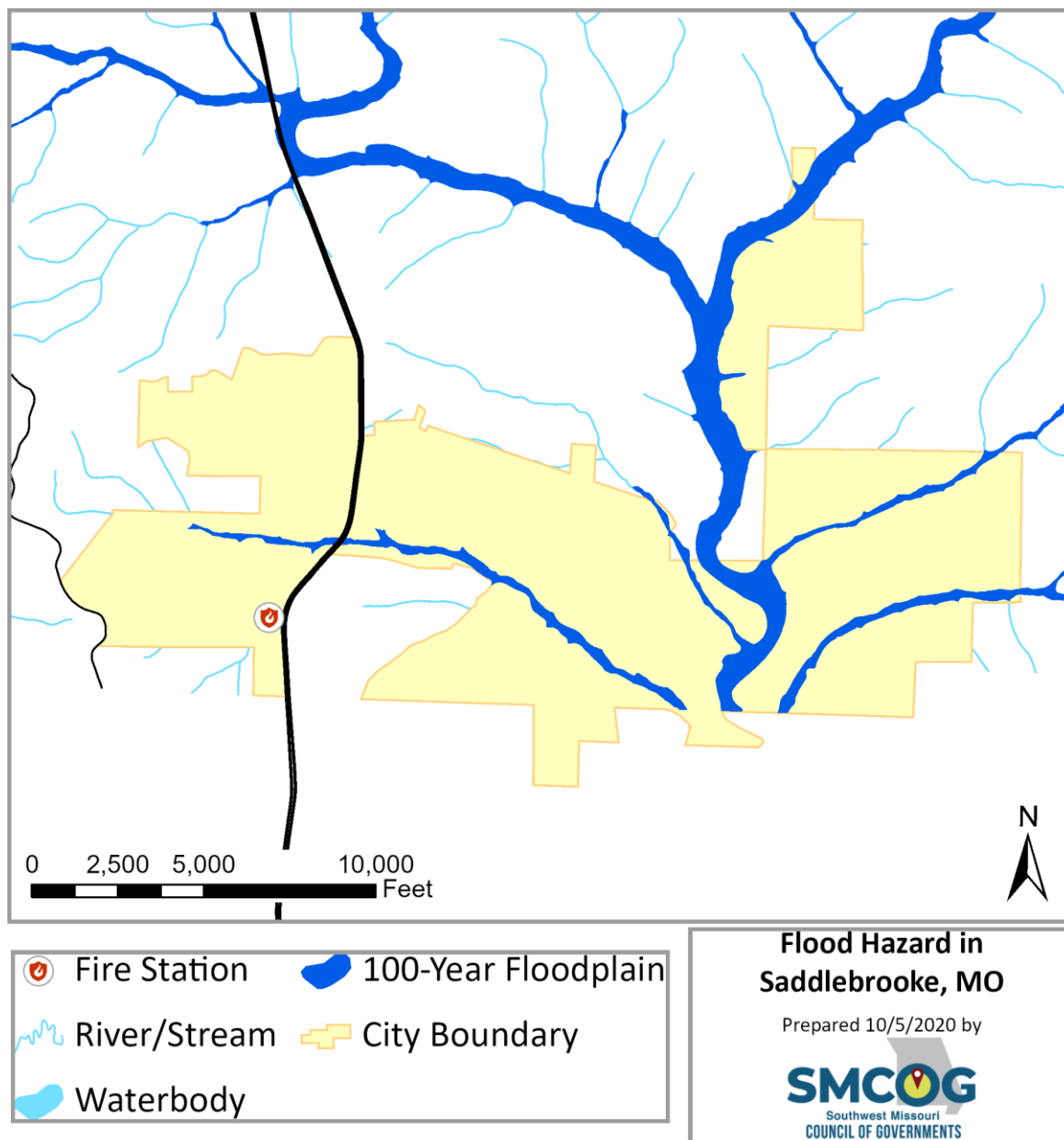
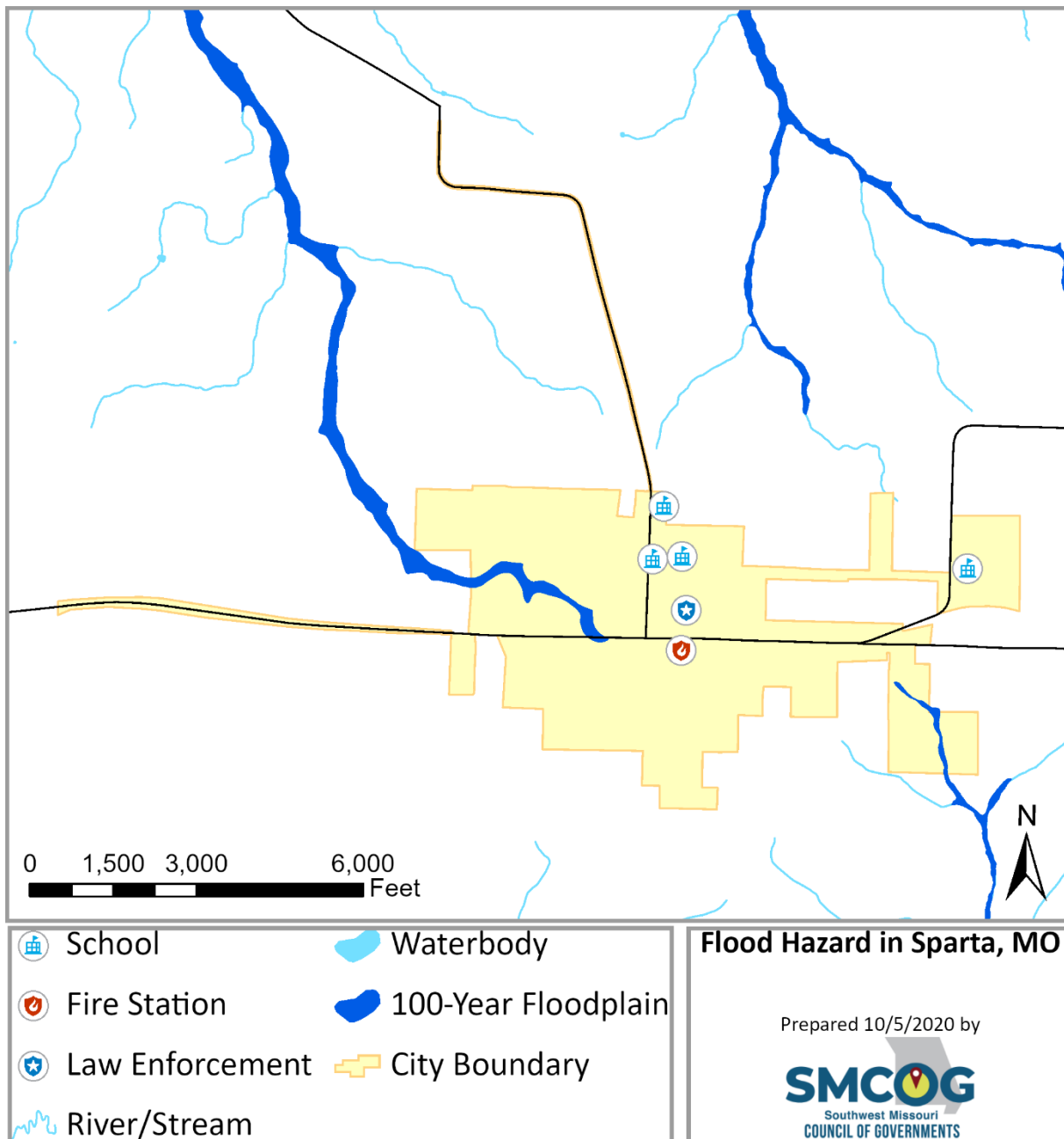


Figure 3.11. Sparta SFHA



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 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 impassible. 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. According to the NCEI storm event data from 1999 - 2019, a total of 42 flash floods were recorded in the county. An additional 37 flash floods were

recorded in jurisdictions within the county. A review of the NCEI storm event database determined which jurisdictions are most prone to flooding and flash flooding from 1999 to 2019 are listed in **Table 3.15** and **Table 3.16**.

Table 3.15. Christian County NCEI Flood Events by Location, 1999-2019

Location	# of Events
Unincorporated County	15
Flooding along Elk and Finley Rivers (2/24/2001)	
Multiple locations across Christian Co. (12/16/2001)	
Finley River major flood (5/8/2002)	
Multiple locations across Christian Co. (5/12/2002)	
Multiple locations including Hwy K (5/17/2002)	
Hwy H and Columbus Road (3/4/2004)	
Wilson Rd. (11/24/2004)	
Riverdale Rd, Bull's Creek, Finley River (1/5/2005)	
Low lying areas across Co. (1/12/2005)	
Bruner, John Ford, Marshfield, and Aztec Rds. (6/2/2007)	
Abadyl, across Co. (3/19/2008)	
Abadyl, Finley River on Braden Rd between Hwy U and 125 (10/30/2009)	
Linden, general flooding across Ozarks (2/24/2018)	
Linden, Route U and Pedelo Creek (3/27/2018)	
Riverdale, Finley River over Riverdale Rd (5/1/2019)	
Clever	2
Jasmine Road, East of Hwy K (9/1/2010)	
Sullivan Rd (2/24/2018)	2
Nixa	
James River in Nixa (6/19/2015)	3
Tracker Rd near Eaglecrest St (2/24/2018)	
Ozark	
Hwy 125/14 Near Ozark (7/10/2015)	1
Low water crossing impassible (2/23/2018)	
Finley River at Ozark (2/24/2018)	
Sparta	1
Hwy 125/14 (9/1/2010)	

Source: National Centers for Environmental Information, 8/30/2019

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. Some specific locations are listed within the narratives for flash flood events. Where specific roads and locations are listed, they are provided in the table. 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 by heavy rains that exacerbate flash flooding across the county. In addition, multiple records are related to the same event and vice versa.

Table 3.16. Christian County NCEI Flash Flood Events by Location, 1999-2019

Location	# of Events
Unincorporated County	42
Western Portion (5/4/1999) & (6/20/2000) X	
Countywide/Unspecified (5/24/2000), (7/12/2000), (7/28/2000), (2/24/2001) X	
Southern Portion (6/29/2001)	
Eastern Portion (7/05/2001)	

Northern Portion (5/17/2002), Montague, Torey Creek, Hwy O, (6/8/2007), (4/25/2011), (6/18/2015), (8/30/2018) Linden, along Finley River, water rescue near Sparta, county roads, Hwy U, Pedelo Creek (6/12/2007), (3/17/2008), (8/5/2013), (5/11/2017), (8/29/2018) (6/4/2019) Cassidy, Hwys MM & CC, North St (6/30/2007), (6/15/2013), (8/30/2018) Abadyl and its surrounding bodies and or routes (2/16/2008), (4/10/2008), (10/8/2009), (8/5/2013), (7/10/2015), (4/21/2017) Center Road & Bull Creek (6/13/2008), (6/23/2008), (6/28/2008) Riverdale, Hwy O, Bull Creek, Finley River near Riverdale Rd (6/28/2008), (9/2/2010) Selmore, Prospect Rd and Hwy W, Hog Creek and Crab tree Rd, (7/30/2008), (10/8/2009), (4/25/2011) Terrell, Farm Rd 186 and 99 near Terrell Creek, Hwy P, County Rd 149, Kerr and Holder Rd, (10/8/2009), (6/30/2016), (5/11/2017) Boaz, Willoughby RD, Hwy N (10/8/2009), (5/30/2013) McCracken, Smyrna Rd north of Green Bridge Rd, (9/1/2010), (4/30/2017)	
Billings	3
General flooding (1/7/2008), (9/14/2008) Terrell Road & Beal Road (6/13/2008)	
Clever	4
Highway K near Clever (11/18/2003) Terrell and Beal Rd (10/8/2009) Water on Jasmine Rd West of Hwy K (4/24/2011) Hwy K (4/29/2017)	
Highlandville	2
Hwy O & Hwy V along Tory Creek (8/6/2006) Sawmill Rd (8/7/2015)	
Nixa	11
Tracker Road & Eagle Crest (7/24/2004) Finley River, Bull's Creek and Riverdale Rd (1/5/2005) Street flooding (6/11/2007), (9/17/2014) Tracker Road west of Hwy 160 (9/6/2007), (7/30/2013) Hwy 14 & Mt. Vernon Rd (9/2/2010) West Tracker Rd. (7/30/2013) Tracker Rd. West of Hwy 160 and multiple locations around Nixa (7/9/2015) Severe storms and flooding across MO Ozark region (4/29/2017) Unspecified location (8/30/2018)	
Ozark	11
Street flooding 1 mi. north of Ozark (6/30/2003) Unspecified location, street flooding and low-lying areas (1/12/2005) Unspecified location, street flooding (5/10/2006) Terrell and Beal Rds., Hwy F, AA, Bull Creek (6/23/2008) Unspecified location, street flooding and low-lying areas (12/27/2008) Hwys J & NN (5/16/2010) Finley River Bridge on Business 14 (9/2/2010) Ozark Airpark ARPT, Hwy J and NN, Fremont Rd between Hwy CC and 14, (5/16/2010), (6/19/2015) Finley and James River, roads and bridges (12/27/2015) Road Flooding (6/30/2016) McCauley Rd. S of Hwy 14 (4/30/2019)	
Sparta	5
Unspecified flooding (3/31/2008) Braden Rd Closure (9/1/2010) Hwy 14 (6/1/2013) Hwy 125 closure (8/4/2013), (8/5/2013)	
Spokane	1

Strength/Magnitude/Extent

Missouri has a long and active history of flooding over the past century, according to the 2018 State Hazard Mitigation Plan. Flooding along Missouri's major rivers generally results in slow-moving disasters. River crest levels are forecast several days in advance, allowing communities downstream sufficient time to take protective measures, such as sandbagging and evacuations. Nevertheless, floods exact a heavy toll in terms of human suffering and losses to public and private property. By contrast, flash flood events in recent years have caused a higher number of deaths and major property damage in many areas of Missouri.

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

National Flood Insurance Program (NFIP) Participation

Table 3.17 provides details on NFIP participation for the communities in the Christian County. **Table 3.18** shows the number of policies in force, amount of insurance in force, number of closed losses, and total payments for each jurisdiction, where applicable. The time period represented by the data for closed losses is from January 1st, 1981 through December 31st, 2019

Table 3.17. NFIP Participation in Christian County

Community ID #	Community Name	NFIP Participant (Y/N/Sanctioned)	Current Effective Map Date	Regular- Emergency Program Entry Date
290847	Christian County	Y	12/17/10(M)	04/01/04
290600	Clever, City of	Y	12/17/10(M)	03/30/81
290755	Fremont Hills, City	Y	12/17/10(M)	10/21/10
290773	Highlandville, City	Y	12/17/10(M)	12/17/10
290078	Nixa, City of	Y	12/17/10(M)	04/22/83
290079	Ozark, City of	Y	12/17/10(M)	02/01/85
290993	Saddlebrooke,	Y	12/17/10(M)	08/06/12
290529	Sparta, City of	Y	12/17/10(M)	08/09/11
-	Spokane, City of	N	-	-

Source: NFIP Community Status Book, 9/5/2019; BureauNet, <http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-community-status-book>; M= No elevation determined – all Zone A, C, and X: NSFHA = No Special Flood Hazard Area; E=Emergency Program

Table 3.18. NFIP Policy and Claim Statistics as of Date

Community Name	Policies in	Insurance in	Closed Losses	Total Payments
Christian County	79	\$19,679.00	44	\$804,785.88
City of Nixa	12	\$2,825.00	4	\$26,856.09
City of Ozark	21	\$6,321.00	24	\$1,097,936.66
City of Republic	1	\$70.00	0	\$0.00
City of Reeds Spring	0	\$0.00	1	\$0.00
City of Sparta	1	\$296.00	0	\$0.00
City of Fremont Hills	1	\$350.00	0	\$0.00

Source: NFIP Community Status Book, [insert date]; BureauNet, <http://bsa.nfipstat.fema.gov/reports/reports.html>; *Closed Losses are those

flood insurance claims that resulted in payment. Loss statistics are for the period from January 1st, 1981 through December 31st, 2019.

The city of Ozark is the jurisdiction with the highest total payments in insurance, with 24 losses totaling \$1,097,936.66. Christian County reports 44 total losses with payments totaling \$804,785.88.

Repetitive Loss/Severe Repetitive Loss Properties

Repetitive Loss Properties are those properties with at least two flood insurance payments of \$1,000 or more in a 10-year period. According to the Flood Insurance Administration, jurisdictions included in the planning area have a combined total of 10 repetitive loss properties.

Table 3.19 provides a summary of repetitive loss properties whether they be residential, commercial, or industrial.

Table 3.19. Christian County Repetitive Loss Properties

Jurisdiction	# of Properties	Type of Property	# Mitigated	Building Payments	Content Payments	Total Payments	Average Payment	# of Losses
Christian County	7	N/A	N/A	\$456,309	\$33,266	\$489,574	\$24,479	20
Ozark	3	N/A	N/A	\$718,878	\$208,264	\$927,142	\$84,286	11
Grand Total	10		N/A	\$1,175,187	\$241,530	\$1,416,716	\$45,701	31

Source: Flood Insurance Administration as of 6/18/2020

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 \$1,000 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 Flood Insurance Information, no updated information is available on severe repetitive loss properties in Christian County.

Previous Occurrences

Table 3.20 and Table 3.21 reflect storm event data and flash flood events in Christian County since 1999. There were 83 flash flood events and 23 riverine flood events totaling \$10,397,000 in damages.

Table 3.20. NCEI Christian County Flash Flood Events Summary, 1999 to 2019

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damages
2000	4	0	0	\$0	\$0
2001	3	0	0	\$0	\$0
2002	1	0	0	\$0	\$0
2003	2	0	0	\$0	\$0
2004	1	0	0	\$0	\$0
2005	2	0	0	\$0	\$0
2006	2	0	0	\$0	\$0
2007	5	0	0	\$0	\$0
2008	11	0	0	\$5,500,000	\$0
2009	6	0	0	\$0	\$0
2010	6	0	0	\$10,000	\$0
2011	3	0	0	\$1,000,000	\$0
2013	8	0	0	\$0	\$0
2014	1	0	0	\$0	\$0
2015	7	0	0	\$870,000	\$0
2016	2	0	0	\$0	\$0

2017	6	1	0	\$752,000	\$0
2018	4	0	0	\$0	\$0
2019	2	0	0	\$0	\$0
Total	76	1	0	\$8,132,000	\$0

Source: NCEI, data accessed 9/5/2019

Table 3.21. NCEI Christian County Riverine Flood Events Summary, 1999 to 2019

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damages
2001	2	0	0	\$0	\$0
2002	3	0	0	\$150,000	\$0
2004	2	0	0	\$10,000	\$0
2005	2	0	0	\$0	\$0
2007	1	0	0	\$0	\$0
2008	1	0	0	\$0	\$0
2009	1	0	0	\$0	\$0
2010	2	0	0	\$0	\$0
2015	2	0	0	\$2,100,000	\$0
2018	6	0	0	\$5,000	\$0
2019	1	0	0	\$0	\$0
Total	23	0	0	\$2,265,000	\$0

Source: NCEI, 9/5/2019

Probability of Future Occurrence

There has been a total of 99 reported flood events in Christian County from 2000 to 2019 in the NCEI storm event database. The total floods were comprised of 76 flash floods and 23 riverine floods. In this 20-year period, there were no years without a flash flood event, and five years with damaging events. This equates to a 100% probability that there will be a flash flood event in any given year and a 25% probability of a damaging event in any given year. Based on the number of events and years, the average number of flash flood events is 3.8 per year. During this 20 year time frame, flash floods accounted for \$8.13 million in damages with an average of \$1,626,400 per event.

During the same time period, 23 riverine floods were reported in Christian County. These events occurred in eleven years, giving a 52% probability for a riverine flood in any given year and an average of 1.15 events per year. Property damages amounted from riverine flooding occurred in 4 specific years totaling approximately \$2.26 million in damages.

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 stored in large containers could break loose or puncture as a result of flood activity. Examples are bulk propane tanks. When this happens, evacuation of citizens is necessary.

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

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

Periods of heavy rain falling at the rate of one inch per hour floods low water crossings throughout the county, making many roads impassable. This creates a severe threat to motorists that attempt to drive through flood waters over the roadway. Riverine flooding occurs less frequently than flash flooding. In Christian County, there are 10 Repetitive Loss properties in which severe property damage costing millions of dollars has occurred. No current data on known SRL properties was available. Property damage is still likely to occur to non-SRL properties in Christian County as a result of flooding, and one death (not in a Repetitive Loss area) has been recorded from a 2017 flood in Clever. It occurred when a 72-year-old woman drowned when entering Highway K in her vehicle south of Clever. Low lying areas outside of the floodplain may also be frequently flooded.

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 jurisdiction 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 3.22 presents the building counts for each type of use within each participating municipality, as well as the unincorporated areas of Christian County.

Table 3.22. Potential Flood Losses for Building Types by Jurisdiction

Jurisdiction	Residential	Commercial	Agricultural	Other	Total
Clever	29	2	2	0	33
Fremont Hills	23	2	0	0	25
Highlandville	2	0	15	0	17
Nixa	105	16	14	0	135
Ozark	329	77	30	0	436
Saddlebrooke	54	2	45	0	101
Sparta	32	5	3	0	40
Unincorporated	1,647	46	1,419	0	3112

Total	2,221	150	1,528	0	3899
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The total exposure for structures and contents by building type and jurisdiction is provided in **Table 3.23**. Losses were estimated by adding a 5% damage factor to the total assessed value of structures in the jurisdiction.

Table 3.23. Total Flood Exposure and Estimated Losses by Jurisdiction

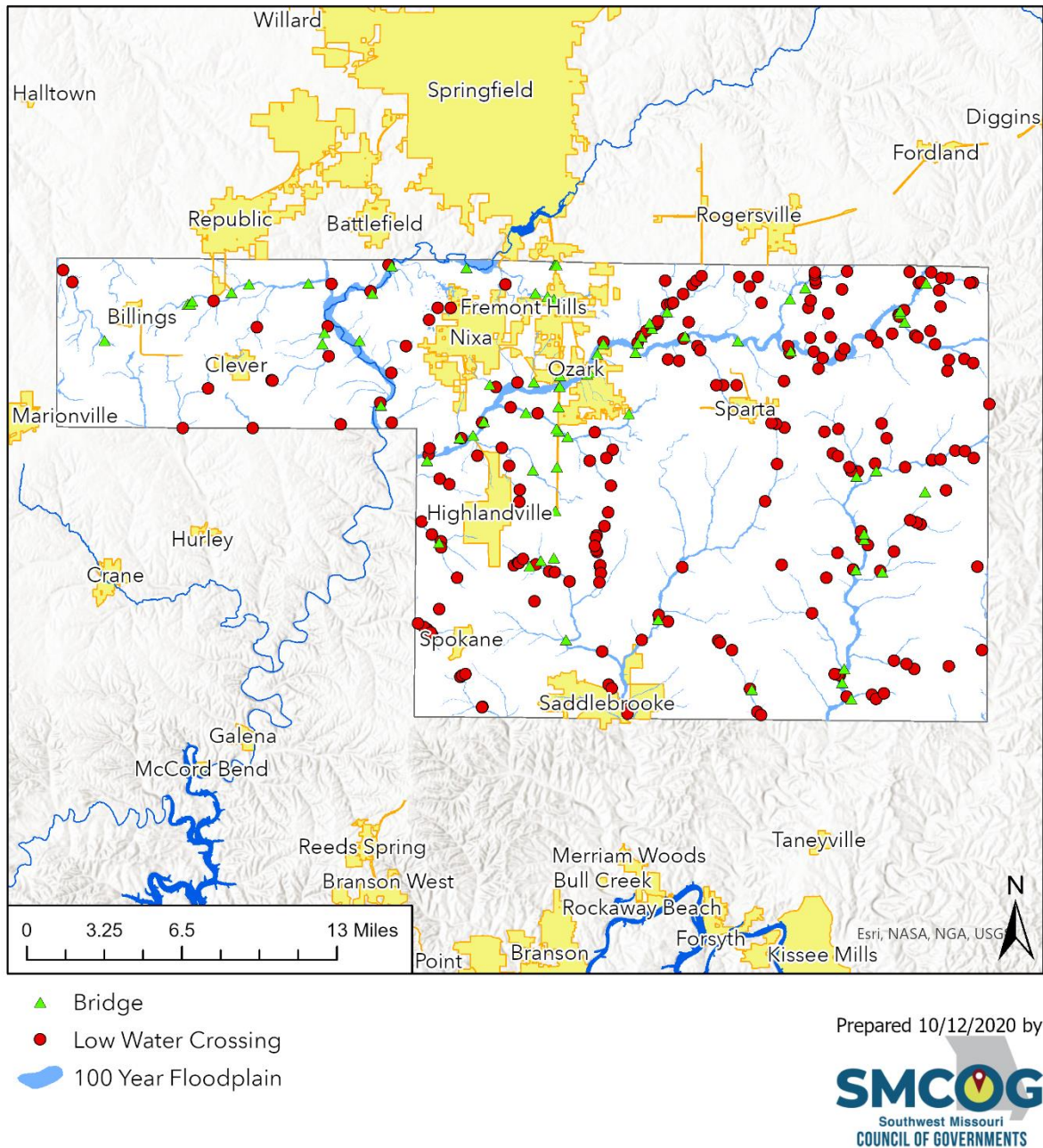
Jurisdiction	Residential	Commercial	Agricultural	Other	Total
Clever	\$456,198	\$501,305	\$405	\$0	\$957,908
Fremont Hills	\$516,631	\$528,582	\$0	\$0	\$1,045,213
Highlandville	\$151,923	\$176,911	\$2,311	\$0	\$331,145
Nixa	\$5,123,191	\$5,783,326	\$322	\$0	\$10,906,839
Ozark	\$3,909,813	\$5,055,878	\$1,235	\$0	\$8,966,926
Saddlebrooke	\$215,766	\$224,883	\$964	\$0	\$441,613
Sparta	\$238,375	\$285,535	\$120	\$0	\$524,030
Unincorporated	\$9,210,410	\$10,003,683	\$162,458	\$0	\$19,376,551
Total	\$19,822,307	\$22,560,103	\$167,815	\$0	\$42,550,225

Low Water Crossings

Damage to low water crossings due to flooding is a significant problem for communities. **Figure 3.12** shows the locations and conditions of all crossings in Christian County. 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 3.12. Christian County Low Water Crossings

Christian County Low Water Crossings



Impact of Previous and Future Development

Future development could impact flash and riverine flooding in Christian 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 to 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 local jurisdictions in the county are at risk to flood hazards; however, as demonstrated in Table 3.23 exposure of assets near SFHAs varies among jurisdictions. Communities such as Arcola, Greenfield, and Lockwood have limited floodplain within the jurisdiction and are likely at lower risk for damaging events. However, all of these communities can be impacted by flooding of major roads and low water crossings in the areas proximate to their corporate limits. Due to previous flood events and general frequent flooding some county bridges will need to be replaced. The two critical facilities within floodplains are privately-owned dams in the southwestern quarter of the county. These dams are not located within the boundaries of a participating municipality, but rather the county. Neither of these dams are state regulated.

Community Comments on Hazard

15 of the 453 respondents of the survey had responded that they had been impacted personally by flooding. 134 of 453 respondents (30%) stated they felt that flooding was highly likely to impact their community in the future. 47 of the 453 respondents stated they felt that flooding would have a catastrophic impact if one were to hit, while 214 felt there would be at least a critical impact. Respondents were very supportive of flood-prone property acquisition and localized flood reduction projects, and somewhat supportive of flood-prone structure elevation.

Problem Statement

Floods are frequent events and have been listed in 10 out of 14 presidential disaster declarations that have included Christian County. At least 2 fatalities have resulted from motorists driving across flooded low water crossings and their vehicles being swept away. Numerous water rescues have been performed since 2002. Significant debris accumulation and damages at low water crossings have are a regular occurrence due to flash flooding throughout the county.

All communities in the plan, with the exception of Spokane, are participating 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 enforce stormwater management regulations.

The Billings Special Road District and the Christian County Commission have identified frequently damaged low water crossings at several locations throughout the county and are currently planning on making improvements to make improvements and replace culverts over the next five years. 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, such as “turn around, don’t drowned” messages during and prior to flood events in the county broadcast 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 State Plan, Missouri had some 5,423 recorded dams in 2013, the largest number of man-made dams of any state in the country. Missouri's topography allows lakes to be built easily and inexpensively, which accounts for the high number of dams. Despite the large number of dams, there are only 682 (about 13 percent) state regulated dams, with an additional 66 federally regulated dams. Federal dams in Missouri are primarily regulated by two federal agencies: the U.S. Army Corps of Engineers (USACE), and the U.S. Department of Agriculture Forest Service. The remaining 4,495 dams are unregulated.

Dams that fall under state regulation are non-federally regulated dams that are more than 35 feet in height. Most nonfederal dams are privately owned structures built either for agricultural, water supply or recreational use. The Department of Natural Resources (MDNR) Water Resources Center maintains the Dam and Reservoir Safety Program in Missouri. The program ensures that dams over 35 feet in height are safely constructed, operated, and maintained pursuant to Chapter 236 of 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 Christian 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 3.24**. The downstream environment zone classification is also used to prescribe the frequency of inspection.

Table 3.24. 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 years.

Class II	The area downstream from the dam that would be affected by inundation contains one to nine permanent dwelling, 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 3.25**, does not indicate its condition. Dams assigned the high hazard potential classification are those in which 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 3.25. 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

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 five dams recorded in Christian County in both the MDNR and NID databases. The Galindo Family Dam and Liar's Lake Dam are the only two state regulated dams in the county with dam heights of 48 and 39 feet, respectively. These dams are rated as high hazard dams in the NID and Class II dams by MDNR. The remaining three dams are rated as low hazard dams in the NID and Class III dams by MDNR. All dams in the county are located in unincorporated rural areas. There are no federally owned and operated dams in the county.

A dam in the city of Ozark known as Mill Pond Dam was identified, but not included in the following information due to its absence from the NID database. The dam is approximately 300 ft long and has a height of 8.67 ft. Dam failure at this dam could result in damage to nearby structure and utility damage, especially to the city of Ozark's water and sewer lines. A full report of the dam can be found in Appendix A.

Pertinent information on dams in Christian County is presented in **Table 3.26**. The table indicates if there is an Emergency Action Plan (EAP) in place, height, last inspection date, nearest downstream city, "as the crow flies" distance to the nearest downstream city and normal storage of water impounded by the dam in acre feet. An acre foot is defined as the volume of one acre of surface area to the depth

of one foot.

Figure 3.13 provides the locations of NID high hazard dams located within the planning area. **Figure 3.14** shows all dam locations in Christian County. **Figure 3.15** shows individual maps for each dam and surrounding floodplain areas.

Table 3.26. High Hazard Dams in the Christian County Planning Area

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
Liar's Lake Dam	Y	39	420	9/26/17	Elkhorn Creek	Forsyth	21	Cindy Winship
Paul's Lake Dam	NR	25	25	N/A	Finley Creek	Ozark	15	Fred Paul
Stoneshire Lake #2 Dam	NR	25	67	N/A	Camp Creek	Saddlebrooke	6	Private
Sugar Camp Creek Dam	NR	34	691	N/A	Swan Creek	Forsyth	22	Bruce Winship
Galindo Family Dam	N	48	0	4/24/14	W. Fork Bull Creek	Saddlebrooke	6	Galindo Family

Sources: Missouri Department of Natural Resources, <https://dnr.mo.gov/geology/wrc/dam-safety/damsinmissouri.htm> and National Inventory of Dams, http://nid.usace.army.mil/cm_apex/f?p=838:12. Contact the MoDNR Dam and Reservoir Safety Program at 800-361-4827 to request the inundation maps for your county to show geographic locations at risk, extent of failure and to perform GIS analysis of those assets at risk to dam failure.

Figure 3.13. High Hazard Dams in Christian County

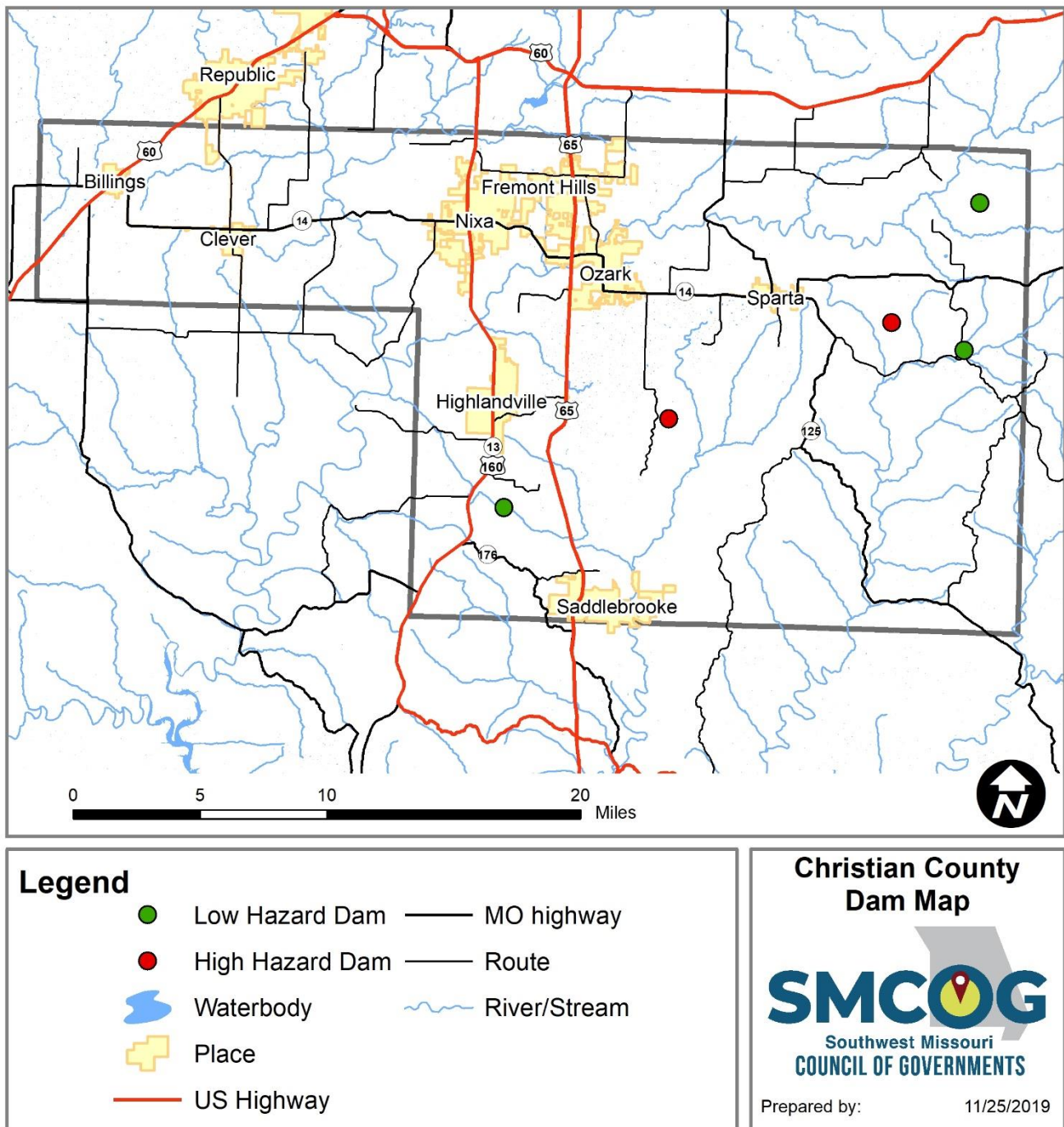


Figure 3.14. Dam Locations in Christian County

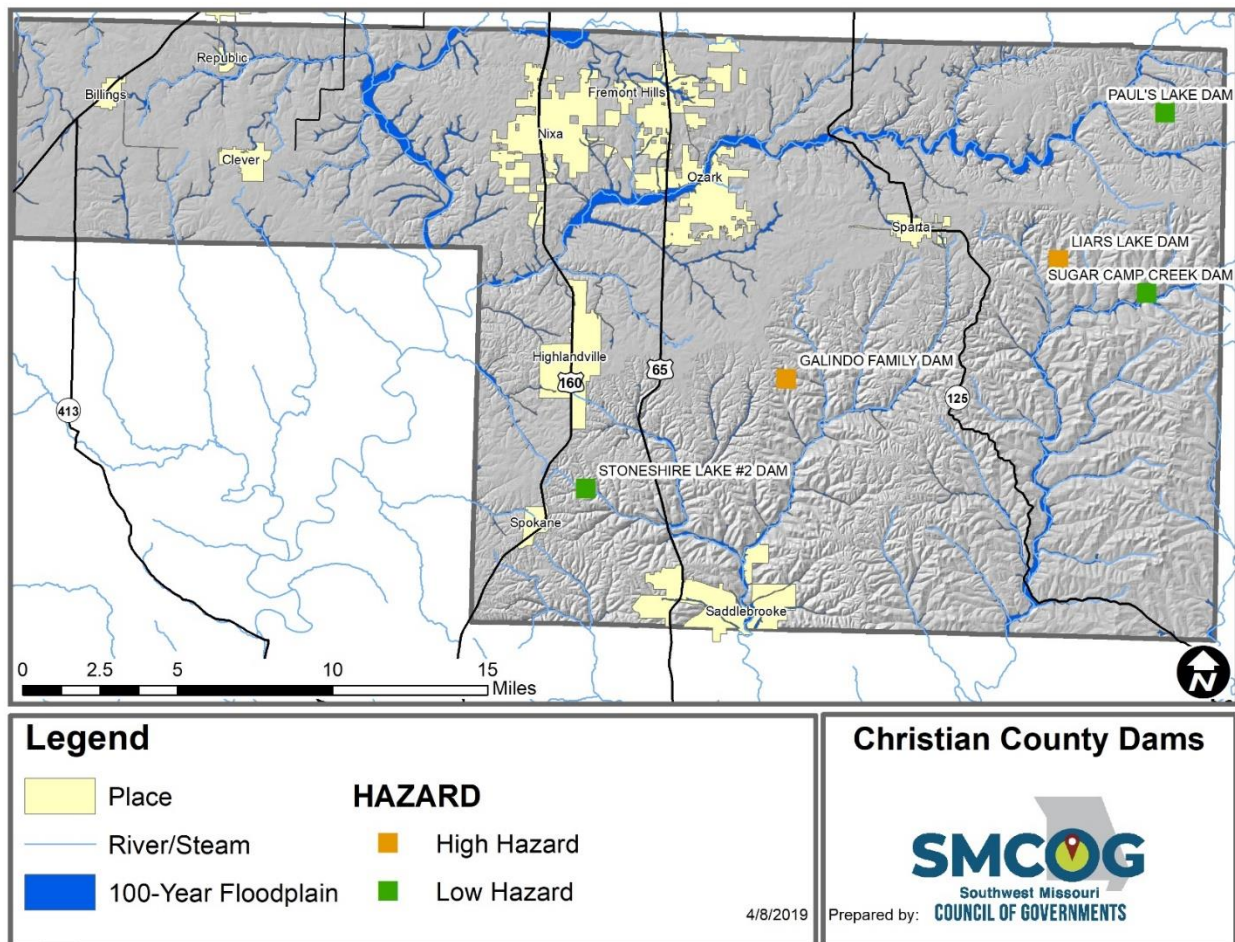
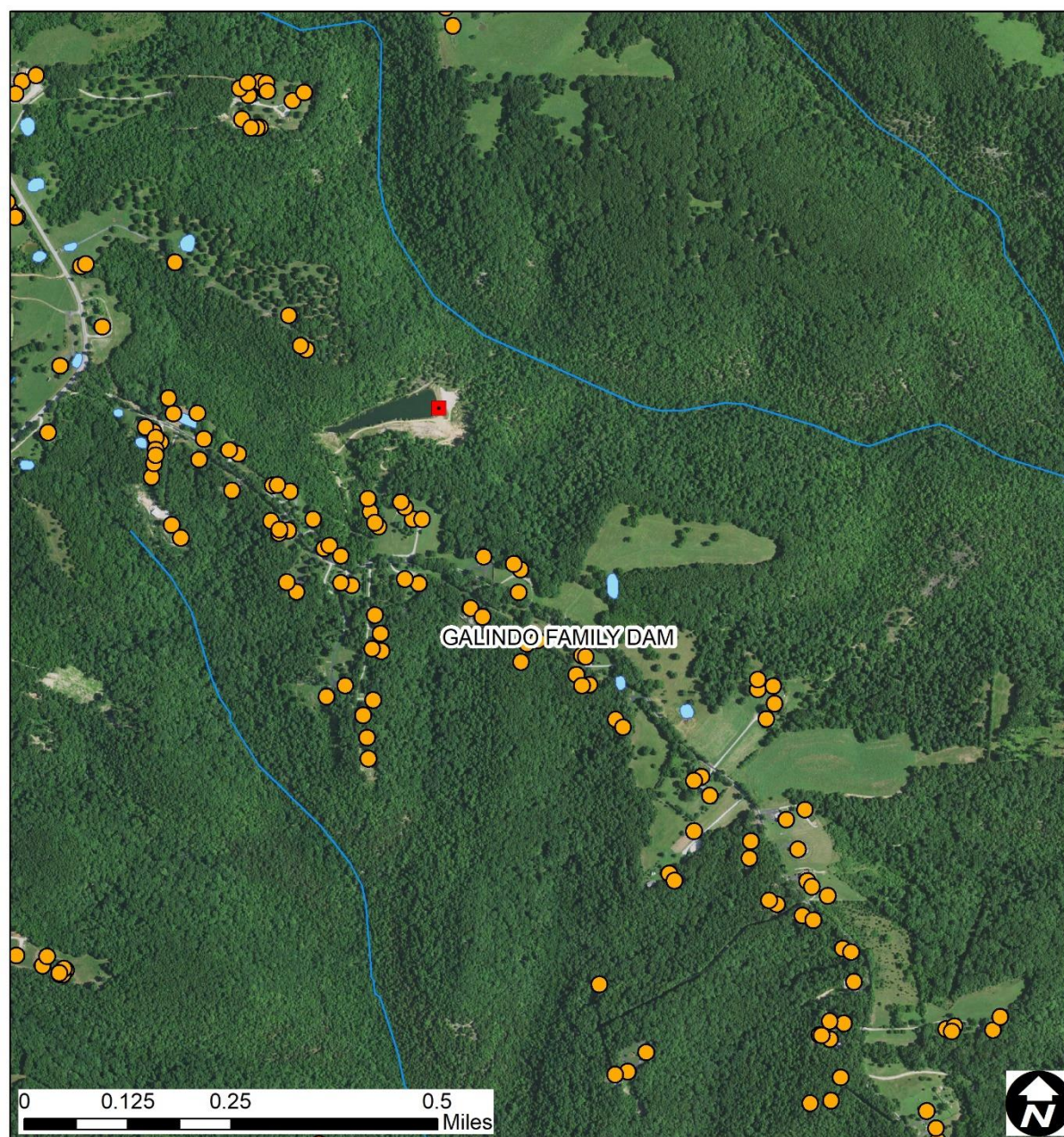
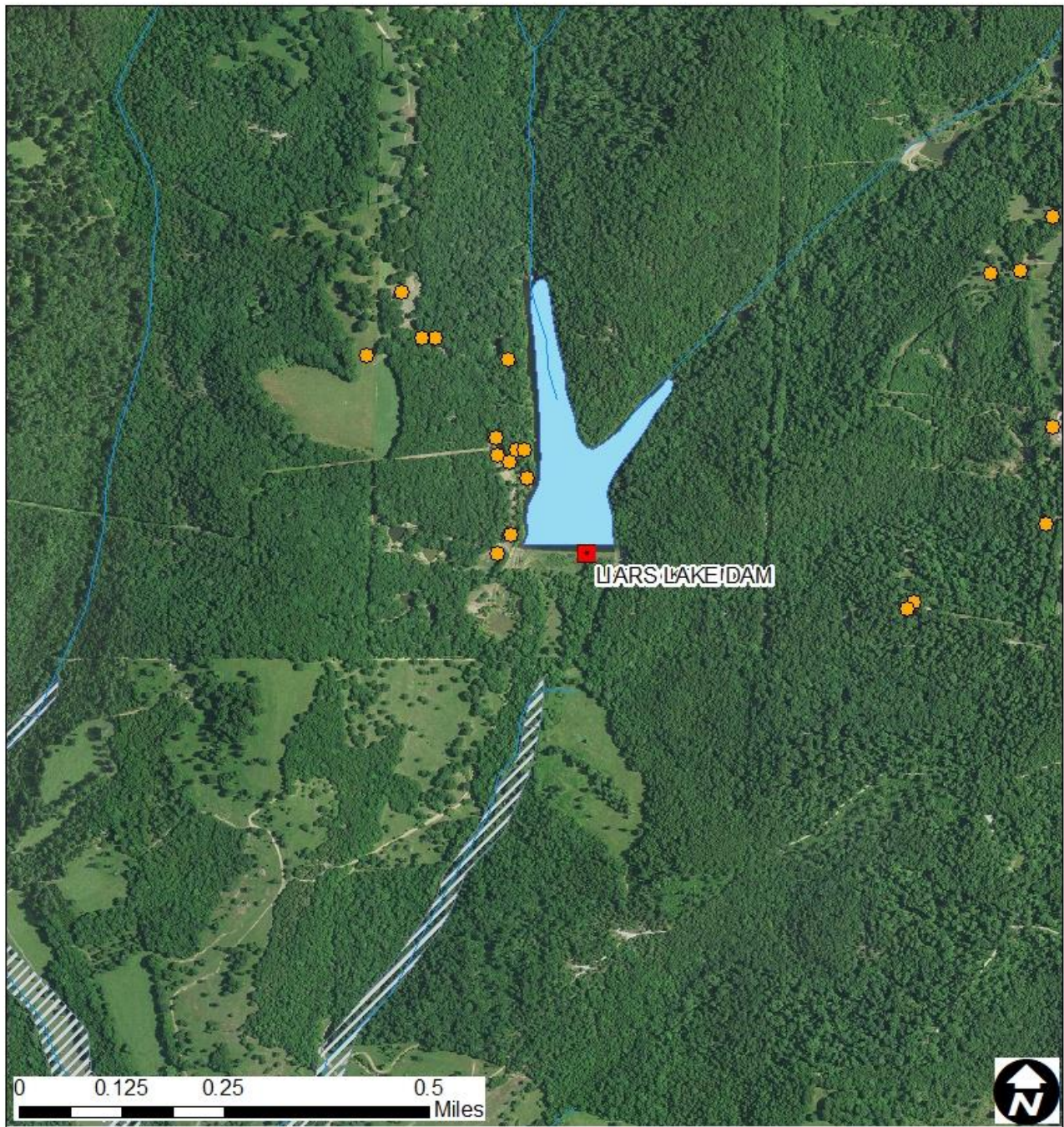


Figure 3.15. Dam Maps in Christian County





Legend

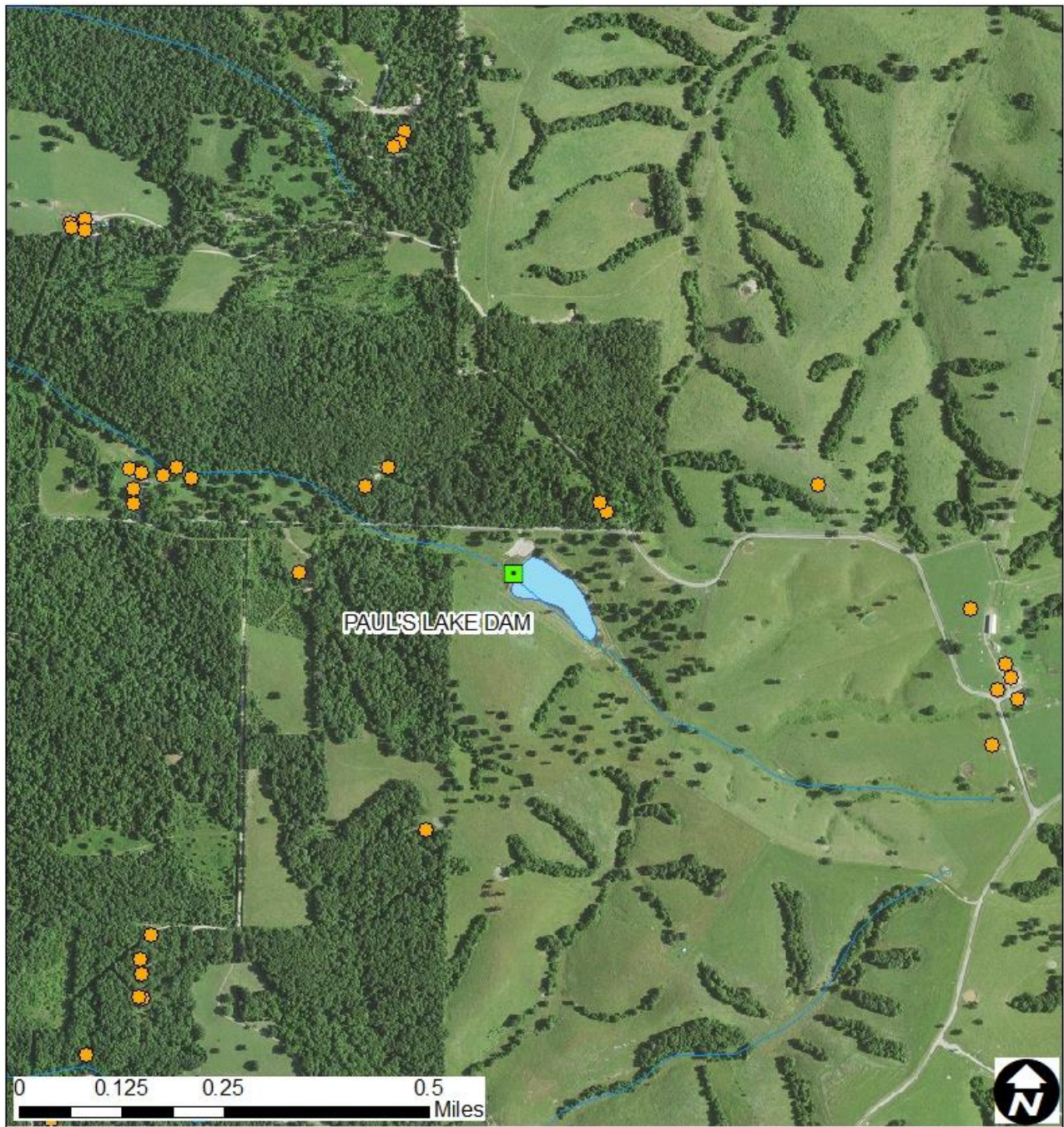
- | | | | |
|---|-----------------|---|---------------------|
|  | Structure Point |  | River/Stream |
|  | High Hazard |  | Waterbody |
|  | Low Hazard |  | 100-Year Floodplain |

Christian County Dams Liars Lake Dam



Prepared by:

03/22/19



Legend

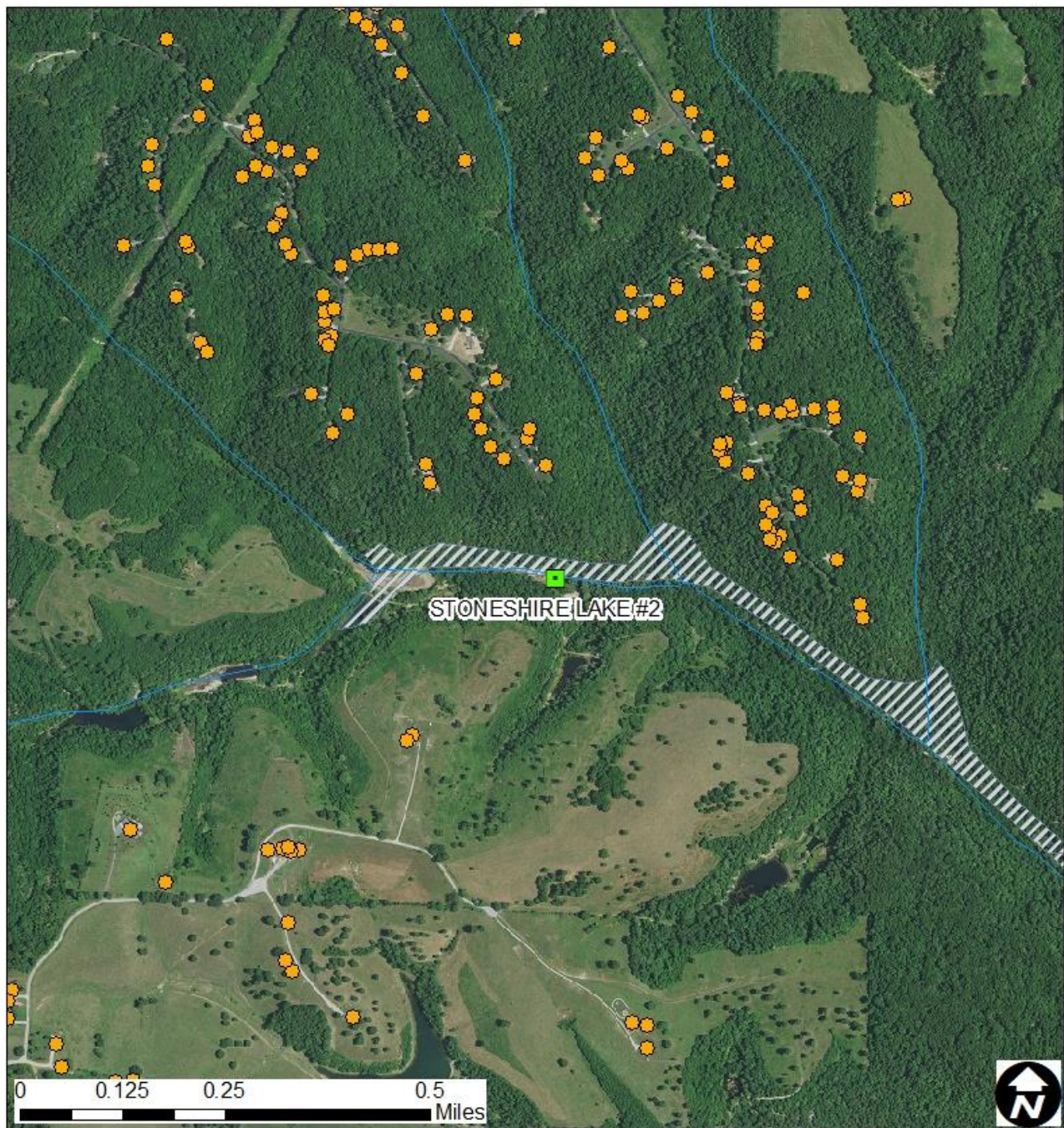
- | | | | |
|---|-----------------|---|---------------------|
|  | Structure Point |  | River/Stream |
|  | High Hazard |  | Waterbody |
|  | Low Hazard |  | 100-Year Floodplain |

Christian County Dams Paul's Lake



Prepared by:

03/22/19



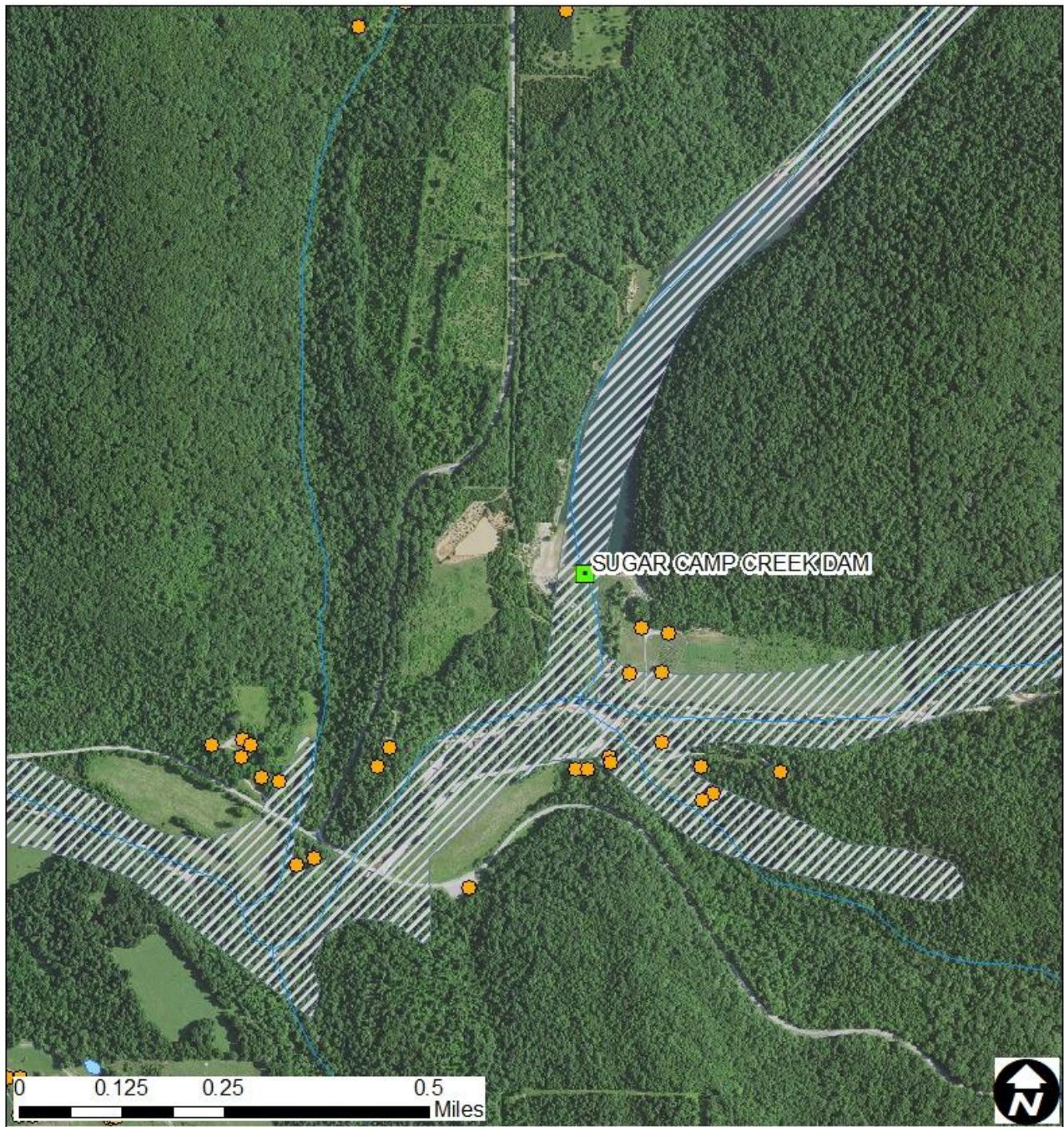
Legend

- | | | | |
|---|-----------------|---|---------------------|
|  | Structure Point |  | River/Stream |
|  | High Hazard |  | Waterbody |
|  | Low Hazard |  | 100-Year Floodplain |

Christian County Dams Stoneshire Lake #2



Prepared by: 03/22/19



Legend

- | | | | |
|---|-----------------|---|---------------------|
|  | Structure Point |  | River/Stream |
|  | High Hazard |  | Waterbody |
|  | Low Hazard |  | 100-Year Floodplain |

Christian County Dams Sugar Camp Creek Dam



Prepared by: 03/22/2019

Upstream Dams Outside the Planning Area

The Springfield Lake Dam in southern Greene County on the James River would have moderate impact if it were to flood. The majority of the water would flow into the James River; however, overtopping would result in flooding of the immediate areas around it. This includes a nearby neighborhood to the left side and the Power Station to the right. Many roads and areas of nature would also be flooded. At its full capacity, the dam has potential to reach all the way to Branson, MO, where it would cease flooding at Table Rock Lake.

Strength/Magnitude/Extent

It can be stated that the strength/magnitude of dam failure would be similar in some cases to flood events (see the flood hazard vulnerability analysis and discussion). The strength/magnitude/extent of dam failure is related to the volume of water behind the dam as well as the potential speed of onset, depth, and velocity. For this reason, dam failures could flood areas outside of mapped flood hazards.

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

Previous Occurrences

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

Probability of Future Occurrence

Since there has been no recorded events in Christian County in the past 20 years, a calculation of a probability percent would give a 0 percent annual probability of a dam failure. According to information from the 2018 State Plan, there were 19 dam failures and 68 incidents in a 42-year period in Missouri. This equates to an annual probability of 45% dam failure somewhere in the state and a 100% annual probability of a dam incident. However, with over 5,000 dams across the state the probability that a dam failure would occur at the significant hazard dam in Christian County is very low. If development occurs downstream of dams, then the percentage of significant or high hazard dams may increase. Additionally, the probability of dam failure may increase, as many of the smaller and privately-owned dams continue to deteriorate without the benefit of further regulation or improvements. Regular inspection and maintenance greatly reduces the probability of dam failure.

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 Christian County is limited to structures and critical infrastructure located in dam inundation zones. All dams are located in unincorporated parts of the county. The Springfield Lake Dam is upstream of the County on the James River and the mapped inundation zone for dam failure only includes unincorporated parts of the county along the James River. Currently only two state regulated dams with heights of 35 or greater. Both of these dams are rated High Hazard/Class II dams. Of these two, only the Liar's Lake Dam inundation area has been mapped by DNR. It should be noted that there are 3 unregulated dams in Christian County that do not meet the 35-foot dam height requirement to fall under state regulation. These three dams are Class III dams according to the NID. According to this classification there are no structures or infrastructure in the downstream. Although failure potential certainly exists for these non-regulated dams, it is very difficult to attempt to analyze vulnerability due to data limitations. It can be assumed that there are up to nine (9) permanent structures, campgrounds, or utilities in the downstream environments of the two Class II dams. The Springfield Lake Dam is a federally regulated Class I structure.

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

In the event of a failure at the Springfield Lake Dam, the immediate unincorporated parts of the county and cities within its inundation zone would begin to flood, stopping at Table Rock Lake at a full capacity flood. Provided there is a failure at Liar's Lake Dam, the water would most likely flood into the immediate floodplains close to the area. No immediate structures would be in the path of the preceding flood and most likely would not be damaged. The Galindo Family Dam would most likely flow through the forest into the nearby river, avoiding any structures. A flood from either of these dams could cause damage to the surrounding natural environment.

Impact of Previous and Future Development

It is possible that future development will occur in the downstream environment of dams within the county, however no major development is expected. Christian County is a participant of the NFIP and can regulate development within SFHAs that overlap with dam inundation zones. Prohibiting development in the floodplain will somewhat mitigate potential damages to future development.

Hazard Summary by Jurisdiction

Christian County is the only jurisdiction in the county vulnerable to dam failure. There are no mapped inundation areas or potential inundation areas within cities. No school district facilities or special district facilities are located within inundation areas or downstream environments from existing dams.

Community Comments on Hazard

None of the 453 residents who completed the online survey stated that they had been personally impacted by dam failure. 12 of the respondents (2.6%) thought it was either highly likely or likely to impact their community in the future. Eight respondents felt that dam failure would have a catastrophic impact, while 264 of the 453 respondents felt that a dam failure would have no impact on their community if it were to occur. 340 of the 453 respondents (75%) said that they were not at all concerned with dam failure occurring in Christian County.

Problem Statement

There are two dams in the county with a high hazard potential. Both of these dams are state regulated, however, only the Liar's Lake Dam has a mapped dam inundation zone or has an emergency action plan in place. Neither DNR nor Christian County have the regulatory authority to regulate the Springfield Lake Dam, however, this dam is federally regulated. Although the probability of dam failure in the county is very low the potential for damage remains.

Residents near a Class I or Class II hazard dams should become familiar with the dam's emergency action plans, if available. Emergency plans written for dams include procedures for notification and coordination with local law enforcement and other governmental agencies, information on the potential inundation area, plans for warning and evacuation, and procedures for making emergency repairs.

3.4.3 Earthquakes

Hazard Profile

Hazard Description

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

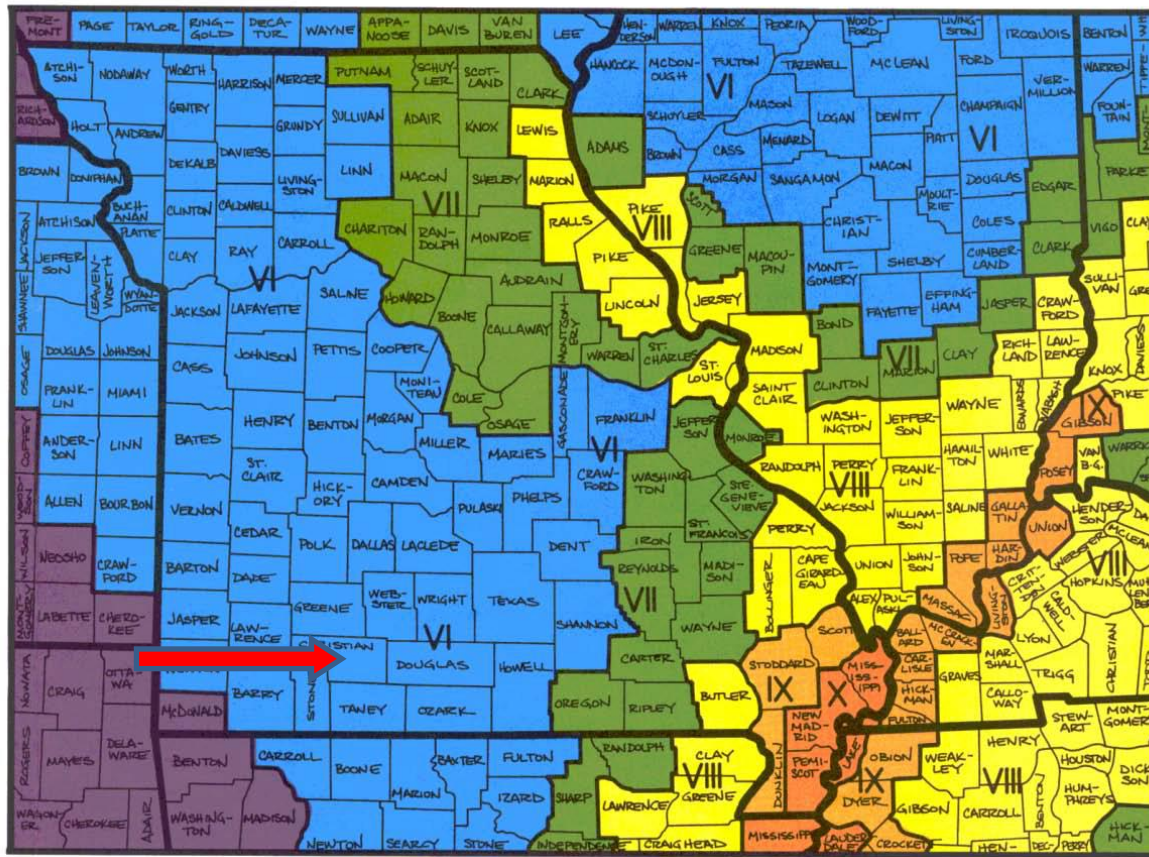
The subterranean faults were formed many millions of years ago on or near the surface of the earth. Subsequent to that time, these ancient faults subsided, while the areas adjacent were pushed up. As this fault zone (also known as a rift) lowered, sediments filled in the lower areas. Under pressure,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

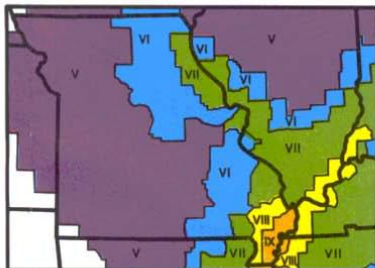
The greatest hazard from earthquakes in Christian County comes from the New Madrid Seismic Zone situated in the boot heel area of southeast Missouri. The potential of high magnitude earthquakes occurring along the New Madrid fault presents risk that does not vary across the planning area. The Nemaha uplift in central Kansas is also prone to seismic activity, however, the center of the Humbolt fault zone near the Nemaha Uplift is approximately 180 to 220 mile west of Christian 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 8.6 earthquake, respectively.

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

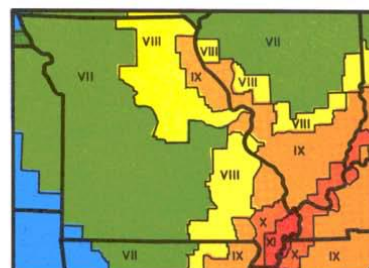


This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude - 7.6 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.



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

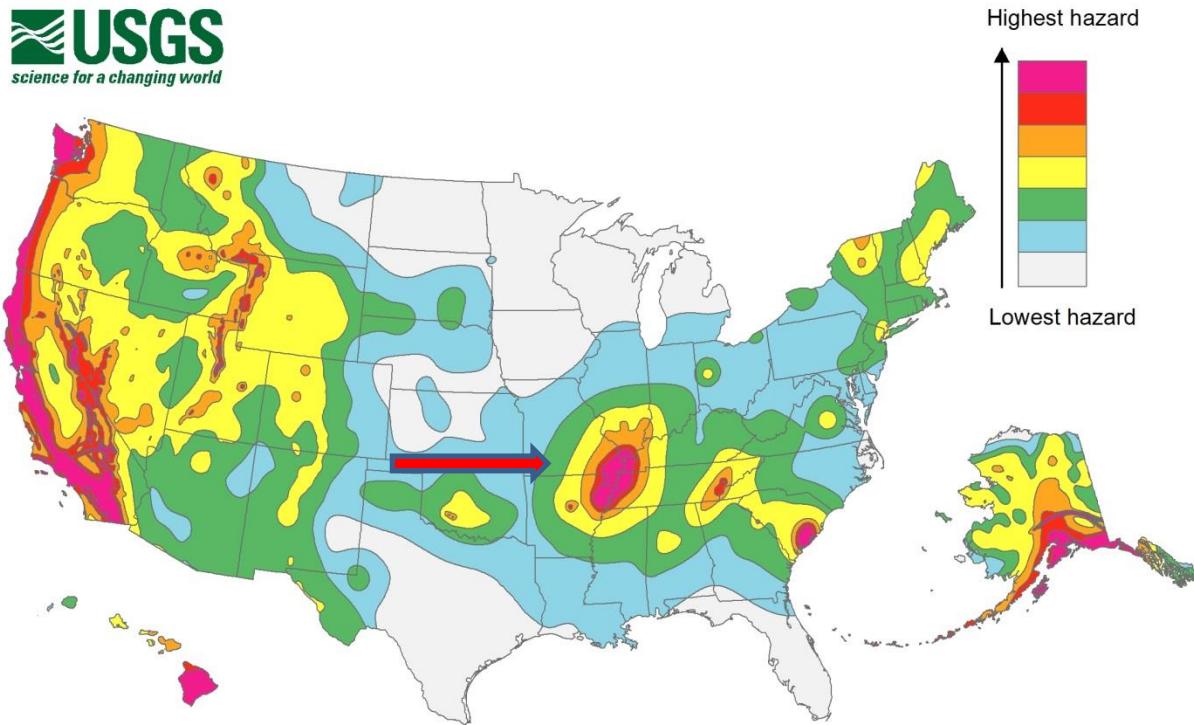
Figure 3.17. Mercalli Intensity Scale

MODIFIED MERCALLI INTENSITY SCALE	
I People do not feel any Earth movement.	
II A few people might notice movement.	
III Many people indoors feel movement. Hanging objects swing.	
IV Most people indoors feel movement. Dishes, windows, and doors rattle. Walls and frames of structures creak. Liquids in open vessels are slightly disturbed. Parked cars rock.	
V Almost everyone feels movement. Most people are awakened. Doors swing open or closed. Dishes are broken. Pictures on the wall move. Windows crack in some cases. Small objects move or are turned over. Liquids might spill out of open containers.	IX Most buildings suffer damage. Houses that are not bolted down move off their foundations. Some underground pipes are broken. The ground cracks conspicuously. Reservoirs suffer severe damage.
VI Everyone feels movement. Poorly built buildings are damaged slightly. Considerable quantities of dishes and glassware, and some windows are broken. People have trouble walking. Pictures fall off walls. Objects fall from shelves. Plaster in walls might crack. Some furniture is overturned. Small bells in churches, chapels and schools ring.	X Well-built wooden structures are severely damaged and some destroyed. Most masonry and frame structures are destroyed, including their foundations. Some bridges are destroyed. Dams are seriously damaged. Large landslides occur. Water is thrown on the banks of canals, rivers, and lakes. Railroad tracks are bent slightly. Cracks are opened in cement pavements and asphalt road surfaces.
VII People have difficulty standing. Considerable damage in poorly built or badly designed buildings, adobe houses, old walls, spires and others. Damage is slight to moderate in well-built buildings. Numerous windows are broken. Weak chimneys break at roof lines. Cornices from towers and high buildings fall. Loose bricks fall from buildings. Heavy furniture is overturned and damaged. Some sand and gravel stream banks cave in.	XI Few if any masonry structures remain standing. Large, well-built bridges are destroyed. Wood frame structures are severely damaged, especially near epicenters. Buried pipelines are rendered completely useless. Railroad tracks are badly bent. Water mixed with sand, and mud is ejected in large amounts.
VIII Drivers have trouble steering. Poorly built structures suffer severe damage. Ordinary substantial buildings partially collapse. Damage slight in structures especially built to withstand earthquakes. Tree branches break. Houses not bolted down might shift on their foundations. Tall structures such as towers and chimneys might twist and fall. Temporary or permanent changes in springs and wells. Sand and mud is ejected in small amounts.	XII Damage is total, and nearly all works of construction are damaged greatly or destroyed. Objects are thrown into the air. The ground moves in waves or ripples. Large amounts of rock may move. Lakes are dammed, waterfalls formed and rivers are deflected.
Intensity is a numerical index describing the effects of an earthquake on the surface of the Earth, on man, and on structures built by man. The intensities shown in these maps are the highest likely under the most adverse geologic conditions. There will actually be a range in intensities within any small area such as a town or county, with the highest intensity generally occurring at only a few sites. Earthquakes of all three magnitudes represented in these maps occurred during the 1811 - 1812 "New Madrid earthquakes." The isoseismal patterns shown here, however, were simulated based on actual patterns of somewhat smaller but damaging earthquakes that occurred in the New Madrid seismic zone in 1843 and 1895. Prepared and distributed by THE MISSOURI STATE EMERGENCY MANAGEMENT AGENCY P.O. BOX 116 JEFFERSON CITY, MO 65102 Telephone: 573-526-9100	

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

Figure 3.18 illustrates seismicity in the United States. A red arrow showing the location Christian County has been inserted into the map.

Figure 3.18. 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 in **Figure 3.17**. It was developed in 1931 and is composed of 12 increasing levels of intensity. They range from imperceptible shaking to catastrophic destruction, and each of the twelve levels is denoted by a Roman numeral. The scale does not have a mathematical basis but is based on observed effects. Its use gives the laymen a more meaningful idea of the severity.

Previous Occurrences

There is no historical record of an earthquake occurrence within Christian 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.

Probability of Future Occurrence

Without a definite historical record for earthquakes in Christian 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 for 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 any given year is 1.0%. At the 40% level, the likelihood of an earthquake happening in any 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 and most impactful earthquake risk to Christian County is the New Madrid fault in the boot-heel region of Missouri. A 7.6 magnitude earthquake would result in poorly built buildings damaged slightly; considerable quantities of dishes, glassware and windows broken; people having trouble walking; pictures falling off walls; objects falling from shelves; plaster in walls cracking; and furniture overturned. Damage to structures will occur but will vary on the quality of construction. In addition, some underground utilities may be damaged. Some injuries may occur, but fatalities are unlikely.

Potential Losses to Existing Development

Potential losses to existing development include the total exposure for all communities. The total exposure of 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 3.27 depicts the estimated losses in each jurisdiction based on total exposure and a 0.5% damage factor.

Table 3.27. Estimated Potential Earthquake Losses

Jurisdiction	Potential Earthquake Losses
Unincorporated Christian County	\$ 34,147,895
Clever	\$ 1,687,716
Fremont Hills	\$ 1,832,109
Highlandville	\$ 586,327
Nixa	\$ 19,252,083
Ozark	\$ 15,978,943
Saddlebrooke	\$ 775,342
Sparta	\$ 928,870

Impact of Previous and Future Development

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

Hazard Summary by Jurisdiction

Earthquake intensity is not likely to vary greatly throughout the planning area, the risk will be the same throughout. However, damages could differ if there are structural variations in the planning area built-environment. For example, if one community has a higher percentage of residences built prior to 1939 than the other participants, that community is likely to experience higher damages. **Table 3.28** shows the number of housing units built in 1939 or earlier as well as the percentage.

Table 3.28. Housing Units Built in 1939 or Earlier

Jurisdiction	Built 1939 or earlier #	Built 1939 or earlier %
Christian County	1,508	4.5%
Clever	29	2.7%
Fremont Hills	2	0.5%
Highlandville	16	3.7%
Nixa	64	0.8%
Ozark	209	2.7%
Saddlebrooke	1	1%
Sparta	44	6%
Spokane	-	-

Source: [Missouri Census Data Center](#). (2013-2017). ACS Profiles

Unincorporated Christian County has the greatest number of structures built before 1939. The Unincorporated County also has the highest percentage overall risk, with 4.5% of the structures located there built before 1939 or earlier.

School Districts with facilities constructed prior to 1939 could suffer more damages than newer facilities, however, most school facilities in the district have been constructed after 1939 and are considered well-built structures and therefore, less vulnerable to potential ground shaking. All districts in the county have renovated or plan on renovating and improving campus facilities over the past five years or within the next five years. Billings Special Road District could experience structural damages to low water crossings and bridges resulting from ground shaking during an earthquake. In addition, Christian County Ambulance District facilities and OTC Richwood Valley Campus facilities have all been constructed after 2000.

Community Comments on Hazard

None of the 453 residents who completed the online survey stated that they had been personally impacted by earthquakes. 241 of the respondents (57%) felt that earthquakes were unlikely to impact their community in the future, while only 9 respondents (2%) thought it was highly likely to impact their community. 183 of 453 respondents (40%) felt that earthquakes would have either a catastrophic or critical impact if one were to occur in Christian County. However, a majority of respondents were generally not concerned about the occurrence of earthquake in Christian County, with 300 respondents (66%) stating they were either not at all or not so concerned of an earthquake affecting their community.

Problem Statement

Based on likely damage from a 7.6 magnitude earthquake along the New Madrid fault, Older poorly built structures will suffer slight damage. Unincorporated Christian County would be most at risk if an earthquake were to hit, as 1,508 buildings (4.8%) were built at 1939 or earlier.

3.4.4 Land Subsidence/Sinkholes

Hazard Profile

Hazard Description

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

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

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

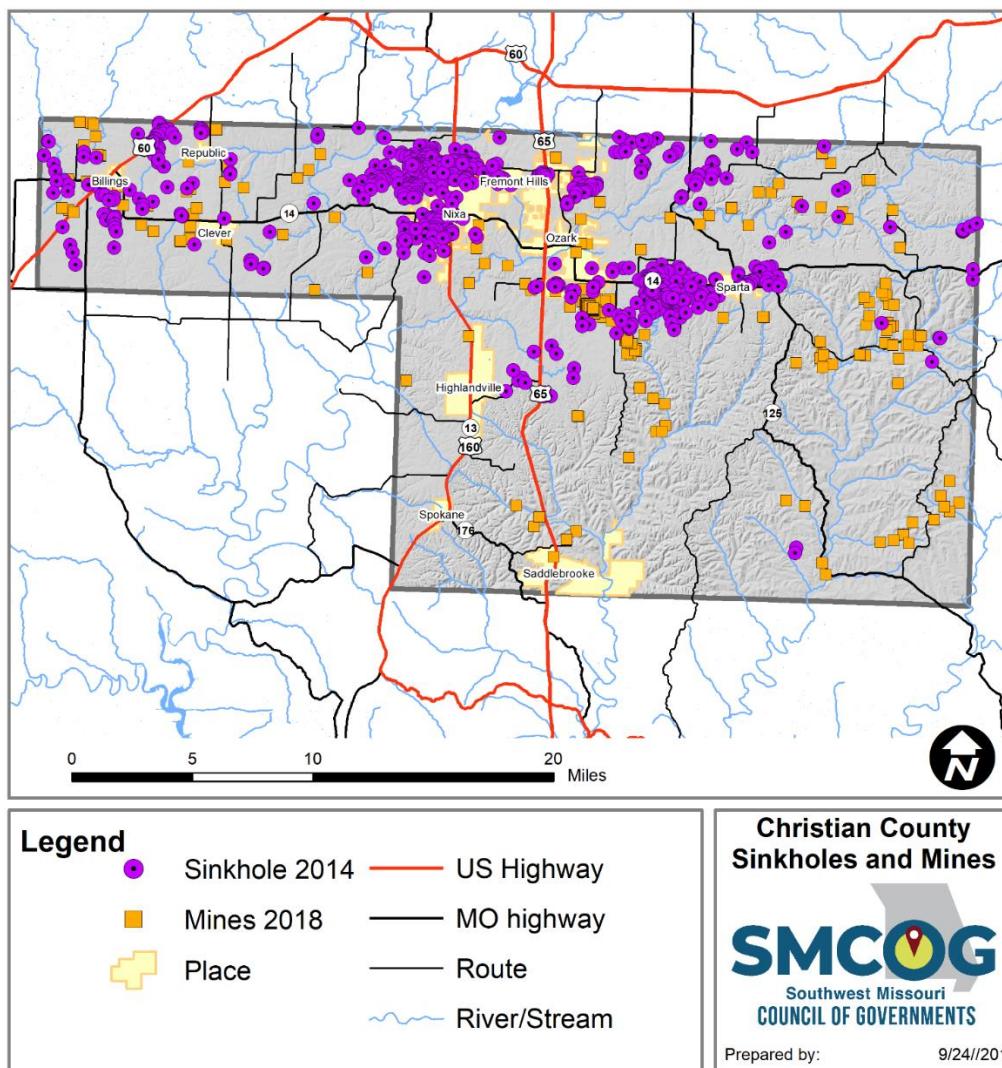
According to the U.S. Geological Survey (USGS), the most damage from sinkholes tends to occur in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania. Fifty-nine percent of

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

Geographic Location

According to spatial data from Missouri Geological Survey, there are 643 sinkhole formations have been identified in Christian County. In addition, according to the MDNR Inventory of Mines, Occurrences, and Prospects, There are 53 underground mines in Christian County. Most of these mines were lead and zinc operations opened in the late 1800s. The only active mining operations in the county are surface operations, such as limestone quarries. **Figure 3.19** depicts the location of sinkholes and mines, occurrences, and prospects within Christian County.

Figure 3.19. Sinkholes and Underground Mines in Christian 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. Most recently in Christian County, sinkholes have occurred in and near Nixa. In March 2018 a [sinkhole](#) formed near Nixa's Junior High School. This sinkhole closed nearby streets and part of the school's track. In February of 2019 [another sinkhole](#) was discovered in the Ozarks Technical Community College Campus, costing an estimated \$7,906 to fill.

Probability of Future Occurrence

There is currently no database regarding sinkhole occurrences in Christian County. Because of this, no official estimation can be made regarding the probability of future occurrences. That being noted, with information available from the 2016 plan and local news sources, an unofficial estimation can be provided to give a rough idea of future probability. The 2016 plan notes 4 documented occurrences between 2006 and 2015, local news sources (KSPR and Springfield News-Leader) documented another 2 between 2015 and 2019. A total of 6 documented occurrences between 2006 and 2019 equates to a 42.8% chance of a sinkhole formation on any given year.

Changing Future Conditions Considerations

Changes in climate conditions could increase the number of sinkhole occurrences throughout Christian 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 the 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. The entire county is underlain with limestone and dolomite bedrock.

Potential Losses to Existing Development

Sinkhole loss estimates were established using GIS processes and appraised valuations. A sinkhole point shapefile acquired from MDNR 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. The only jurisdiction that contains a sinkhole hazard-prone area within its boundaries is the City of Everton; all other sinkhole hazard-prone areas lie outside of city and village limits and fall under the jurisdiction of Christian County. **Table 3.30** depicts the estimated losses in each jurisdiction based on total exposure and a 0.5% damage factor.

Table 3.29. Sinkhole Exposure by Building Type

Jurisdiction	Residential	Commercial	Industrial	Agricultural	Building Count
Clever	251	7	0	0	258
Fremont Hills	275	0	0	0	275
Highlandville	118	11	0	31	160
Nixa	5,670	171	94	37	5,972
Ozark	4,171	263	16	43	4,493
Saddlebrooke	29	0	0	0	29
Sparta	511	34	3	12	560
Unincorporated	5,563	166	102	2,483	8,314
Total	16,588	652	215	2,606	20,061

Table 3.30. Sinkhole Exposure and Estimate Loses by Jurisdiction

Jurisdiction	Residential	Commercial	Agricultural	Estimated Exposure	Estimated Loss
Clever	\$456,198	\$501,305	\$405	\$957,908	\$4,789.54
Fremont Hills	\$516,631	\$528,582	\$0	\$1,045,213	\$5,226.07
Highlandville	\$151,923	\$176,911	\$2,311	\$331,145	\$1,655.73
Nixa	\$5,123,191	\$5,783,326	\$322	\$10,906,839	\$54,534.20
Ozark	\$3,909,813	\$5,055,878	\$1,235	\$8,966,926	\$44,834.63
Saddlebrooke	\$215,766	\$224,883	\$964	\$441,613	\$2,208.07
Sparta	\$238,375	\$285,535	\$120	\$524,030	\$2,620.15
Unincorporated	\$9,210,410	\$10,003,683	\$162,458	\$19,376,551	\$96,882.76
Total	\$19,822,307	\$22,560,103	\$167,815	\$42,550,225	\$212,751.15

Impact of Previous and Future Development

Because the majority of sinkholes in Christian County occur in urban areas, increased development has affected sinkhole areas as they contain numerous structures. Future development poses an even bigger threat of having infrastructure damage, as well as posing a threat to people. Identified in the county's comprehensive plan is the fact that citizens have been using sinkholes for waste disposal or dumping material. This harms the county's groundwater-based water system, introducing pollutants. The county plan mentions work towards incorporating ordinances into preventing land use around known sinkhole risk areas and hopes to ensure successful development around these areas.

Hazard Summary by Jurisdiction

Sinkholes in Christian County pose the biggest threat closest to urban areas, or just outside city limits.

One of the biggest concentrations of sinkholes lies west and within the city of Nixa as well as west of its northern neighbor Fremont Hills, while the other biggest area of concentration is just west of Sparta and southeast of Ozark. These areas contain structures and have potential to harm both the life and property in the area. It is because of this that Christian County works to regulate limiting construction near existing sinkholes.

Community Comments on Hazard

None of the respondents responded that they had been personally affected by sinkholes or land subsidence in their community. The sinkholes reported in the previous occurrences section are the most major recent sinkholes to affect Christian County.

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 as region-specific since the atmospheric conditions that result in deficiencies of precipitation are highly variable from region to region.
- Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (e.g., streamflow, reservoir and lake levels, ground water). The frequency and severity of hydrological drought is often defined on a watershed or river basin scale. Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. Hydrological droughts are usually out of phase with or lag the occurrence of meteorological and agricultural droughts. It takes longer for precipitation deficiencies to show up in components of the hydrological system such as soil moisture, streamflow, and ground water and reservoir levels. As a result, these impacts also are out of phase with impacts in other economic sectors.
- Agricultural drought focus is on soil moisture deficiencies, differences between actual and potential evaporation, reduced ground water or reservoir levels, etc. Plant demand for water depends on prevailing weather conditions, biological characteristics of the specific plant, its

stage of growth, and the physical and biological properties of the soil.

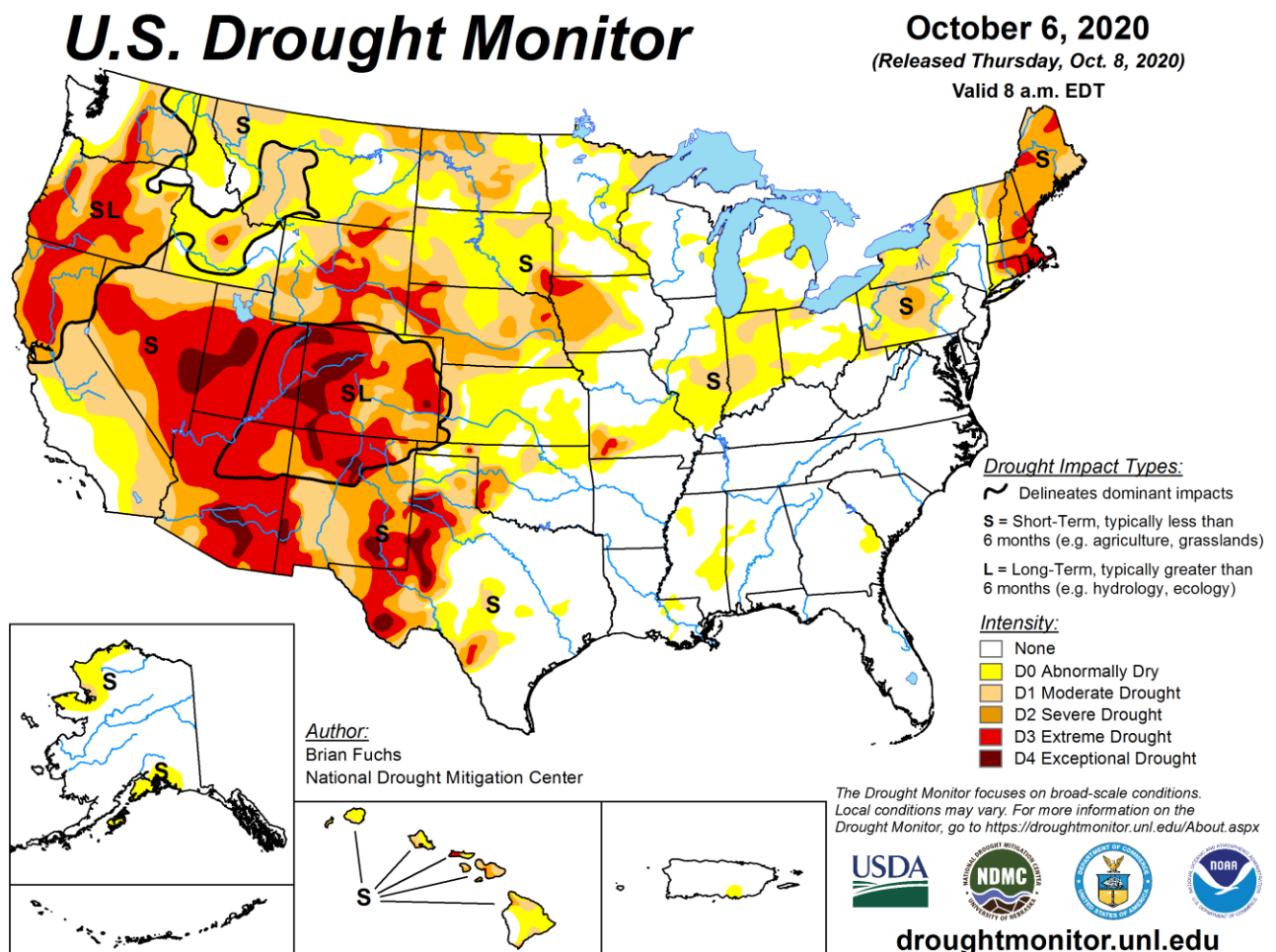
- Socioeconomic drought refers to when physical water shortage begins to affect people.

Geographic Location

Droughts are regional climatic events that can impact large areas and multiple counties. The entire county is at risk to the impacts of drought. However, drought most directly impacts the agricultural sector, so areas within the county where there is extensive agricultural land use can experience significant impacts. Although areas in the western panhandle of the county are rated by the USDA Soil Survey as prime farmland, the majority of agricultural activity in the county is low-intensity livestock production. The lower density of low intensity livestock production in the county limits areas of extensive agricultural land use in the county. All incorporated communities in the county rely on wells for water supply. The impact of drought on deeper public wells would not be significant unless the drought was of such severity to reduce groundwater levels.

Figure 3.20 is a recent map from the U.S. drought monitor. At this snapshot in time, parts of Missouri were in an extreme drought. Areas in and around Christian County were affected by this drought.

Figure 3.20. U.S. Drought Monitor Map of Missouri on October 6, 2020



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

Strength/Magnitude/Extent

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

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

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 17 drought events occurring in Christian County from 1996 through 2014. Many of these were multiple reports from persistent drought events that lasted several months. The NCEI reports indicate that there were five distinct drought periods during a 20-year timeframe. **Table 3.31** provides a summary of these events.

Table 3.31. Previous Drought Occurrences 2000-2019

Drought Year	Months	Property Damage	Crop Damage
2000	August-September	\$0	\$0
2006	January-April	\$0	\$0
2011	July-November	\$0	\$5,000
2012	October-December	\$0	\$2,470,000
2013	January	\$0	\$0

Source: NCEI Storm Events Database <https://www.ncdc.noaa.gov/stormevents/>

According to the USDA cause of loss historical data files, there were 27 insurance payments for crop loss over the past four years. **Table 3.32** provides details on past insurance payments.

Table 3.32. Insurance Payments by Year Because of Drought 2016-2019

Year	Insurance Payments	Total Cost
2019	0	\$0
2018	2	\$161,312.10
2017	1	\$3,323.00
2016	1	\$18,953.00

Source: USDA Cause of Loss Historical Data Files <http://www.rma.usda.gov/data/cause.html>

Probability of Future Occurrence

Over the 20-year record period, Christian County was in a drought for 16 months. There is a total of 240 months in the record period. Based on the number of months of drought and the total number of months in the record period, there is a 6.6% probability of drought occurrence in the county in any given month. Although drought is not predictable, long-range outlooks and predicted impacts of climate change could indicate an increased chance of drought persistence and severity.

Changing Future Conditions Considerations

Drought frequently affects Missouri, including Christian 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 Christian County, 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.

According to data from the USDA Risk Management Agency, there was \$183,588.10 in insured crop loss payments in Christian County in the years of 2016-2019. Therefore, it is probably that future droughts will result in crop losses. There are no anticipated structural losses.

Impact of Previous and Future Development

Increases in acreage planted with crops would add to exposure to drought-related agricultural losses. In addition, increases in population result in increased demand for treated water, adding additional strain on water supply 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 Clever Fire Protection District or Logan-Rogersville Fire District, would feel impacts in the form of increased risk for wildfire and reduced fire-fighting water sources. Districts currently making improvements to water systems and containing water-based industries, such as Clever's addition of new water towers and improvements towards its water treatment plant, may also be disproportionately affected by a drought.

Community Comments on Hazard

One respondent noted they had been affected by a drought in 2012 in the Chadwick Rural Fire District. 150 respondents (33%) thought it was either highly likely or likely for a drought to hit their community. 16 respondents felt that a drought would have a catastrophic impact on their community, while 131 respondents felt a drought would have a critical impact on the community. The majority of residents were only somewhat concerned that a drought was going to affect their 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 restrict the use of public water resources for non-essential usage, such as landscaping, washing cars, filling swimming pools, etc. during extreme drought periods. School and special districts can also implement water conservation measures at all district facilities as well. Additionally, Christian 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 3.21** 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 for ice jams on flat rivers or streams. When combined with high winds from winter storms, extreme cold becomes extreme wind chill, which is hazardous to health and safety.

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

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

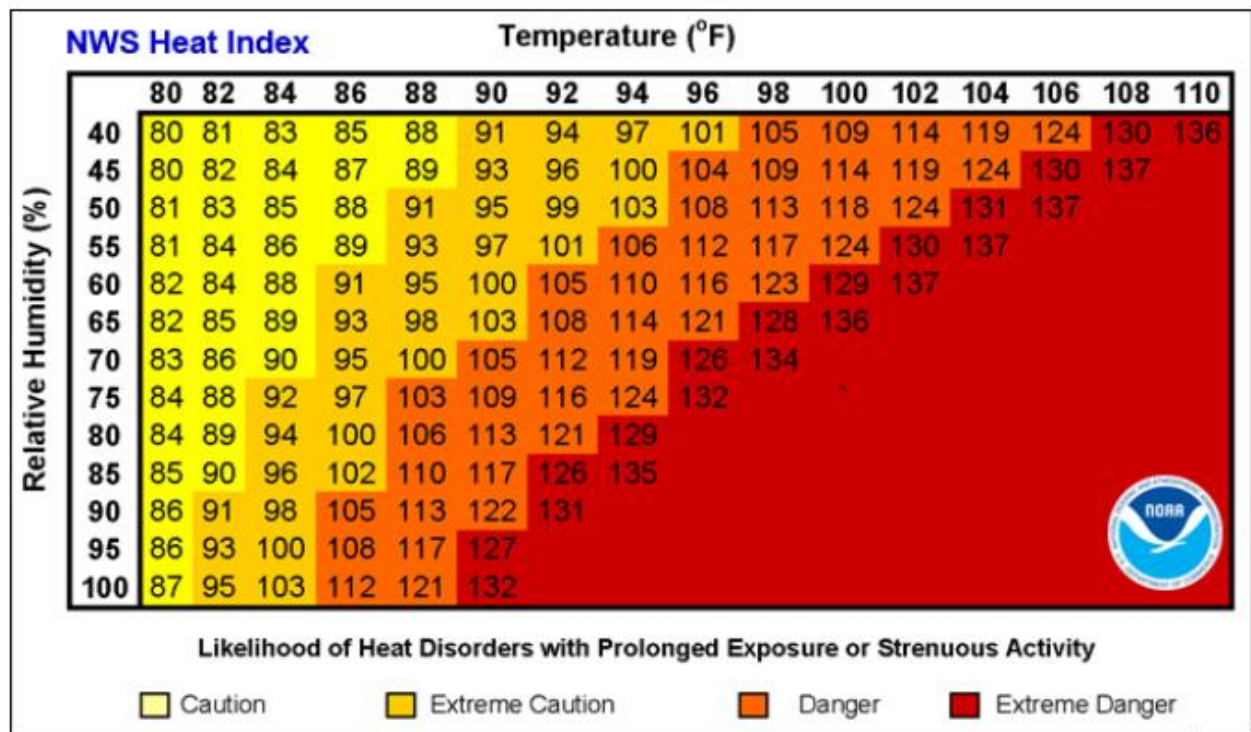
Geographic Location

Extreme heat is an area-wide hazard event, the risk of extreme heat does not vary across Christian 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 for two or more consecutive days: (1) when the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F); and the night time minimum Heat Index is 80°F or above. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees.

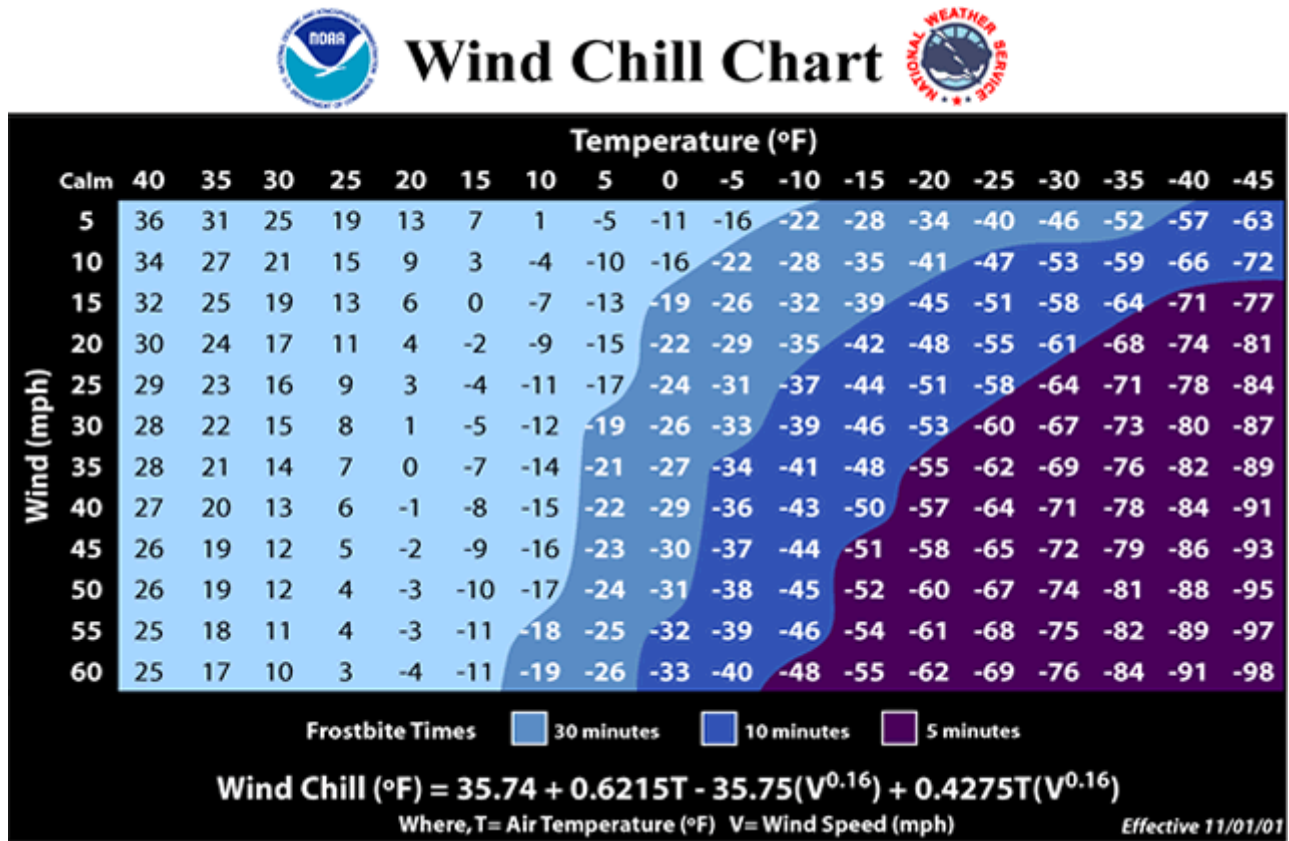
Figure 3.21. Heat Index (HI) Chart



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 3.22** 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 3.22. Wind Chill Chart



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

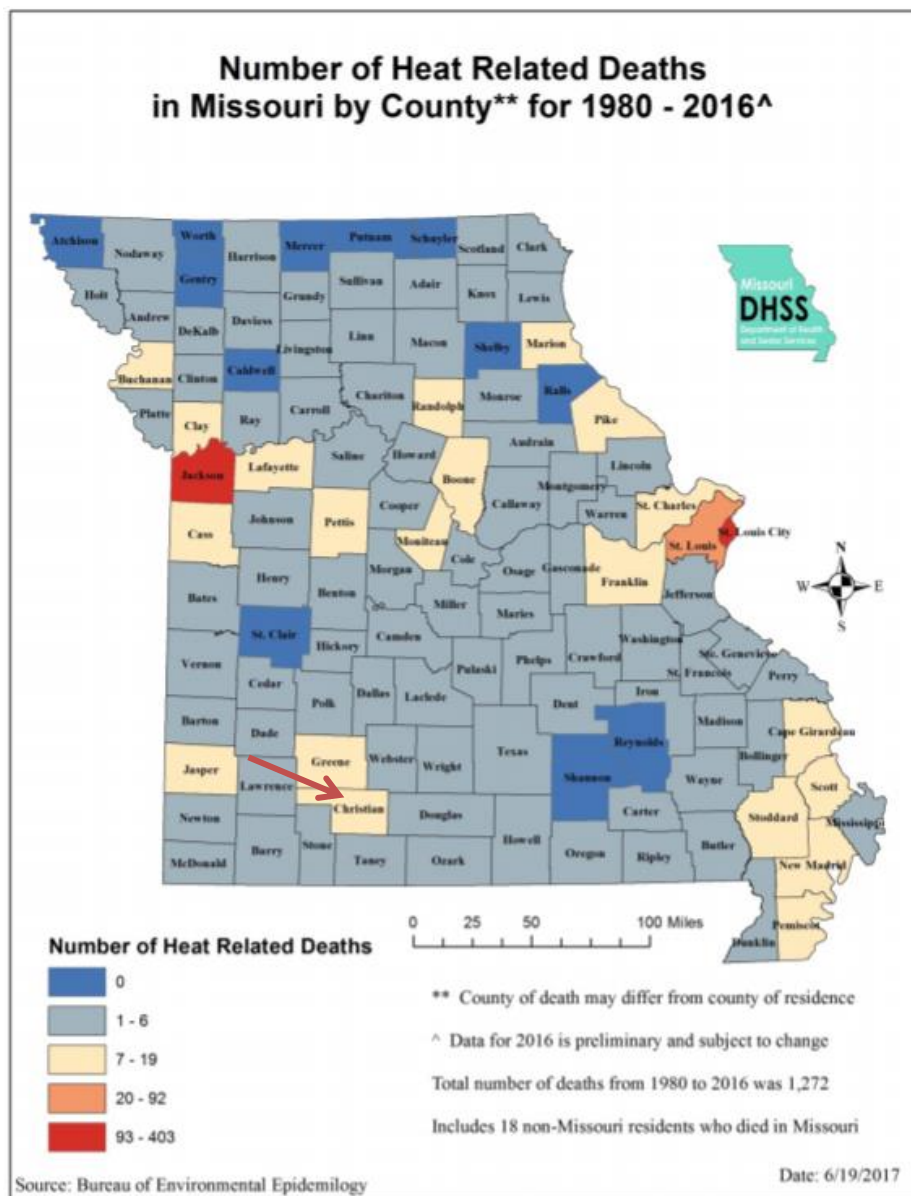
Previous Occurrences

There are seven (7) recorded extreme heat events in the National Centers for Environmental Information (NCEI) database from 2000 to 2019 for Christian County. There were zero deaths and injuries, as well as no property and crop damage associated with these events in the NCEI data for Christian County. The event narratives describe fatalities that occurred during regional multi-county heat events for other nearby counties. Extreme heat events in Christian County were recorded in consecutive months in three separate years from 2000 to 2019. The months for each year are summarized as follows:

- **2000:** August and September
- **2001:** July and August
- **2012:** June, July, and August

Figure 3.23 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 seven (7) and nineteen (19) heat related fatalities in Christian County from 1980 to 2016.

Figure 3.23. Heat Related Deaths in Missouri 1980 - 2016



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

Extreme heat can cause stress to crops and animals. According to USDA Risk Management Agency, losses to insurable crops during the 10-year time period from 2010 to 2019 were \$54,367.13. Extreme heat can also strain electricity delivery infrastructure overloaded during peak use of air conditioning during extreme heat events. Another type of infrastructure damage from extreme heat is road damage. When asphalt is exposed to prolonged extreme heat, it can cause buckling of asphalt-paved roads, driveways, and parking lots.

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

NCEI data lists 2 instances of extreme cold/wind chill from 1999 to 2019, once on December 12th, 2000, and the other on January 1st, 2001. No recorded deaths or injuries occurred from either event. The event on December 12th, 2000 led to numerous water mains breaking, roof leakage, and hazardous roadways. In Stafford, a water main in a high school gymnasium caused considerable damage to school ceiling tiles, light fixtures and the gym floor. Hay supplies also decreased due to persistent ice- and snow-covered fields. Livestock were also affected, and some died.

Probability of Future Occurrence

There were three (3) years with extreme heat events in a 20-year span in Christian County. As a result, there is a 15% of that an extreme temperature event will occur in a given year. There are limitations to the accuracy of this projection as events could go unreported to the NCEI or fail to meet a consecutive occurrence threshold to be considered an event.

There were two periods of extreme cold/wind chill in Christian County over 20 years, which makes the probability of extreme cold/wind chill occurring in any given year 10%.

The events recorded in the NCEI database describe extreme heat as prolonged periods where temperatures rose above 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 conditions, 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 3.33 lists typical symptoms and health impacts due to exposure to extreme heat.

Table 3.33. Typical Health Impacts of Extreme Heat

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

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

Potential Losses to Existing Development

Over a 10-year period Christian County experienced only a single heat related event which damaged crops. This damage which amassed \$54,367.13 translates to an average of \$5,436.71 in damage per year over another 10-year period if similar events are to occur. According to the NCEI disaster database, in a 20-year period (2000-2019) Christian County experienced no deaths or property damage from extreme heat.

Impact of Previous and Future Development

Population growth can result in increases in the age-groups that are most vulnerable to extreme heat. Population growth also increases the strain on electricity infrastructure, as more electricity is needed to accommodate the growing population. Nixa has the highest number of at-risk age groups (under 5 years of age and 65 years and older) of any jurisdiction in the county (when not taking into account the unincorporated portion). Because of Christian County's rising population, it is important to consider infrastructure changes that may be needed to accommodate this change.

Hazard Summary by Jurisdiction

Those at greatest risk for heat-related illness and deaths include children up to five years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. To determine jurisdictions within the planning area with populations more vulnerable to extreme heat, demographic data was obtained from the 2010 census on population percentages in each jurisdiction comprised of those under age 5 and over age 65. Data was not available for overweight individuals and those on medications vulnerable to extreme heat. **Table 3.34** below summarizes vulnerable populations in the participating jurisdictions. Note that school and special districts are not included in the table because students and those working for the special districts are not customarily in these age groups.

Table 3.34. Christian County Population Under Age 5 and Over Age 65, 2019 Census Data

Jurisdiction	Population under 5 years	Population 65 years and over
Unincorporated County	5,644	13,972
Clever	282	384
Fremont Hills	65	173
Highlandville	45	157

Nixa	1,497	3,317
Ozark	1,445	2,495
Saddlebrooke	4	75
Sparta	113	221

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

Schools in the county have proper air-conditioning and heating and follow proper procedures in the event of extreme temperatures. However, daycare and eldercare facilities may be at risk of heat related injuries if facilities are not properly cooled.

Community Comments on Hazard

The community survey only surveyed respondents about extreme heat. Extreme cold was included in the Severe Winter Weather portion of the survey. None of the 453 residents who completed the online survey stated that they had been impacted by extreme heat. 156 of the respondents (34%) felt that extreme heat was highly likely to impact their community in the future. 23 respondents felt that extreme heat would have a catastrophic impact, though 176 felt extreme heat would have a critical impact. Respondents were only somewhat concerned with how extreme heat would impact their community.

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.

The Christian County EMA maintains a list of heating and cooling centers throughout the county. These locations are promoted on the County's website. Partnering with local community organizations to continue to donate fans and offer weatherization programs would mitigate the impact on vulnerable populations in the county.

3.4.7 Severe Thunderstorms Including High Winds, Hail, and Lightning

Hazard Profile

Hazard Description

Thunderstorms

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

High Winds

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

Lightning

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

Hail

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

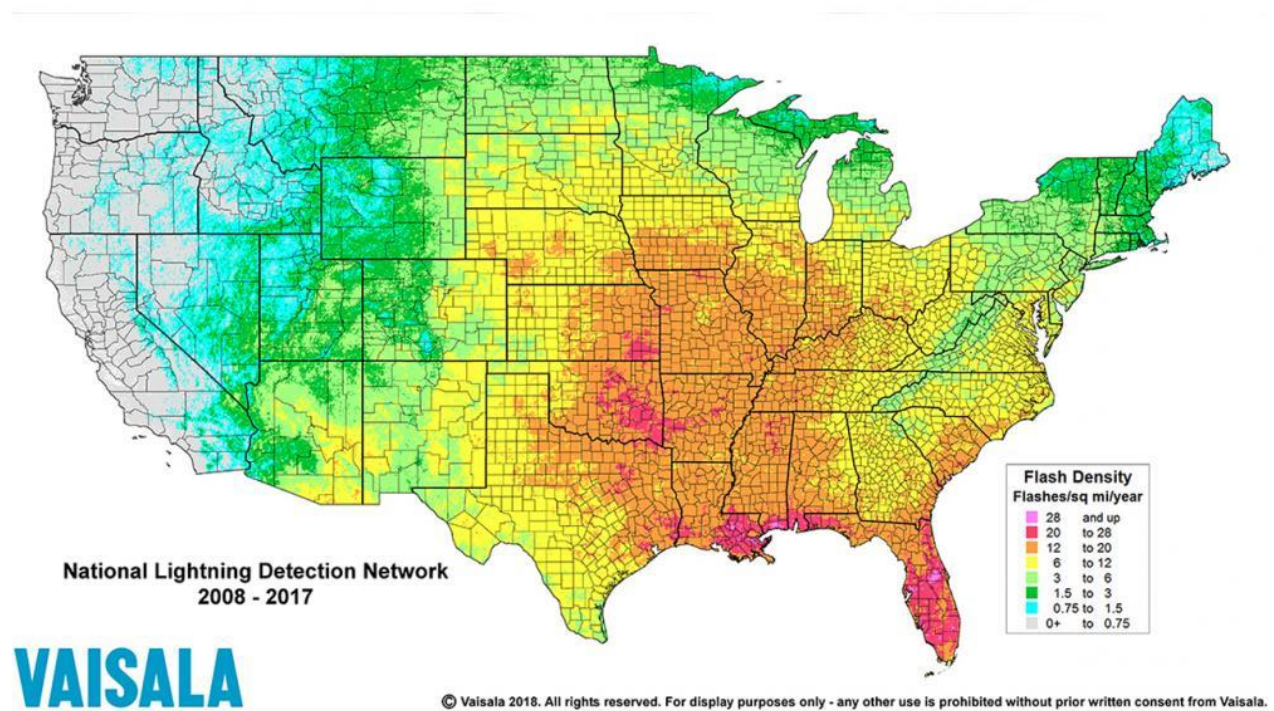
At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a 1/4" diameter or pea sized hail requires updrafts of 24 miles per hour, while a 2 3/4" diameter or baseball sized hail requires an updraft of 81 miles per hour. According to the NOAA, the largest hailstone in diameter recorded in the United States was found in Vivian, South Dakota on July 23, 2010. It was eight inches in diameter, almost the size of a soccer ball. Soccer-ball-sized hail is the exception, but even small pea-sized hail can do damage.

Geographic Location

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

Figure 3.24 shows lightning frequency in the United States. Christian County is located in an area with an average flash density between 6 and 20.

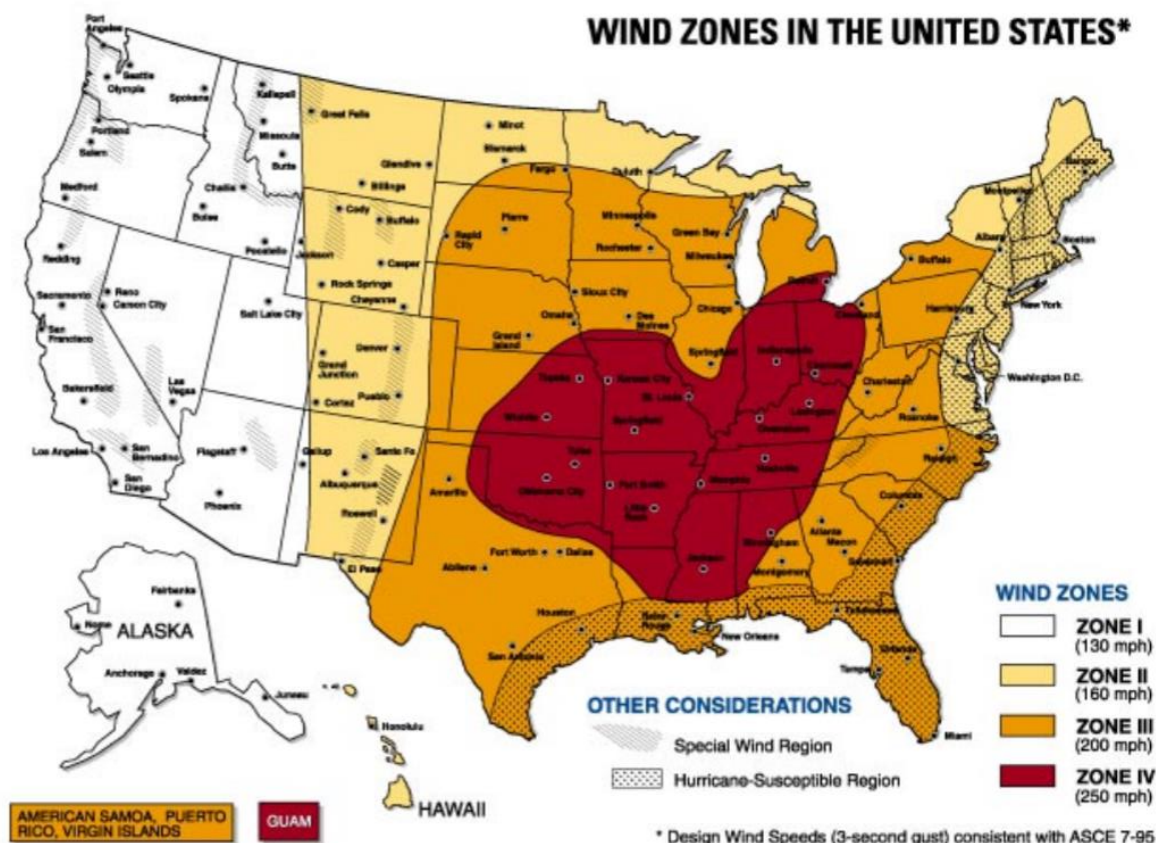
Figure 3.24. Location and Frequency of Lightning in Missouri



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

Figure 3.25 shows wind zones in the United States. Christian County lies in Zone IV, the zone with the highest possible wind speeds in the country.

Figure 3.25. 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 3.35** below describes typical damage impacts of the various sizes of hail.

Table 3.35. Tornado and Storm Research Organization Hailstorm Intensity Scale

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
Hard Hail	5-9	0.2-.04	Pea	No damage
Potentially damaging	10-15	0.4-0.6	Mothball	Slight general damage to plants, crops
Significant	16-20	0.6-0.8	Marble, grape	Significant damage to fruit, crops, vegetation
Severe	21-30	0.8-1.2	Walnut	Severe damage to fruit and crops, damage to glass and
Severe	31-40	1.2-1.6	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
Destructive	41-50	1.6-2.0	Golf ball > Pullet's egg	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries

Destructive	51-60	2.0-2.4	Hen's egg	Bodywork of grounded aircraft dented, brick walls pitted
Destructive	61-75	2.4-3.0	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries
Destructive	76-90	3.0-3.5	Large orange > soft ball	Severe damage to aircraft bodywork
Super Hailstorms	91-100	3.6-3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Super Hailstorms	>100	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

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

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

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

Previous Occurrences

Thunderstorm Winds

Table 3.36. NCEI Thunderstorm Wind Events in Christian County 2010-2019.

Location	# of Events	Deaths	Injuries	Property Damage	Crop Damage
Unincorporated County	46	0	0	\$296,000	\$0
Clever	5	0	0	\$21,000	\$0
Fremont Hills	-	0	0	-	\$0
Highlandville	14	0	0	\$91,000	\$0
Nixa	27			\$173,000	\$0
Ozark	17	0	0	\$40,000	\$0
Saddlebrooke	-	0	0	-	\$0
Sparta	8	0	0	\$43,000	\$0
Total	117	0	0	\$664,000	\$0

Source: NCEI Storm Events Database <https://www.ncdc.noaa.gov/stormevents/>

High Winds

Table 3.37. NCEI High Wind Events in Christian County 2010-2019.

Location	# of Events	Deaths	Injuries	Property Damage	Crop Damage
Unincorporated	1	0	0	\$10,000	\$0
Clever	-	0	0	\$0	\$0
Fremont Hills	-	0	0	\$0	\$0
Highlandville	-	0	0	\$0	\$0

Nixa	-	0	0	\$0	\$0
Ozark	-	0	0	\$0	\$0
Saddlebrooke	-	0	0	\$0	\$0
Sparta	-	0	0	\$0	\$0
Spokane	-	0	0	\$0	\$0
Total	1	0	0	\$10,000	\$0

Source: NCEI Storm Events Database <https://www.ncdc.noaa.gov/stormevents/>

Lightning

Table 3.38. NCEI Lightning Events in Christian County 2010-2019.

Location	# of Events	Deaths	Injuries	Property Damage	Crop Damage
Unincorporated	0	0	0	\$0	\$0
Clever	0	0	0	\$0	\$0
Fremont Hills	0	0	0	\$0	\$0
Highlandville	1	0	0	\$300,000	\$0
Nixa	1	0	0	\$250,000	\$0
Ozark	2	0	0	\$75,000	\$0
Saddlebrooke	0	0	0	\$0	\$0
Sparta	0	0	0	\$0	\$0
Spokane	0	0	0	\$0	\$0
Total	4	0	0	\$625,000	\$0

Source: NCEI Storm Events Database <https://www.ncdc.noaa.gov/stormevents/>

Hail

Table 3.39. NCEI Hail Events in Christian County 2010-2019.

Location	# of Events	Deaths	Injuries	Property Damage	Crop Damage
Unincorporated	17	0	0	\$10,000	\$0
Clever	3	0	0	\$0	\$0
Fremont Hills	-	0	0	\$0	\$0
Highlandville	10	0	0	\$0	\$0
Nixa	10	0	0	\$0	\$0
Ozark	15	0	0	\$0	\$0
Saddlebrooke	-	0	0	\$0	\$0
Sparta	5	0	0	\$0	\$0
Spokane	5	0	0	\$0	\$0
Total	65	0	0	\$10,000	\$0

Source: NCEI Storm Events Database <https://www.ncdc.noaa.gov/stormevents/>

Table 3.40 and **Table 3.41** summarize past crop damages as indicated by crop insurance claims. The tables illustrate the magnitude of the impact on the planning area's agricultural economy.

Table 3.40. Crop Insurance Claims Paid in Christian County from Thunderstorms, 2010-2019.

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
2010	All Other Crops	Excess Moisture/Precipitation/Raid	\$782.00
2011	All Other Crops	Excess Moisture/Precipitation/Raid	\$3,461.00
2013	All Other Crops	Excess Moisture/Precipitation/Raid	\$6,371.85
2014	Corn	Excess Moisture/Precipitation/Raid	\$2,212.00
2015	Corn	Excess Moisture/Precipitation/Raid	\$49,634.00

2015	Wheat	Excess Moisture/Precipitation/Raid	\$99,319.00
2017	All Other Crops	Excess Moisture/Precipitation/Raid	\$22,203.77
Total			\$183,983.62

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

Table 3.41. Crop Insurance Claims Paid in Christian County from High Winds, 2010-2019.

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
2013	All Other Crops	Wind/Excess Wind	\$1,899.00
Total			\$1,899.00

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

Probability of Future Occurrence

Thunderstorm Winds

There were 117 reported thunderstorm wind events that occurred in Christian County in the past 10 years reported to the NCEI. Due to the number of reported occurrences the likelihood of thunderstorm winds in any given year is approximately 100% calculating to 11.7 events annually. A total of \$664,000 in property damages resulted from this.

High Winds

There is 1 reported high wind event that occurred in Christian County in the past 10 years. This accounts for a 10% chance of a high wind event (large enough to constitute reporting) occurring in any given year. The single high wind event accounted for \$10,000 in property damage.

Lightning

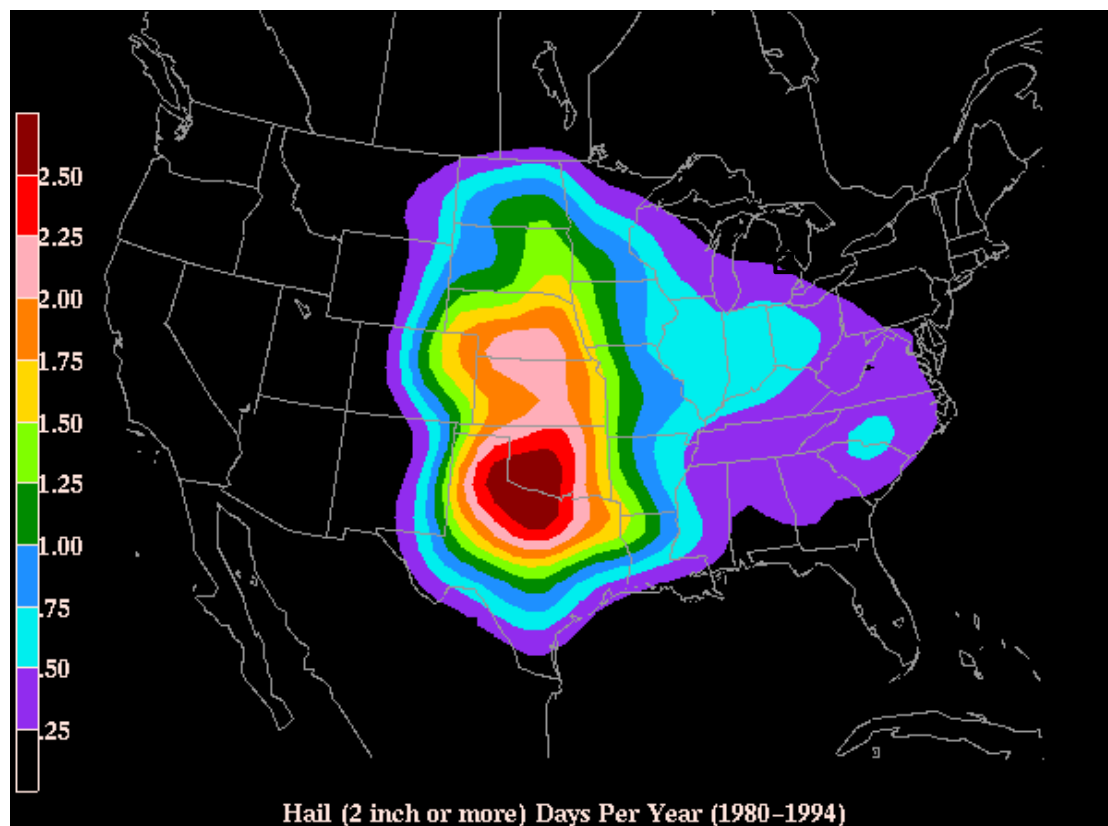
Four lightning events occurred in Christian County over the last 10-year period. This accounts for a 40% probability of a lightning event of potentially damaging caliber could occur in any given year. Four events within this time accounted for \$665,000 in property damages.

Hail

There were 65 reported hail events that occurred in Christian County in the past 10 years. Due to the number of reported occurrences the likelihood of hail in any given year is 100%, averaging 6.5 events annually. A single event within this time frame produced \$10,000 in property damages.

Figure 3.26 is based on hailstorm data from 1980-1994. It shows the probability of hailstorm occurrence (2" diameter or larger) based on number of days per year. Christian County's geographic location constitutes a probability of 1.00 that a hailstorm of this caliber will occur annually.

Figure 3.26. 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, occasionally fatal injury.

In general, assets in the County vulnerable to thunderstorms with lightning, high winds, and hail include people, crops, vehicles, and built structures. Although this hazard results in high annual losses, private property insurance and crop insurance usually cover the majority of losses. Considering insurance coverage as a recovery capability, the overall impact on jurisdictions is reduced.

Most lightning damages occur to electronic equipment located inside buildings, but structural damage can also occur when a lightning strike causes a building fire. Additionally, lightning strikes can cause damages to crops if fields or forested lands are set on fire. Communications equipment and warning transmitters and receivers can also be knocked out by lightning strikes.

Potential Losses to Existing Development

The average annual loss determined from historical losses for thunderstorms, high wind, hail and lightning are indicators of the potential losses to existing development. Thunderstorm wind events in the county have damaged critical facilities, schools, local governments, and private property. Potential annual losses throughout Christian County are: Thunderstorm - \$66,400; Heavy Winds – \$1,000; Lightning -\$62,500; and Hail - \$1,000.

Previous and Future Development

Development and population growth within Unincorporated Christian County, as well as in specific jurisdictions, including school and special districts, results in the 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 before 1939. This puts the Unincorporated County at the greatest risk relative to total building count percentage; the Unincorporated County and the city of Ozark have the highest numbers in terms of total assets at risk. 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

15 respondents of the survey responded that they were personally affected by severe thunderstorms, high winds, hail, or lightning. 324 of 453 residents (72%) felt that severe thunderstorms were highly likely to impact their community in the future. Only 38 respondents felt that severe thunderstorms would have a catastrophic impact, though 217 felt severe thunderstorms would have a critical impact. 222 of the 453 respondents were either extremely concerned or very concerned (49%) with severe thunderstorms impacting their communities.

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. People are also 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

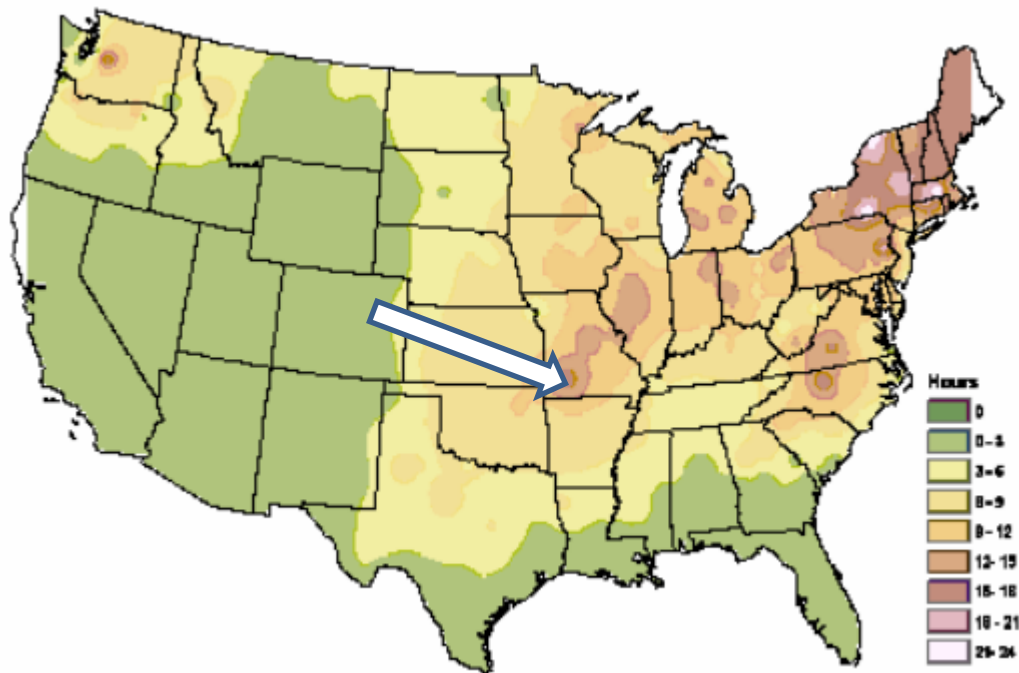
A major winter storm can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. The National Weather Service describes different types of winter storm events as follows.

- **Blizzard**—Winds of 35 miles per hour or more with snow and blowing snow reducing visibility to less than $\frac{1}{4}$ 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 3.27** depicts the average number of hours per year with freezing rain. Christian County is located within a zone that can expect 16-18 hours of freezing rain per year.

Figure 3.27. NWS Statewide Average Number of Hours per Year with Freezing Rain



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

Strength/Magnitude/Extent

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

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

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

Previous Occurrences

Table 3.42 includes NCEI reported winter events and damages for at least the past 20 years.

Table 3.42. NCEI Christian County Winter Weather Events Summary, 2000-2019

Type of Event	Inclusive Dates	Magnitude	# of Injuries	Property Damages	Crop Damages
Blizzard	(2/1/2011)	-	0	\$0	\$0
Extreme Cold/Wind Chill	(12/12/2000), (1/1/2001)	-	0	\$25,000	\$0
Heavy Snow	(12/12/2000), (12/10/2003), (3/4/2008)	-	0	\$10,000	\$0
Ice Storm	(2/21/2001), (1/12/2007), (2/11/2008), (2/21/2008), (1/26/2009), (1/11/20019)	-	0	\$100,000	\$0
Sleet	-	-	-	-	-
Winter Storm	12/25/2000), (12/4/2002), (12/24/2002), (2/23/2003), (2/5/2004), (11/30/2006), (1/20/2007), (1/28/2010), (3/20/2010), (2/21/2013), (12/5/2013), (1/5/2014), (3/2/2104), (2/15/2015), (2/20/2015), (3/4/2015))	-	0	\$0	\$0
Winter Weather	(2/10/2019), (2/15/2019)	-	0	\$0	\$0

Source: NCEI, data accessed [1/27/2020]

Within this timeframe was a notable ice storm event which occurred in January of 2007. Several counties in Southwest Missouri, mainly along the I-44 corridor, suffered ice accumulation of up to 2.5 inches. This disaster caused catastrophic tree damages and power outages lasting weeks in many areas as well as several indirect deaths as a result of the dangerous elements. This event warranted a FEMA disaster declaration and resulted in a Public Assistance grant of \$106,468,427.80 for the impacted counties in Missouri (FEMA.gov).

Winter storms, cold, frost and freeze take a toll on crop production in the planning area. **Table 3.43** shows the USDA's Risk Management Agency payments for insured crop losses in the Christian County as a result of cold conditions and snow for the past 10 years.

Table 3.43. Crop Insurance Claims Paid in Christian County as a Result of Cold Conditions and Snow 2010-2019

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid (\$)
2012	All Other Crops	Cold Wet Weather	\$12,158.19
2017	All Other Crops	Cold Wet Weather	\$11,005.56
Total			\$23,163.75

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

Probability of Future Occurrence

Since one storm generally includes a lot of the different types of events the probability of future occurrence is calculated through the combination of these events. 30 winter weather events were experienced in Christian County over a period of 20 years calculating to 1.5 possible events occurring in any given year.

Changing Future Conditions Considerations

Shorter overall winter seasons 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 damage to power lines due to the ice weight on the lines and equipment. Damages also occur to lines and equipment from falling trees and tree limbs weighted down by ice. Potential losses could include cost of repair or replacement of damaged facilities and lost economic opportunities for businesses.

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

Potential Losses to Existing Development

During the 20-year period from 1999 to 2018, Christian County sustained a total of \$135,000 in damages due to winter weather. This damage equates to an average of \$6,750 per year.

Impact of Previous and Future Development

Increased development will always result in more assets being at risk to hazards. Commercial development may experience periods of closure or downtime due to severe winter weather, resulting in decreased revenues for the businesses. Jurisdictions may also be prepared to assist in snow or ice removal from the street to keep transportation from being hindered. Construction going on, especially

on roads, may also be halted due to severe weather.

Hazard Summary by Jurisdiction

Special road districts may be affected by this, as their workload will increase as they try to help clean up highways and areas of the city. Actions taken to improve road work will be halted as attention is shifted towards cleaning up the roads. In addition, houses which are vulnerable to power outages may resort to fuel heaters due to the extreme cold. This especially affects populations below the poverty line, who are at a greater risk of being affected.

Community Comments on Hazard

20 of the respondents noted they were personally affected by severe winter weather. 186 of the respondents (41%) felt that severe winter weather was highly likely to impact their community in the future. 50 respondents felt that severe winter weather would have a catastrophic impact, though 222 felt severe winter weather would have a critical impact. The majority of respondents were somewhat concerned with severe winter weather impacting their communities in the future. Most reports relating to severe winter weather mostly reference an ice storm that devastated areas of Missouri in 2007/2008 that left many people out of power for weeks or months, and cost jurisdictions and the private sector thousands of dollars.

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.

The Christian County EMA maintains a list of heating and cooling centers throughout the county. These locations are promoted on the County's website. This provides individuals who are at risk refuge from periods of extreme cold. Public works departments and road districts can develop snow removal plans and maintain adequate snow removal equipment and salt to quickly open roads after periods of heavy snow and freezing rain. The County and cities can work with local electric coops to develop vegetation management programs in rights of way to minimize damages to falling tree limbs laden with ice resulting from ice storms to minimize power outages throughout the county

3.4.9 Tornado

Hazard Profile

Hazard Description

Essentially, tornadoes are a vortex storm with two components of winds. The first is the rotational winds that can measure up to 500 miles per hour, and the second is an uplifting current of great strength. The dynamic strength of both these currents can cause vacuums that can overpressure structures from the inside.

Although tornadoes have been documented in all 50 states, most of them occur in the central United States. The unique geography of the central United States allows for the development of thunderstorms that spawn tornadoes. The jet stream, which is a high-velocity stream of air, determines which area of the central United States will be prone to tornado development. The jet stream normally separates the

cold air of the north from the warm air of the south. During the winter, the jet stream flows west to east from Texas to the Carolina coast. As the sun “moves” north, so does the jet stream, which at summer solstice flows from Canada across Lake Superior to Maine. During its move northward in the spring and its recession south during the fall, the jet stream crosses Missouri, causing the large thunderstorms that breed tornadoes.

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

A typical tornado can be described as a funnel-shaped cloud that is “anchored” to a cloud, usually a cumulonimbus that is also in contact with the earth’s surface. This contact on average lasts 30 minutes and covers an average distance of 15 miles. The width of the tornado (and its path of destruction) is usually about 300 yards. However, tornadoes can stay on the ground for upward of 300 miles and can be up to a mile wide. The National Weather Service, in reviewing tornadoes occurring in Missouri between 1950 and 1996, calculated the mean path length at 2.27 miles and the mean path area at 0.14 square mile.

The average forward speed of a tornado is 30 miles per hour but may vary from nearly stationary to 70 miles per hour. The average tornado moves from southwest to northeast, but tornadoes have been known to move in any direction. Tornadoes are most likely to occur in the afternoon and evening, but have been known to occur at all hours of the day and night.

Geographic Location

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 Enhanced Fujita Scale, based on the original Fujita Scale developed by Dr. Theodore Fujita, a renowned severe storm researcher). The EF-Scale (see **Table 3.44**) 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 3.44. Enhanced F Scale for Tornado Damage

Fujita Scale			Derived EF Scale		Operational EF Scale	
F Number	Faster 1/4-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	168-209	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 3.45**. The damage descriptions are summaries. For the actual EF scale, it is necessary to look up the damage indicator (type of structure damaged) and refer to the degrees of damage associated with that indicator. Information on the Enhanced Fujita Scale's damage indicators and degrees of damage is located online at www.spc.noaa.gov/efscale/ef-scale.html.

Table 3.45. 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. Lead time for actual tornado warnings is about 30 minutes. Tornadoes have been known to change paths very rapidly, thus limiting the time in which to take shelter. Tornadoes may not be visible on the ground if they occur after sundown or due to blowing dust or driving rain and hail.

Previous Occurrences

Table 3.46 includes NCEI reported tornado events and damages since 1993 in the planning area. Prior to that date, only highly destructive tornadoes were recorded. There are limitations to the use of NCEI tornado data that must be noted. A tornado that crosses a county line or state line is considered a separate segment for the purposes of reporting to the NCEI. 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 this it is considered a separate tornado.

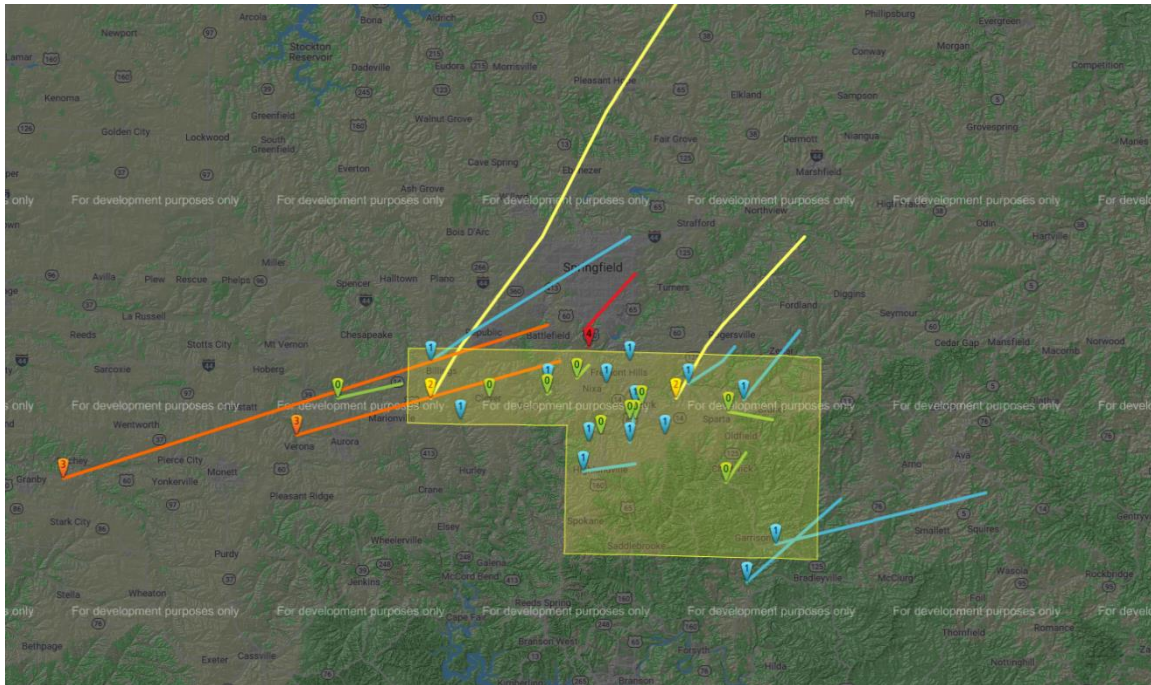
Table 3.46. Recorded Tornadoes in Christian County, 1993 – Present

Date	Beginning Location	Ending Location	Length (miles)	Width (yards)	F/EF Rating	Death	Injury	Property Damage	Crop Damages
4/28/1994	Ozark	Sparta	7	20	F1	0	0	\$500,000	\$500
5/4/2003	Billings	Boaz	13	880	F3	1	3	\$5,100,000	\$0
11/5/2005	Garrison	Garrison	4	530	F1	0	0	\$0	\$0
3/12/2006	Clever	Nixa	17	250	F3	0	3	\$50,000,000	\$0
6/18/2007	Ozark	Ozark	1	75	EF0	0	1	\$0	\$0
6/30/2007	Ozark	Ozark	0.1	50	EF0	0	0	\$0	\$0
9/6/2007	Clever	Clever	0.5	50	EF0	0	0	\$2,000	\$0
1/7/2008	Billings	Billings	0.04	50	EF0	0	0	\$0	\$0
1/7/2008	Riverdale	Riverdale	0.36	100	EF1	0	1	\$200,000	\$0
1/8/2008	Montague	Selmore	4.98	100	EF1	0	0	\$250,000	\$0
4/9/2009	Nixa	Nixa	1.64	150	EF0	0	0	\$100,000	\$0
5/8/2009	Garrison	Garrison	7.19	880	EF1	0	0	\$2,000,000	\$0
5/13/2010	Sparta	Bruner	4.25	200	EF0	-	-	\$50,000	\$0
9/15/2010	Boaz	Boaz	0.43	100	EF0	0	0	\$0	\$0
12/31/2010	Bruner	Abadyl	5.27	250	EF1	0	2	\$200,000	\$0
5/19/2017	Chadwick	Oldfield	3	500	EF0	0	0	\$100,000	\$0
5/3/2018	Ozark Airpark ARPT	Ozark Airpark ARPT	1.5	100	EF1	0	0	\$100,000	\$0
12/1/2018	Clever	Clever	2.11	40	EF0	0	0	\$190,000	\$0
12/1/2018	Billings	Billings	1.24	75	EF1	0	0	\$150,000	\$0
4/30/2019	Keltner	Keltner	0.02	50	EF0	0	0	\$0	\$0
4/30/2019	Ozark Airpark ARPT	Ozark Airpark ARPT	1.93	400	EF2	0	2	\$6,800,000	\$0
4/30/2019	Spokane	Christian Center	12.15	100	EF1	0	0	\$85,000	\$0
10/21/2019	Terrell	Terrell	4.2	100	EF0	0	0	\$30,000	\$0
10/21/2019	Highlandville	Sparta	11.88	150	EF1	0	0	\$0	\$0
10/21/2019	Linden	Abadyl	4.46	250	EF1	0	0	\$65,000	\$0
Total	-	-	-	-		1	12	\$65,922,000	\$0

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

Figure 3.28 shows historic tornado paths in the Christian County. This map also presents fatalities caused by the tornado designated by color (Green: 0, Blue: 1, Yellow: 2, Red: 4).

Figure 3.28. Christian County Map of Historic Tornado Events (1954-2017)



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

Throughout the elapsed period there was a single recorded instance of crop damage by the NCEI for \$500. The USDA Risk Management Agency Database provided no other damage claims for this hazard.

Probability of Future Occurrence

From 2000-2019, a period of 20 years there have been 24 tornado events reported by the NCEI). Although there are (consecutive) years where no tornadoes were reported, certain years experienced several tornadoes. Given the frequency there is a high likelihood (~100%) for a tornado to occur in any given year and an average of 1.2 tornadoes annually. Out of the 24 tornadoes, 17 were damaging and resulted in \$65,922,500 in losses. The probability of a damaging event is 85% with an average potential damage of \$3,296,125 per 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, 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.

Christian County received a vulnerability rating for each criterion as follows: Building Exposure: low-medium, Population Density: medium, Social Vulnerability: low-medium, Percentage of Mobile Homes: low-medium, Likelihood of Occurrence: medium-high, Annual Property Loss: medium. This equates to an overall vulnerability rating of low-medium. **Figure 3.29** illustrates areas where dangerous tornadoes historically have occurred. Christian County is located within a region of the U.S. with high frequency of dangerous and destructive tornadoes referred to as "Tornado Alley."

Figure 3.29. Tornado Alley in the U.S.



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

Potential Losses to Existing Development

From 2000-2019, a period of 20 years a total of \$65,922,500 occurred in Christian County. Out of the 24 tornadoes 17 were damaging, equating to an 85% probability of a damaging event occurring and an average potential damage of \$3,296,125 per year. Of the 25 reported tornadoes, 8% were EF3, 4% were EF2, 40% were EF/F1, and the remaining 48% were EF/F0 on the Fujita Scale. Potential losses for each jurisdiction were estimated based on the total exposure with applied damage factor of 1%, an

estimate of the average damage a tornado could cause in a community. **Table 3.47** provides estimates for total losses by jurisdiction.

Table 3.47. Tornado Losses by Jurisdiction

Jurisdiction	Total Exposure	Estimated Losses
Unincorporated County	\$6,829,579,050	\$68,295,791
Clever	\$337,543,250	\$3,375,433
Fremont Hills	\$366,421,900	\$3,664,219
Highlandville	\$117,265,500	\$1,172,655
Nixa	\$3,850,416,300	\$38,504,163
Ozark	\$3,195,788,550	\$37,957,886
Saddlebrooke	\$155,068,400	\$1,550,684
Sparta	\$185,774,100	\$1,857,741
Totals	\$8,208,278,000	\$50,124,895

Impact of Previous and Future Development

Christian County is one of the fastest growing counties in Missouri. Development is anticipated to continue in the communities of Clever, Nixa, Ozark, and unincorporated areas in the in north central part of the county. Development across the county and within incorporated jurisdictions increases the potential for losses. During the 20-year period, the average annual losses countywide were \$3,296,100. 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 may help reduce the risk of building damage.

Hazard Summary by Jurisdiction

Although tornado events are 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.

Community Comments on Hazard

45 respondents to the public survey responded they had been personally affected by a tornado. 200 of the 453 respondents (44%) felt that tornadoes were highly likely to impact their community in the future. 134 respondents felt that tornadoes would have a catastrophic impact, while 164 felt that tornadoes would have a critical impact. 298 of the respondents were either extremely concerned or very concerned about a tornado affecting their community. Respondents were very supportive of tornado mitigation, with 140 respondents supporting construction of tornado safe rooms, and 90 respondents supporting structural refitting to existing buildings to add tornado safe rooms.

Problem Statement

Tornadoes are the most violent of all atmospheric storms and are capable of tremendous destruction. Wind speeds can exceed 250 miles per hour and damage paths can be more than one mile wide and 50 miles long. Significant tornado events in Christian County have resulted in 1 death, 12 injuries, \$65,922,500 in property damage, and \$500 in crop damage, most of which occurred over the past 2-years. Information in the 2018 State Plan indicates that Christian County has a moderate vulnerability to tornados based on frequency of occurrence and previous damages.

The risk of property damage, injury, and death in the county can be mitigated by Constructing FEMA saferooms in facilities that house vulnerable populations such as nursing homes government buildings, and schools, in addition identifying safe refuge areas in public buildings, nursing homes and other facilities that house vulnerable populations that do not have a saferoom. Retrofitting school district facilities with protective filming of windows and installation of blast proof doors will provide more protection for students and staff at school facilities. 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 take cover during tornado.

3.4.10 Wildfire

Hazard Profile

Hazard Description

The fire incident types for wildfires include: 1) natural vegetation fire, 2) outside rubbish fire, 3) special outside fire, and 4) cultivated vegetation, crop fire.

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

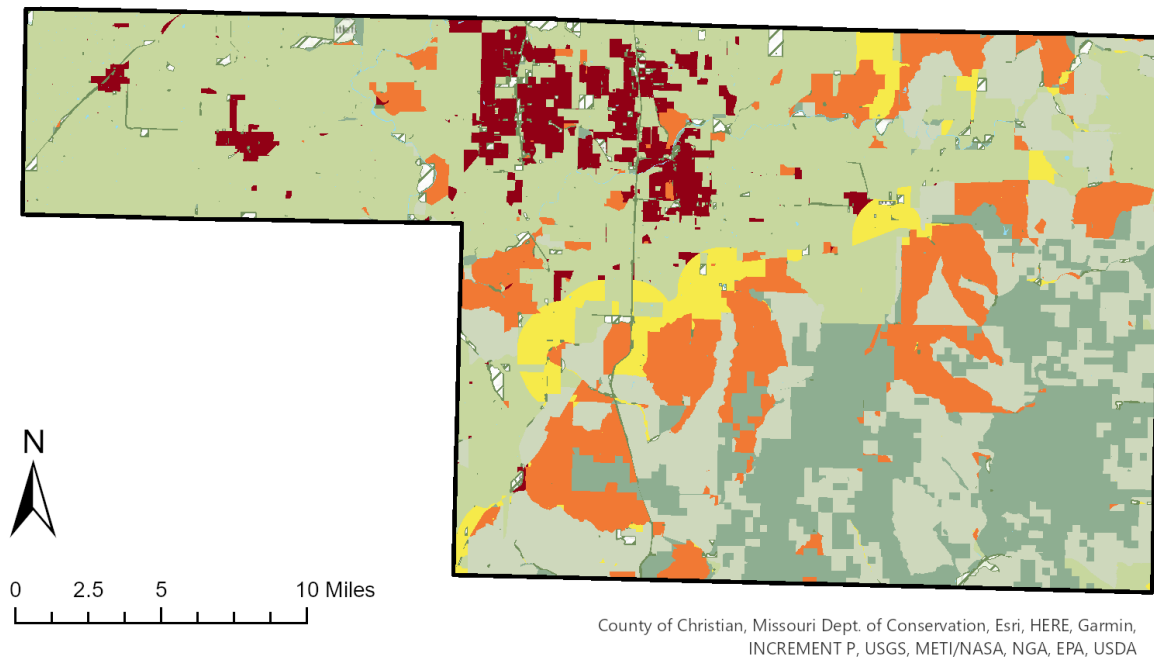
Most of Missouri fires occur during the spring season between February and May. The length and severity of wildland fires depend largely on weather conditions. Spring in Missouri is usually characterized by low humidity and high winds. These conditions result in higher fire danger. In addition, due to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

Geographic Location

Damages due to wildfires would be 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. Each of the communities in Christian County have some risk of wildfire; small areas surrounding Highlandville and south of Ozark are areas of medium risk. Highlandville, Saddlebrooke, and Sparta are covered in low risk swatches of land. **Figure 3.30** shows the WUI of Christian County while **Figure 3.31** shows the risk assessment of these areas.

Figure 3.30. Christian County Wildfire Urban Interface Map

Christian County Wildland Urban Interface



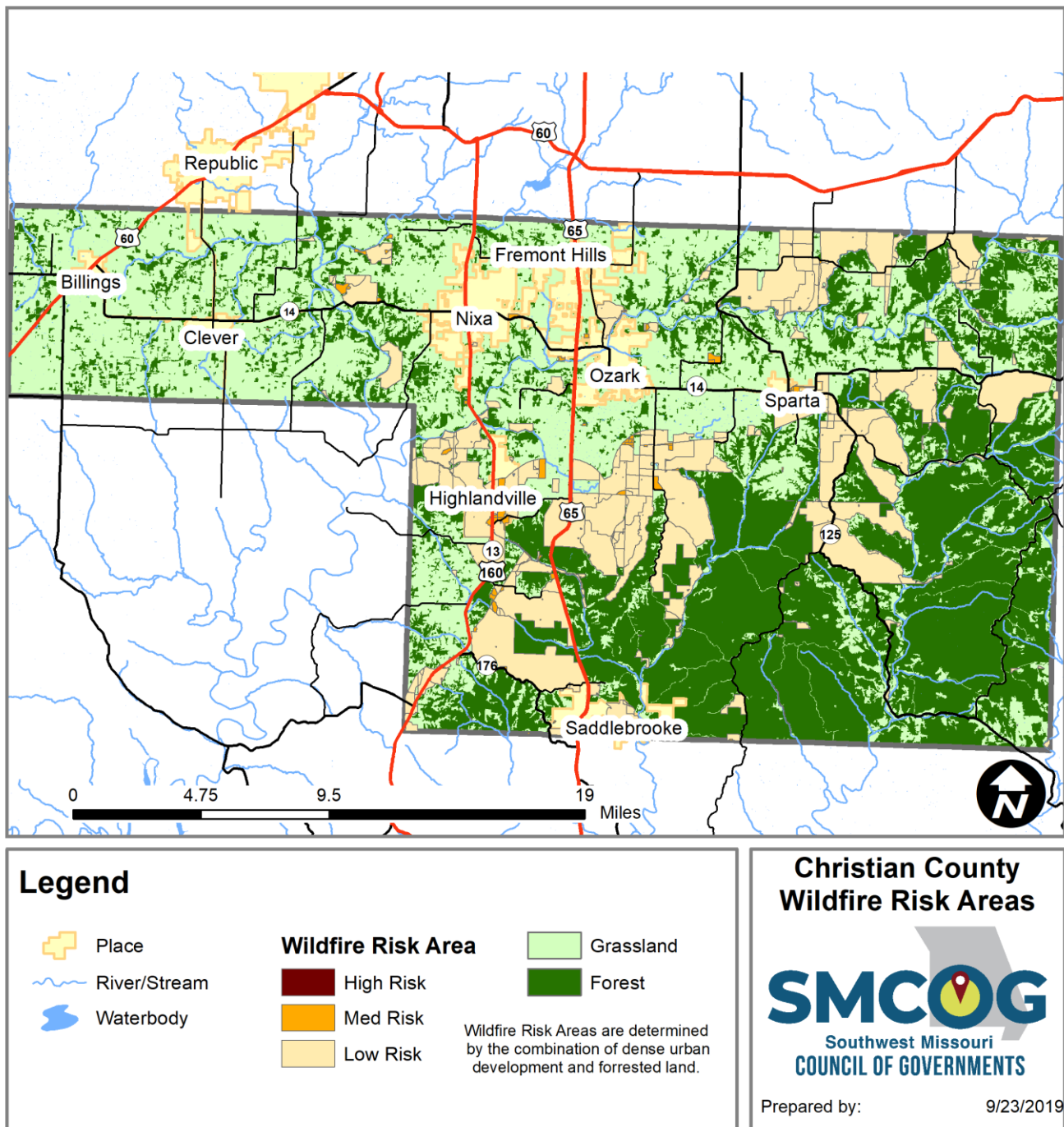
Wildland Urban Interface

- WUI Interface
- WUI Intermix
- Vegetated, no housing
- Vegetated, very low housing density
- Non-vegetated, low and very low housing density
- Non-vegetated, medium and high housing density
- Water
- Uninhabited

Prepared 10/5/2020 by



Figure 3.31. Wildfire Risk Area Map



Strength/Magnitude/Extent

Wildfires damage the environment, killing some plants and occasionally animals. Firefighters have been injured or killed, and structures can be damaged or destroyed. The loss of plants can heighten the risk of soil erosion and landslides. Although Missouri wildfires are not the size and intensity of those in the Western United States, they could impact recreation and tourism in and near the fires.

Wildland fires in Missouri have been mostly a result of human activity rather than lightning or some

other natural event. Wildfires in Missouri are usually surface fires, burning the dead leaves on the ground or dried grasses. They do sometimes “torch” or “crown” out in certain dense evergreen stands like eastern red cedar and shortleaf pine. However, Missouri does not have the extensive stands of evergreens found in the western US that fuel the large fire storms seen on television news stories.

While very unusual, crown fires can and do occur in Missouri native hardwood forests during prolonged periods of drought combined with extreme heat, low relative humidity, and high wind. Tornadoes, high winds, wet snow and ice storms in recent years have placed a large amount of woody material on the forest floor that causes wildfires to burn hotter and longer. These conditions also make it more difficult for fire fighters suppress fires safely.

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

Previous Occurrences

According to MDC Wildfire Data, there have been 301 wildfires reported in Christian County from 2010 to 2019. A total of 9,395 acres were burned as a result of these reported wildfires. A total of fifteen buildings were destroyed, nine were damaged, and 282 were threatened. The most damage occurred in 2012, which accounted for 29% of all wildfires, 80% of all acres burned, and 58% of all buildings threatened, damaged, or destroyed. **Table 3.48** contains MDC wildfire statistics by year.

Table 3.48. Christian County Wildfires 2010 - 2019

Year	Number of Wildfires	Buildings Destroyed	Buildings Damaged	Buildings Threatened	Acres Burned
2010	15	0	0	15	113.5
2011	45	1	1	42	399.25
2012	87	12	5	162	7,471
2013	4	0	0	8	26
2014	65	2	1	29	651.75
2015	52	0	0	6	320
2016	20	0	2	13	231
2017	7	0	0	3	97
2018	2	0	0	3	81
2019	4	0	0	1	4.5
Total	301	15	9	282	9,395

Source: Missouri Department of Conservation, <https://mdc12.mdc.mo.gov/applications/mdcfirereporting/home>

Probability of Future Occurrence

Based on the last ten years of fire reporting statistics from the MDC in **Table 3.48**, there were a total of 301 fires. This equates to 30.1 average fires per year and a 100% probability of occurrence in any given 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 0.

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 wildfire data, an average of 2.4 buildings are destroyed or damaged, 28.2 buildings are threatened, and 940 acres are lost to fire annually in Christian County. However, it should be noted that a large percentage of that damage occurred in one year (2012).

Impact of Previous and Future Development

It is anticipated that there will be future development in WUI areas throughout unincorporated areas 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 will be mitigated by development regulations reducing the risk to wildfire hazard.

Hazard Summary by Jurisdiction

Wildfire risk areas are determined by the combination of dense urban development and forested land. This means that city jurisdictions within the county face the greatest risk of being impacted by wildfires as they are the most densely populated and developed.

Community Comments on Hazard

Two of the respondents responded they had been personally affected by wildfires. 288 of respondents (63%) felt that a wildfire affecting their community was unlikely. 245 of the respondents felt there would be limited or no impact if a wildfire were to occur in their community. 360 of the respondents were either not at all or not so concerned about wildfires affecting their community.

Problem Statement

Wildfire occurrence is frequent within Christian County. These events can destroy, damage, and threaten structures in hazard prone areas. Populations and structures in WUI areas of the county have an increased risk to wildfires due to the level of fuel mixed with structures. Table 3.23 indicates that the participating jurisdictions of Christian County, Nixa and Ozark have some risk of wildfire. Cities that

have adopted landscape ordinances can include fire safe landscape design requirements in these areas. The Chadwick and Spokane school districts have facilities located in WUI areas and have a slightly elevated risk of wildfire due to the proximate amount of fuel present.

The unincorporated part of the county has the highest risk and exposure to wildfires. The County Planning and Development department can promote fire resistant construction materials and landscape design techniques to mitigate the risk to wildfire in future development. Information about these materials and techniques are included in the MDC publication, [Wildfire Prevention](#). Including this information to education and awareness programs for the public may potentially mitigate wildfire damage in the county.

4 MITIGATION STRATEGY

4	MITIGATION STRATEGY	4.1
4.1	Goals.....	4.1
4.2	Identification and Analysis of Mitigation Actions.....	4.2
4.3	Implementation of Mitigation Actions	4.8

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

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

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

4.1 Goals

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

This planning effort is an update to Christian County’s existing hazard mitigation plan approved by FEMA on March 24, 2016. Therefore, the goals from the 2016 Christian County Hazard Mitigation Plan were reviewed to see if they were still valid, feasible, practical, and applicable to the defined hazard impacts. The MPC conducted a discussion session during their 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.

In the 2016 Plan, the organization of the actions included broad goals and a set of objectives linking the actions the goals. The MPC opted to keep the goals from the 2016 Plan but has chosen to remove specific objectives related to said goals to avoid over-complication. The plan update 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.

Some specific sources for mitigation action ideas include the following:

- FEMA's Mitigation Action Ideas Publication, <https://www.fema.gov/media-library/assets/documents/30627>
- FEMA's Climate Resilient Activities for Hazard Mitigation Assistance, <https://www.fema.gov/media-library/assets/documents/110202>
- EPA's Hazard Mitigation for Natural Disasters Publication, <https://www.epa.gov/waterutilityresponse/hazard-mitigation-natural-disasters>
- EPAs Planning for an Emergency Drinking Water Supply Publication, <https://www.epa.gov/waterutilityresponse/water-utility-planning-emergency-drinking-water-supply>

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. Actions from the previous plan included completed actions, on-going actions, and actions upon which progress had not been made. The MPC discussed SEMA's identified funding priorities and the types of mitigation actions generally recognized by FEMA.

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

The focus of Meeting #3 was update of the mitigation strategy. For a comprehensive range of mitigation actions to consider^{7(a)}, the MPC reviewed the following information during Meeting #3:

- A list of actions proposed in the previous mitigation plan, the current State Plan, and approved plans in surrounding counties,
- Key issues from the risk assessments, including the problem statements concluding each hazard profile and vulnerability analysis,

- State priorities established for HMA grants, and
- Public input during meetings, responses to data collection questionnaires, and other efforts to involve the public in the plan development process.

For Meeting #3, individual jurisdictions, including school and special districts, developed final mitigation strategy for submission to the MPC. They were encouraged to review the details of the risk assessment vulnerability analysis specific to their jurisdiction. They were also provided a link to the FEMA's publication, *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013)*. This document was developed by FEMA as a resource for identification of a range of potential mitigation actions for reducing risk to natural hazards and disasters.

The MPC reviewed the actions from the previously approved plan for progress made since the plan had been adopted. Prior to Meeting #3, the list of actions for each jurisdiction was emailed to that jurisdiction's MPC representative along with the worksheets. Each jurisdiction was instructed to provide information regarding the "Action Status" with one of the following status choices:

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

Additionally, the future inclusion of each mitigation action in the plan update was identified as either keep, delete, or modify. Based on the status updates, there were 10 completed actions, 103 continuing actions (either ongoing or modified), and 29 deleted actions.

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

Table 4.1. Action Status Summary

Jurisdiction	Completed Actions	Continuing Actions (Ongoing or Modified)	Deleted Actions
Christian County	0	25	0
City of Clever	3	11	5
City of Fremont Hills	2	7	8
City of Highlandville	-	-	-
City of Nixa	0	17	2
City of Ozark	4	10	4
City of Sparta	-	-	-
Village of Saddlebrooke	-	-	-
Nixa School District	0	7	1
Ozark School District	0	8	0
Sparta School District	0	1	0
Spokane School District	0	6	2
OTC Richwood Valley	1	1	6
Billings Special Road District	0	5	0
Christian County Ambulance District	0	5	1

Note: Highlandville, Sparta, and Saddlebrooke did not participate in the previous plan

Table 4.2 provides a summary of the completed actions from the previous plan, and **Table 4.3** provides a summary of the deleted actions from the previous plan.

Table 4.2. Summary of Completed Actions from the Previous Plan

Completed Actions	Action Description	Completion Details (Date, Amount, Funding Source)
Clever 1.3.3	Encourage local community organizations to continue and augment programs to provide fans, air conditioners, and winter weatherization for those at risk.	This has been taken on by local churches.
Clever 2.1.1	Encourage electrical utilities to use underground construction methods where possible to reduce disruptions of service due to natural hazard events.	Worked with both companies in town. All newly constructed utility will be underground unless not plausible when connecting to older parts of town.
Clever 3.2.1	Enhance strategies and coordinate with utility providers to manage encroachment of vegetation in easements and rights of way	Major easements that have utilities and vegetation on them are maintained by the city
Fremont Hills 2.1.1	Encourage electrical utilities to use underground construction methods where possible to reduce disruptions of service due to natural hazard events	Fully developed
Fremont Hills 2.2.4	Adopt the International Building Code (IBC) and International Residential Code (IRC)	n/a
Ozark 1.3.1	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentration where feasible	The schools added safe rooms and OTC and OC have safe rooms
Ozark 2.1.1	Encourage electrical utilities to use underground construction methods where possible to reduce disruptions of service due to natural hazard events	Ordinances were created for new utility construction
Ozark 2.1.4	Acquire, elevate, or flood-proof properties and critical infrastructure within hazard areas	Ordinances are in place
Ozark 3.1.2	Enforce highly visible 911 addressing for residences and businesses through building and business permitting as well as public education of existing ordinances	Ordinances are in place
OTC 1.3.4	Retrofit doors to vulnerable facilities with metal doors, or place protective film on glass doors and windows	Our current shelter areas meet this specification

Table 4.3. Summary of Deleted Actions from the Previous Plan

Deleted Actions	Action Description	Reason for Deletion
Christian County 2.1.2	Encourage electrical utilities to use underground construction methods where possible to reduce disruptions of service due to natural hazard events.	No longer relevant
Clever 1.3.6	Promote and distribute FEMA publication 320 which provides information on construction plans and cost estimates for building safe rooms in homes or small business and cost estimates for construction.	Clever Schools has taken this over. City is not aware of any progress
Clever 2.1.4	Acquire, elevate, or flood-proof properties and critical infrastructure within hazard areas	Currently no areas where this is effective or needed
Clever 2.2.5	Develop an open space acquisition, reuse, and preservation place targeting hazard areas	City has no knowledge of this plan
Clever 3.2.4	Develop an ordinance to restrict the use of public water resources for non-essential usage, such as landscaping, washing cars, filling swimming pools, etc.	City has not done anything with this area of water restrictions. There is however an ordinance on file that allows the Water Superintendent to restrict water usage of any kind when the city is in drought conditions
Clever 3.3.1	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities	The city will continue to monitor for funding
Fremont Hills 1.3.1	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentration where feasible	n/a
Fremont Hills 1.3.3	Encourage local community organizations to continue and augment programs to provide fans, air conditioners, and winter weatherization for those at risk.	n/a
Fremont Hills 1.3.5	Identify and designate heating and cooling refuge areas in community buildings and make these locations available to the public during extreme temperature events	n/a
Fremont Hills 1.3.6	Promote and distribute FEMA publication 320 which provides information on construction plans and cost estimates for building safe rooms in homes or small businesses and cost estimates for construction	The city was not aware of this publication but will implement with new construction
Fremont Hills 2.1.4	Acquire, elevate or flood-proof properties and critical infrastructure within hazard areas.	n/a

Fremont Hills 2.2.1	Adopt low impact storm water management policies to control runoff from developing areas outside the floodplain where ordinances have not been enacted.	n/a
Fremont Hills 2.2.5	Develop an open space acquisition, reuse, and preservation plan targeting hazard areas.	n/a
Fremont Hills 3.3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in National Incident Management System (NIMS) training and compliance programs.	n/a
Nixa 1.1.4	Increase public awareness on techniques to reduce risk, such as the use of fire-resistant materials in construction, landscaping techniques, and planting materials that are more resistant to the spread of wildfires	n/a
Nixa 1.3.6	Promote and distribute FEMA publication 320 which provides information on construction plans and cost estimates for building safe rooms in homes or small business and cost estimates for construction.	n/a
Ozark 1.3.3	Encourage local community organizations to continue and augment programs to provide fans, ai conditioners, and winter weatherization for those at risk	n/a
Ozark 1.3.5	Identify and designate heating and cooling refuge areas in community buildings and make these locations available to the public during extreme temperature events	Lack of funding
Ozark 1.3.6	Promote and distribute FEMA publication 320 which provides information on construction pans and cost estimates for building safe rooms in homes or small businesses and cost estimate for construction	Developers are adding safe rooms to their homes when feasible. The city has not promoted this program
Ozark 2.2.3	Maintain Storm Ready status with the National Weather Service	The county manages this program
Nixa Schools 1.1.6	Increase, promote, establish, and maintain participating in citizen preparedness activities, such as: Citizen Corps, CERT, COAD, Neighborhood Watch, Fire Corps, Amateur Radio, etc	n/a
Spokane Schools 3.1.1	Encourage all elected officials, public administrators, community stakeholders, and responders to participate in National Incident Management System (NIMS) training and compliance programs	The city has no knowledge of this program

Spokane Schools 3.3.1	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities	No known funding sources
OTC 1.1.3	Continue to promote and expand educational programs regarding natural hazard mitigation and preparedness in school newsletters and seek to integrate information on natural hazards into school curriculum where feasible.	This action does not apply to us
OTC 1.1.6	Increase, promote, establish and maintain participation in citizen preparedness activities, such as; Citizen Corps, CERT, COAD, Neighborhood Watch, Fire Corps, Amateur Radio, etc.	This action does not apply to us
OTC 1.3.1	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentration where feasible.	This action does not apply to us
OTC 1.3.3	Encourage local community organizations to continue and augment programs to provide fans, air conditioners, and winter weatherization for those at risk.	This action does not apply to us
OTC 3.1.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in National Incident Management System (NIMS) training and compliance programs.	This action does not apply to us
OTC 3.3.1	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities.	This action does not apply to us
Christian County Ambulance District 1.3.1	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentration where feasible.	n/a

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

Many jurisdictions found that actions were still relevant and would be ongoing. Some of the continued actions were re-worded for the update and are noted as “revised, continuing” on the action sheets. The actions listed in **Table 4.2** and **4.3** are numbered according to the 2015 Plan and are not consistent with the new numbering in this plan.

4.3 Implementation of Mitigation Actions

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

Jurisdictional MPC members were encouraged to meet with others in their community to finalize the actions to be submitted for the updated mitigation strategy. Throughout the MPC consideration and discussion, emphasis was placed on the importance of a benefit-cost analysis in determining project priority. The Disaster Mitigation Act requires benefit-cost review as the primary method by which mitigation projects should be prioritized. The MPC decided to pursue implementation according to when and where damage occurs, available funding, political will, jurisdictional priority, and priorities identified in the 2018 Missouri State Hazard Mitigation Plan. The benefit/cost review at the planning stage primarily consisted of a qualitative analysis and was not the detailed process required grant funding application. For each action, the plan sets forth a narrative describing the types of benefits that could be realized from action implementation. The cost was estimated as closely as possible, with further refinement to be supplied as project development occurs.

FEMA's STAPLEE methodology was used to assess the costs and benefits, overall feasibility of mitigation actions, and other issues impacting project^{7(a)}. During the prioritization process, the jurisdictions used worksheets to assign scores. The worksheets posed questions based on the STAPLEE elements as well as the potential mitigation effectiveness of each action. Scores were based on the responses to the questions as follows:

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

The following questions were asked for each proposed action.

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

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

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

Figure 4.1. Blank STAPLEE Worksheet

STAPLEE Worksheet		
Name of Jurisdiction:		
Action or Project		
Action/Project Number:	Insert a unique action number for this action for future tracking purposes. This can be a combination of the jurisdiction name, followed by the goal number and action number (i.e. Joplin1.1)	
Name of Action or Project:		
Mitigation Category:	Prevention; Structure and Infrastructure Projects; Natural Systems Protection; Education and Outreach; Emergency Services	
STAPLEE Criteria Evaluation Rating 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. Blank Action Worksheet

Action Worksheet	
Name of Jurisdiction:	
Risk / Vulnerability	
Hazard(s) Addressed:	List the hazard or hazards that will be addressed by this action
Problem being Mitigated:	Provide a brief description of the problem that the action will address. Utilize the problem statement developed in the risk assessment.
Action or Project	
Applicable Goal Statement:	Choose the goal statement that applies to this action
Action/Project Number:	Insert a unique action number for this action for future tracking purposes. This can be a combination of the jurisdiction name, followed by the goal number and action number (i.e. Joplin1.1)
Name of Action or Project:	
Mitigation Category:	Prevention; Structure and Infrastructure Projects; Natural Systems Protection; Education and Outreach; Emergency Services
Action or Project Description:	Describe the action or project.
Estimated Cost:	Provide an estimate of the cost to implement this action. This can be accomplished with a range of estimated costs.
Benefits:	Provide a narrative describing the losses that will be avoided by implementing this action. If dollar amounts of avoided losses are known, include them as well.
Plan for Implementation	
Responsible Organization/Department:	Which organization will be responsible for tracking this action? Be specific to include the specific department or position within a department.
Supporting Organization/Department:	Which organization/department will assist in implementation of this action?
Action/Project Priority:	Include the STAPLEE score and Priority (H, M, L)
Timeline for Completion:	How many months/years to complete.
Potential Fund Sources:	List specific funding sources that may be used to pay for the implementation of the action.
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	Indicate status as New, Continuing Not Started, or Continuing in Progress)
Report of Progress:	For Continuing actions only, indicate the report on progress. If the action is not started, indicate any barriers encountered to initiate the action. If the action is in progress, indicate the activity that has occurred to date.

Goal 1: Protect the lives and livelihoods of all citizens

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of public awareness regarding hazard vulnerability and mitigation measures
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Christian County 1.1
Name of Action or Project:	Social Media and Public Information
Mitigation Category:	Prevention; Education and Outreach
Action or Project Description:	Encourage the media and leverage social media platforms to publish or broadcast information about natural hazard vulnerability, preparedness plans and mitigation efforts throughout the county.
Estimated Cost:	Negligible. This can be accomplished utilizing current staff using readily available social media avenues.
Benefits:	Social media tools are an effective means to disseminate information quickly and to a broad audience. These tools can be used by government and humanitarian agencies to help formulate preparedness, response, and recovery efforts by sending alerts and warnings and other communications to the public while also monitoring public interaction
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management.
Supporting Organization/Department:	Coordination with all the various PIO's in the county.
Action/Project Priority:	High: 37
Timeline for Completion:	Continuous / Constant
Potential Fund Sources:	Can be accomplished with current staffing levels and funding levels.
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budget
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Current weekly activity on social media pages, occasional local paper articles on current threats, hazards, and impending hazards.

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of community preparedness
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Christian County 1.2
Name of Action or Project:	Citizen Preparedness/ Citizen Corps
Mitigation Category:	Prevention; Emergency Services
Action or Project Description:	Increase, promote, establish and maintain participation in citizen preparedness activities, such as; Citizen Corps, CERT, COAD, Neighborhood Watch, Fire Corps, Amateur Radio, etc.
Estimated Cost:	\$15,000 annually
Benefits:	Better prepared and informed citizens are less susceptible to disaster losses.
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management
Supporting Organization/Department:	Program support from Christian County Commission and political subdivisions.
Action/Project Priority:	High: 38
Timeline for Completion:	Continuous / Constant
Potential Fund Sources:	County general revenue, RHSOC funding, EMPG, local community grants, private funding, organizational fund raising
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budget, community involvement,
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Our Citizen Corps program continues to be one of the best in the state. Over 1,300 people trained in CERT. Continue to have classes every year, have training on a monthly basis, members contribute over 2,000 volunteer hours to the community every year.

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of community preparedness
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Christian County 1.3
Name of Action or Project:	NOAA Radios
Mitigation Category:	Prevention; Emergency Services
Action or Project Description:	Seek and utilize funding mechanisms to establish and maintain programs enabling the distribution of free and low-cost NOAA all-hazard radios for continuous operation in homes, businesses, schools, nursing homes, all facilities for public accommodation, vulnerable populations, and low-income senior citizens
Estimated Cost:	\$5,000 - \$10,000 for annual programs
Benefits:	Lives saved. Enabling people to hear the warnings and seek appropriate measures to protect themselves in the event of an eminent emergency
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management
Supporting Organization/Department:	Each political subdivision in the county
Action/Project Priority:	High: 36
Timeline for Completion:	Continuous / Constant
Potential Fund Sources:	Local general revenue, local community grants, donations from local businesses
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting, grant writing
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	So far, several hundred radios have been distributed by various agencies in the county to low-income, vulnerable, and at-risk populations

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Flash/Riverine Flood
Problem being Mitigated:	Adequate public alert to hazard levels
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Christian County 1.4
Name of Action or Project:	Low water crossing markings
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Install, replace, and maintain low water markings and gauges in flood prone areas.
Estimated Cost:	\$800 per sign
Benefits:	Mostly, the benefit of this program will be lives saved. Visual display of water levels to encourage them to not cross high-water areas.
Plan for Implementation	
Responsible Organization/Department:	Christian County Highway Department
Supporting Organization/Department:	Christian County Emergency Management
Action/Project Priority:	High: 37
Timeline for Completion:	Continuous / Constant
Potential Fund Sources:	General revenue, Hazard Mitigation Grants, MDC, DNR, USDA, EDA Grants
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting, grant writing
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Great strides have been made by the County Road Department in placing these signs in high risk areas, most are marked at this time. There are some areas outside the county's jurisdiction that remain un-marked. Maintenance and upkeep remain a problem from vandals and damage from flooding, accidents.

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado
Problem being Mitigated:	Loss of life and injury reduction during tornado and high wind events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Christian County 1.5
Name of Action or Project:	Safe room construction
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentrations where feasible
Estimated Cost:	\$500,000 - \$3,000,000
Benefits:	Lives saved. Have a safe refuge from severe weather events or persons that would not otherwise have a place to go will prevent injuries and save lives
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management
Supporting Organization/Department:	
Action/Project Priority:	High: 32
Timeline for Completion:	Continuous / Constant
Potential Fund Sources:	Local general revenue, Hazard Mitigation Funds, SEMA/FEMA Gants, HMGP, PDM, FMA
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting, grant writing and application
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	There are 11 public safe rooms in county with the ability to shelter almost 12,000 people. One more is under construction. Ozark School District also has safe rooms for their students that are not open to the public

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events
Problem being Mitigated:	Identifying safe refuge areas in existing facilities
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Christian County 1.6
Name of Action or Project:	Safe refuge area plan
Mitigation Category:	Prevention, emergency services
Action or Project Description:	Create and update tornado/severe storm plans and identify refuge areas that comply with FEMA publication 431 Selecting Refuge Areas in Buildings, in Schools, Large Facilities, and Other Establishments Serving the Public
Estimated Cost:	Negligible. Can be accomplished utilizing current staff
Benefits:	Lives saved. Identifying the best place to seek shelter from severe weather events will save lives
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management
Supporting Organization/Department:	Any organization/department that is responsible for the safety of employees, visitors, residents, or other individuals that are present at their facility
Action/Project Priority:	H: 34
Timeline for Completion:	Continuous / Constant
Potential Fund Sources:	Can be accomplished with current staff levels and funding sources
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Christian County Emergency Management continues to visit various facilities throughout the county to assist with the planning and operations of the facilities emergency plans as well as assisting them with identifying the best places for refuge

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme Temperatures
Problem being Mitigated:	Keeping the public informed with timely and actionable information
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Christian County 1.7
Name of Action or Project:	OACAC Programs
Mitigation Category:	Prevention; Emergency Services
Action or Project Description:	Encourage local community organizations to continue and augment programs to provide fans, air conditioners, and winter weatherization for those at risk.
Estimated Cost:	Negligible. This can be accomplished utilizing current staff using readily available social media tools
Benefits:	Social media tools are an effective means to disseminate information quickly and to a broad audience. These tools can be used by government and humanitarian agencies to help formulate preparedness, response, and recovery efforts by sending alerts and warnings and other communications to the public
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management
Supporting Organization/Department:	Coordination with all the various PIOs in the county
Action/Project Priority:	H: 27
Timeline for Completion:	Ongoing
Potential Fund Sources:	Can be accomplished with current staffing levels and funding levels
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Current weekly activity on social media pages, occasional local paper articles on current threats, hazards, and impending hazards

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme temperatures
Problem being Mitigated:	Loss of life and injury caused by extreme temperatures
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Christian County 1.8
Name of Action or Project:	Community extreme temperature refuge areas
Mitigation Category:	Prevention, Emergency Services
Action or Project Description:	Encourage local organizations, public buildings make available space in their facility for at-risk and vulnerable populations to seek refuge during extreme temperature events
Estimated Cost:	Near zero
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management.
Supporting Organization/Department:	Any willing and capable facility that may provide a benefit and service to meet this goal
Action/Project Priority:	M: 24
Timeline for Completion:	Continuous / Constant
Potential Fund Sources:	Funding sources will need to be borne by the facility willing to accept this responsibility
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budget
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	This historically has been a hard program to accomplish. First, it is difficult to get private facilities to open their doors to public that are just there to seek refuge and not to contribute to their business. There is some perception that the persons that would use this service may not conform to the preferred clientele of the business. Publicizing locations and times open in a timely manner has also been an issue.

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, High-wind Events
Problem being Mitigated:	lack of safe space to go during tornados and high wind events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Christian County 1.9
Name of Action or Project:	Residential safe-room construction
Mitigation Category:	Prevention; Structure and Infrastructure Projects
Action or Project Description:	Promote and distribute FEMA publication 320 which provides information on construction plans and cost estimates for building safe rooms in homes or small business and cost estimates for construction.
Estimated Cost:	Estimated costs could range from \$1,000 to \$5,000 for new construction and possible more for retrofitting existing houses.
Benefits:	The benefit of this program will be lives saved.
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management
Supporting Organization/Department:	Christian County Planning and Resource Management
Action/Project Priority:	Medium: 29
Timeline for Completion:	Continuous / Constant
Potential Fund Sources:	Local funds
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Requires a substantial monetary commitment from the homeowner and therefore has not been widespread involvement. There have been, however, several hundred persons that have registered their underground safe rooms with the county.

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado
Problem being Mitigated:	Loss of life and injury reduction during tornado and high wind events.
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Nixa 1.1
Name of Action or Project:	Safe Room Construction
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentration where feasible.
Estimated Cost:	\$50,000 - \$1 million
Benefits:	Lives saved.
Plan for Implementation	
Responsible Organization/Department:	City of Nixa Elected Officials working with Nixa Public Schools
Supporting Organization/Department:	Nixa Planning and Development
Action/Project Priority:	38 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local, HMGP, PDM
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive Plans, Capital Improvements Plan, Crisis Management Plans
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Community saferooms have been constructed in school buildings since 2011.

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Natural Hazards
Problem being Mitigated:	Community Preparedness
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Nixa 1.2
Name of Action or Project:	Citizen Preparedness
Mitigation Category:	Education and Outreach
Action or Project Description:	Increase, promote, establish, and maintain participation in citizen preparedness activities, such as Citizen Corps, CERT, COAD, Neighborhood Watch, Fire Corps, Amateur Radio, etc.
Estimated Cost:	\$0
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	Police Department
Supporting Organization/Department:	City Council, coordination with Christian County Emergency Manager
Action/Project Priority:	36 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funds, Grants
Local Planning Mechanisms to be Used in Implementation, if any:	Community Outreach
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Land Subsidence, Flood
Problem being Mitigated:	Property Loss
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Nixa 1.3
Name of Action or Project:	Private Property Hazard Insurance
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote homeowner purchase of flood insurance and Missouri FAIR Plan sinkhole loss policies for dwellings in hazard prone areas.
Estimated Cost:	\$0-\$500
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	Planning and Development
Supporting Organization/Department:	Public Works
Action/Project Priority:	30 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local
Local Planning Mechanisms to be Used in Implementation, if any:	Site Plan Review, Building Permit Process
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Requiring Structures to be built a certain distance from known natural hazards.

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Public awareness of hazard vulnerability and mitigation measures.
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Nixa 1.4
Name of Action or Project:	Ozark and Nixa Expo
Mitigation Category:	Education and Outreach
Action or Project Description:	Continue collaboration between local government, community organization, and businesses to host community expos to promote public awareness health and safety during natural hazard events.
Estimated Cost:	TBD
Benefits:	Reduction of loss of life, injury, and property during hazard events.
Plan for Implementation	
Responsible Organization/Department:	Nixa Emergency Management Office
Supporting Organization/Department:	Administration
Action/Project Priority:	33 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budget process, community collaboration
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Annual Events

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events
Problem being Mitigated:	Identifying safe refuge areas in existing facilities
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Nixa 1.5
Name of Action or Project:	Safe Refuge Area Plan
Mitigation Category:	Education and Outreach
Action or Project Description:	Create and update tornado/severe storm plans and identify refuge areas that comply with FEMA publication 431
Estimated Cost:	\$0 - \$500
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	Nixa Emergency Management Office
Supporting Organization/Department:	Public safety officials
Action/Project Priority:	H:34
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local
Local Planning Mechanisms to be Used in Implementation, if any:	Emergency operations plan
Progress Report	
Action Status:	Continuing not started
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme Temperatures
Problem being Mitigated:	Extreme temperature fatalities
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Nixa 1.6
Name of Action or Project:	OACAC Programs
Mitigation Category:	Prevention
Action or Project Description:	Encourage local community organizations to continue and augment programs to provide fans, air conditioners, and winter weatherization for those at risk.
Estimated Cost:	\$0 - \$500
Benefits:	Lives saved.
Plan for Implementation	
Responsible Organization/Department:	City Administration, Communications
Supporting Organization/Department:	LIHEAP / OACAC
Action/Project Priority:	30 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funds
Local Planning Mechanisms to be Used in Implementation, if any:	N/A
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Low Income Home Energy Assistance Program

Action Worksheet	
Name of Jurisdiction:	Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme Temperatures
Problem being Mitigated:	Extreme temperature fatalities
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Nixa 1.7
Name of Action or Project:	Community Extreme Temperature Refuge Areas
Mitigation Category:	Emergency Services
Action or Project Description:	Identify and designate heating and cooling refuge areas in community buildings and make these locations available to the public during extreme temperature events.
Estimated Cost:	TBD
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	Local Emergency Managers
Supporting Organization/Department:	Administration
Action/Project Priority:	32 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Emergency Operations Plan
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Progress has been made identifying refuge areas

Action Worksheet	
Name of Jurisdiction:	Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Emergency Response Capabilities
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Nixa 1.8
Name of Action or Project:	911 Addressing for Structures
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Enforce highly visible 911 addressing for residences and businesses through building and business permitting as well as public education of existing ordinances.
Estimated Cost:	\$0
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	Planning and Development Staff
Supporting Organization/Department:	Christian County E911
Action/Project Priority:	37 (H)
Timeline for Completion:	Ongoing.
Potential Fund Sources:	General Fund
Local Planning Mechanisms to be Used in Implementation, if any:	Building Permit Review process
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Coordinating with Christian County E911 for all new addressing and road names.

Action Worksheet	
Name of Jurisdiction:	City of Fremont Hills
Risk / Vulnerability	
Hazard(s) Addressed:	Sinkholes/Land subsidence
Problem being Mitigated:	Avoid construction in sinkhole areas
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Fremont Hills 1.1
Name of Action or Project:	Private property hazard insurance
Mitigation Category:	Education and outreach
Action or Project Description:	Promote homeowner purchase of flood insurance and Missouri FAIR Plan sinkhole loss policies for dwellings in hazard prone areas
Estimated Cost:	\$0
Benefits:	Avoid property damage
Plan for Implementation	
Responsible Organization/Department:	NFIP Floodplain Administrator
Supporting Organization/Department:	City Clerk
Action/Project Priority:	M: 25
Timeline for Completion:	Estimated 6 months
Potential Fund Sources:	General Fund
Local Planning Mechanisms to be Used in Implementation, if any:	County sinkhole map
Progress Report	
Action Status:	New
Report of Progress:	No barriers have been encountered yet

Action Worksheet	
Name of Jurisdiction:	City of Fremont Hills
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, severe thunderstorms
Problem being Mitigated:	Unpreparedness of residents
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Fremont Hills 1.2
Name of Action or Project:	Safe refuge area plan
Mitigation Category:	Emergency services
Action or Project Description:	Create and update tornado/severe storm plans and identify refuge areas that comply with FEMA publication 431 Selecting Refuge Areas in Buildings, in schools, large facilities, and other establishments serving the public
Estimated Cost:	\$0
Benefits:	Avoid property damage
Plan for Implementation	
Responsible Organization/Department:	Planning and Zoning Department
Supporting Organization/Department:	City Council
Action/Project Priority:	M: 25
Timeline for Completion:	Estimated 6 months
Potential Fund Sources:	General Fund
Local Planning Mechanisms to be Used in Implementation, if any:	County sinkhole map
Progress Report	
Action Status:	New
Report of Progress:	No barriers have been encountered yet

Action Worksheet	
Name of Jurisdiction:	City of Fremont Hills
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of community preparedness
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Fremont Hills 1.3
Name of Action or Project:	Citizen preparedness
Mitigation Category:	Education and outreach
Action or Project Description:	Increase, promote, establish, and maintain participation in citizen preparedness activities such as Citizen Corps, CERT, COAD, Neighborhood Watch, Fire Corps, Amateur Radio, etc
Estimated Cost:	\$0 - \$1000
Benefits:	Better prepared and informed citizens are less susceptible to disaster losses
Plan for Implementation	
Responsible Organization/Department:	Public safety department
Supporting Organization/Department:	Administration
Action/Project Priority:	M: 29
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Training workshops are held regularly

Action Worksheet	
Name of Jurisdiction:	City of Fremont Hills
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado
Problem being Mitigated:	Loss of life and injury reduction during tornado and high wind events.
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Fremont Hills 1.4
Name of Action or Project:	Safe Room Construction
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentration where feasible.
Estimated Cost:	\$50,000 - \$1 million
Benefits:	Lives saved. Safe place to shelter during tornado and high wind events
Plan for Implementation	
Responsible Organization/Department:	Planning and Zoning Committee
Supporting Organization/Department:	City Administration
Action/Project Priority:	38 (H)
Timeline for Completion:	5 years
Potential Fund Sources:	Local, HMGP, PDM
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive Plans, building codes
Progress Report	
Action Status:	New
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	City of Highlandville
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, severe thunderstorms, hail, lightning
Problem being Mitigated:	Adequate public alert to hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Highlandville 1.1
Name of Action or Project:	Outdoor warning sirens
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Increase number of warning sirens in developing areas and make all warning sirens radio-activated to ensure that warning siren coverage remains consistent with current standards
Estimated Cost:	\$82,000
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	EMD
Supporting Organization/Department:	Police
Action/Project Priority:	M: 28
Timeline for Completion:	5 years
Potential Fund Sources:	FEMA Grants
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting, emergency response plans
Progress Report	
Action Status:	New
Report of Progress:	Potential barriers: lack of funding and timeline for completion is long

Action Worksheet	
Name of Jurisdiction:	City of Highlandville
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado
Problem being Mitigated:	Loss of life and injury during tornado and high wind events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Highlandville 1.2
Name of Action or Project:	Safe Room Construction
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentration where feasible
Estimated Cost:	\$2,000,000
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	EMD
Supporting Organization/Department:	Police Department
Action/Project Priority:	M: 28
Timeline for Completion:	5 years
Potential Fund Sources:	FEMA Grants
Local Planning Mechanisms to be Used in Implementation, if any:	Grant applications, annual budgeting
Progress Report	
Action Status:	New
Report of Progress:	Potential barriers: lack of funding and city resources

Action Worksheet	
Name of Jurisdiction:	City of Highlandville
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events
Problem being Mitigated:	Identifying safe refuge areas in existing facilities
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Highlandville 1.3
Name of Action or Project:	Safe refuge area plan
Mitigation Category:	Emergency Services
Action or Project Description:	Create and update tornado/severe storm plans and identify refuge areas that comply with FEMA public 431 Selecting Refuge Areas in Buildings, in schools, large facilities, and other establishments serving the public
Estimated Cost:	\$1,000
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	EMD
Supporting Organization/Department:	Police Department
Action/Project Priority:	M: 27
Timeline for Completion:	5 years
Potential Fund Sources:	Sales tax
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	New
Report of Progress:	no activity to date

Action Worksheet	
Name of Jurisdiction:	City of Highlandville
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme Temperatures
Problem being Mitigated:	Extreme temperature fatalities
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Highlandville 1.4
Name of Action or Project:	Community Extreme Temperature Refuge Areas
Mitigation Category:	Emergency Services
Action or Project Description:	Identify and designate heating and cooling refuge areas in community buildings and make these locations available to the public during extreme temperature events
Estimated Cost:	\$5,000
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	EMD
Supporting Organization/Department:	Police Department
Action/Project Priority:	H: 36
Timeline for Completion:	5 years
Potential Fund Sources:	Grants
Local Planning Mechanisms to be Used in Implementation, if any:	Grant applications, annual budgeting
Progress Report	
Action Status:	New
Report of Progress:	Barriers encountered: lack of funds

Action Worksheet	
Name of Jurisdiction:	Ozarks Technical Community College – Richwood Valley
Risk / Vulnerability	
Hazard(s) Addressed:	Earthquake, flood, severe t-storms, lightning, severe winter weather, tornado, wildfire
Problem being Mitigated:	Adequate public alert to hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	Ozarks Technical Community College 1.1
Name of Action or Project:	Currently finishing updating our storm, fire, emergency alert system
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Update fire alarm system and security system
Estimated Cost:	Cost estimate is still being developed
Benefits:	Up to date alarm system will properly alert all faculty, staff, and students to hazards
Plan for Implementation	
Responsible Organization/Department:	OTC Safety and Security Department
Supporting Organization/Department:	Information Technology Department
Action/Project Priority:	H: 37
Timeline for Completion:	2 years
Potential Fund Sources:	Safety and security budget
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Ongoing
Report of Progress:	Replaced all fire alert systems (strobes and horns)

Action Worksheet	
Name of Jurisdiction:	Ozarks Technical Community College – Richwood Valley
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, severe thunderstorm
Problem being Mitigated:	Loss of life and injury reduction during tornado and high wind events.
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	Ozarks Technical Community College 1.2
Name of Action or Project:	Protective filming and blast proof doors
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Retrofit doors to all vulnerable facilities with metal doors, or place protective film on glass doors and windows
Estimated Cost:	\$30,000 - \$50,000 per structure
Benefits:	Lives saved and structure damage avoided
Plan for Implementation	
Responsible Organization/Department:	Maintenance
Supporting Organization/Department:	Security
Action/Project Priority:	38 (H)
Timeline for Completion:	5 years
Potential Fund Sources:	Local, HMGP, PDM
Local Planning Mechanisms to be Used in Implementation, if any:	Critical facilities plan, master plan, capital improvement plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	On campus FEMA shelter currently meets this specification. Looking into upgrading other buildings next

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	All hazards
Problem being Mitigated:	Public awareness of hazard vulnerability and mitigation measures
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	Village of Saddlebrooke 1.1
Name of Action or Project:	Awareness Program
Mitigation Category:	Education and Outreach
Action or Project Description:	Use local and regional traditional media and social media platforms to raise awareness of mitigation activities
Estimated Cost:	\$2,000
Benefits:	Reduction of loss of life, injury, and property during hazard events
Plan for Implementation	
Responsible Organization/Department:	The Village has no employees. Action will be taken by the Trustees of the Village
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 35
Timeline for Completion:	Ongoing
Potential Fund Sources:	General funds
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Revised, continuing
Report of Progress:	Reviewed the hazards and action program with community as documented in minutes

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, thunderstorm, flood, winter weather, drought, heat
Problem being Mitigated:	Lack of communication during hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Village of Saddlebrooke 1.2
Name of Action or Project:	NOAA Radio Purchase
Mitigation Category:	Prevention
Action or Project Description:	Purchase and install NOAA weather radios in schools, government buildings, parks, and other public facilities
Estimated Cost:	\$200
Benefits:	Improves communication during hazard events
Plan for Implementation	
Responsible Organization/Department:	The Village has no employees. Action will be taken by Trustees of the Village
Supporting Organization/Department:	n/a
Action/Project Priority:	H:36
Timeline for Completion:	One year to include in operating budget
Potential Fund Sources:	General fund
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budget
Progress Report	
Action Status:	Revised, continuing
Report of Progress:	n/a

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, thunderstorm, flood, winter weather, drought, heat
Problem being Mitigated:	Lack of communication during hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Village of Saddlebrooke 1.3
Name of Action or Project:	Citizen NOAA Radios
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote the use o NOAA weather radios by all residents and businesses
Estimated Cost:	\$50
Benefits:	Improves communication during hazard events
Plan for Implementation	
Responsible Organization/Department:	The Village has no employees. Action will be taken by Trustees of the Village
Supporting Organization/Department:	n/a
Action/Project Priority:	H:36
Timeline for Completion:	Ongoing
Potential Fund Sources:	General fund
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budget
Progress Report	
Action Status:	Revised, continuing
Report of Progress:	n/a

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, thunderstorm, flood, winter weather, drought, heat
Problem being Mitigated:	Lack of communication during hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Village of Saddlebrooke 1.4
Name of Action or Project:	Mobile Hazard Alert
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote local severe weather alert applications for mobile communications devices
Estimated Cost:	\$50 - \$200
Benefits:	Improves communication during hazard events
Plan for Implementation	
Responsible Organization/Department:	The Village has no employees. Action will be taken by Trustees of the Village
Supporting Organization/Department:	n/a
Action/Project Priority:	H:36
Timeline for Completion:	6 months
Potential Fund Sources:	General fund
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budget
Progress Report	
Action Status:	Revised, continuing
Report of Progress:	n/a

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, thunderstorm
Problem being Mitigated:	Exposure of the public to hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Village of Saddlebrooke 1.5
Name of Action or Project:	Safe Place Awareness
Mitigation Category:	Prevention
Action or Project Description:	Create and update tornado/severe thunderstorm plans and identify strong, safe places in schools, large facilities, and other establishments serving the public
Estimated Cost:	\$100 - \$500
Benefits:	Improves public safety during hazard events
Plan for Implementation	
Responsible Organization/Department:	The Village has no employees. Action will be taken by Trustees of the Village
Supporting Organization/Department:	n/a
Action/Project Priority:	H:36
Timeline for Completion:	3 years
Potential Fund Sources:	General fund
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budget
Progress Report	
Action Status:	Revised, continuing
Report of Progress:	n/a

Action Worksheet	
Name of Jurisdiction:	Sparta School District
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, severe thunderstorm
Problem being Mitigated:	Lack of FEMA safe room
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Sparta School District 1.1
Name of Action or Project:	FEMA Saferoom
Mitigation Category:	Emergency Services
Action or Project Description:	Construction of FEMA safe room
Estimated Cost:	\$2,500,000
Benefits:	Safe place to shelter during severe hazard events
Plan for Implementation	
Responsible Organization/Department:	Sparta school district administration
Supporting Organization/Department:	FEMA, SEMA, Board of Education
Action/Project Priority:	H: 37
Timeline for Completion:	10 months
Potential Fund Sources:	Local, state, and federal funding
Local Planning Mechanisms to be Used in Implementation, if any:	Grant writing/application. Annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Footers poured, paper for pre-cast arrival

Action Worksheet	
Name of Jurisdiction:	Christian County Ambulance District
Risk / Vulnerability	
Hazard(s) Addressed:	Dam failure, drought, earthquake, extreme temperatures, flood, sinkholes, severe t-storms, hail, lightning, severe winter weather, tornado, wildfire
Problem being Mitigated:	Community Preparedness
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	Christian County Ambulance District 1.1
Name of Action or Project:	Citizen Preparedness
Mitigation Category:	Prevention
Action or Project Description:	Increase, promote, establish, and maintain participation in citizen preparedness activities, such as: Citizen Corps, CERT, COAD, Neighborhood Watch, Fire Corps, Amateur Radio, etc
Estimated Cost:	\$0 - \$1,000
Benefits:	Community Resilience, dollar amount unknown
Plan for Implementation	
Responsible Organization/Department:	Christian County Ambulance District Administration
Supporting Organization/Department:	Christian County EMA, Area Fire Districts
Action/Project Priority:	High: 41
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local grants
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	We have increased our CPR program with the organizations listed above and continue to help provide those organizations with other education programs.

Action Worksheet	
Name of Jurisdiction:	Christian County Ambulance District
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events
Problem being Mitigated:	Identifying safe refuge areas in existing facilities
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	Christian County Ambulance District 1.2
Name of Action or Project:	Safe refuge area plan
Mitigation Category:	Prevention, Emergency Services
Action or Project Description:	Create and update tornado/severe storm plans and identify refuge areas that comply with FEMA publication 431 Selecting Refuge Areas in Buildings, in schools, large facilities, and other establishments serving the public
Estimated Cost:	\$0 - \$500
Benefits:	Cost of one life saved \$6,000,000
Plan for Implementation	
Responsible Organization/Department:	Christian County Ambulance District Administration
Supporting Organization/Department:	Local schools
Action/Project Priority:	M: 27
Timeline for Completion:	Ongoing
Potential Fund Sources:	n/a
Local Planning Mechanisms to be Used in Implementation, if any:	Local emergency operations plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	CCAD assists by sharing the locations of know shelters in Christian County with the community as needed and as a reminder.

Action Worksheet	
Name of Jurisdiction:	Christian County Ambulance District
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme temperatures
Problem being Mitigated:	Extreme temperature fatalities
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	Christian County Ambulance District 1.3
Name of Action or Project:	OACAC Programs
Mitigation Category:	Education and Outreach
Action or Project Description:	Encourage local community organizations to continue and augment programs to provide fans, air conditioners, and winter weatherization for those at risk
Estimated Cost:	\$1,000 - \$5,000
Benefits:	Cost of 1 life saved \$6,000,000
Plan for Implementation	
Responsible Organization/Department:	Christian County Ambulance District Administration
Supporting Organization/Department:	OACAC, CERT
Action/Project Priority:	42
Timeline for Completion:	ongoing
Potential Fund Sources:	Local grants
Local Planning Mechanisms to be Used in Implementation, if any:	n/a
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	The fan program has not been provided due to funding. We do assist in education and first aid classes to educate citizens on hazardous weather emergencies.

Action Worksheet	
Name of Jurisdiction:	Christian County Ambulance District
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Outdated facilities hinder our ability to respond to and handle emergencies in our service area
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	Christian County Ambulance District 1.4
Name of Action or Project:	Ozark and Nixa facility upgrades
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Update/rebuild facility in Nixa (built in 1992) and relocate Ozark facility to a more central location within the City of Ozark
Estimated Cost:	Estimated cost is 2.5 million for both projects
Benefits:	Updated and centrally located facilities will provide better service and faster response times during emergencies
Plan for Implementation	
Responsible Organization/Department:	Christian County Ambulance District Administration, Board of Directors
Supporting Organization/Department:	Cox Health will provide additional input as needed
Action/Project Priority:	35
Timeline for Completion:	Ozark project will take 18 months, Nixa project will take 18 months after Ozark project is finished
Potential Fund Sources:	General tax revenue
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	New
Report of Progress:	Architects have been chosen. Site design has begun for Ozark project

Action Worksheet	
Name of Jurisdiction:	City of Clever
Risk / Vulnerability	
Hazard(s) Addressed:	Land Subsidence, Flood
Problem being Mitigated:	Property Loss
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Clever 1.1
Name of Action or Project:	Private Property Hazard Insurance
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote homeowner purchase of flood insurance and Missouri FAIR Plan sinkhole loss policies for dwellings in hazard prone areas.
Estimated Cost:	\$0
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	Planning and Zoning Commission
Supporting Organization/Department:	Public Works
Action/Project Priority:	H: 36
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local
Local Planning Mechanisms to be Used in Implementation, if any:	Site Plan Review, Building Permit Process
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	This will continue to be an ongoing process. Keeping the community informed will help keep the community safe.

Action Worksheet	
Name of Jurisdiction:	City of Clever
Risk / Vulnerability	
Hazard(s) Addressed:	Dam failure, drought, earthquake, extreme temperatures, flood, sinkholes, severe t-storms, hail, lightning, severe winter weather, tornado, wildfire
Problem being Mitigated:	Community Preparedness
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Clever 1.2
Name of Action or Project:	Citizen Preparedness
Mitigation Category:	Prevention
Action or Project Description:	Increase, promote, establish, and maintain participation in citizen preparedness activities, such as: Citizen Corps, CERT, COAD, Neighborhood Watch, Fire Corps, Amateur Radio, etc
Estimated Cost:	\$0 - \$1,000
Benefits:	Community Resilience, dollar amount unknown
Plan for Implementation	
Responsible Organization/Department:	Police Department
Supporting Organization/Department:	Emergency management director
Action/Project Priority:	High: 40
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	With the turnover of city employees these programs have been placed on hold. The city will be re-establishing them.

Action Worksheet	
Name of Jurisdiction:	City of Clever
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, severe thunderstorm, hail, lightning
Problem being Mitigated:	Adequate public alert to hazard levels
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Clever 1.3
Name of Action or Project:	Outdoor warning sirens
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Increase number of warning sirens in developing areas and make all warning sirens radio-activated and ensure that warning siren coverage remains consistent with current standards
Estimated Cost:	\$10,000 - \$20,000 per sirens
Benefits:	Lives saved, injury reduction
Plan for Implementation	
Responsible Organization/Department:	Local emergency management
Supporting Organization/Department:	Public safety departments
Action/Project Priority:	H: 32
Timeline for Completion:	18 months – 2 years
Potential Fund Sources:	Local funding, FEMA grants
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting, grant writing
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	The city has not installed a new siren but has used social media and fliers to promote weather radios. Looking into programs to get one for every residence in town

Action Worksheet	
Name of Jurisdiction:	City of Clever
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado
Problem being Mitigated:	Loss of life and injury during tornado and high wind events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Clever 1.4
Name of Action or Project:	Safe Room Construction
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentration where feasible
Estimated Cost:	\$700,000 - \$1,500,000
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	City administration and building officials
Supporting Organization/Department:	n/a
Action/Project Priority:	H:37
Timeline for Completion:	1 – 3 years
Potential Fund Sources:	Local funding, CDBG, FEMA grants
Local Planning Mechanisms to be Used in Implementation, if any:	Grant applications, master plans, capital improvement plans, crisis management plans, annual budgeting
Progress Report	
Action Status:	Continuing, not started
Report of Progress:	This action was not reviewed, but will be taken to the Planning and Zoning Commission for review

Action Worksheet	
Name of Jurisdiction:	City of Clever
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events
Problem being Mitigated:	Identifying safe refuge areas in existing facilities
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Clever 1.5
Name of Action or Project:	Safe refuge area plan
Mitigation Category:	Emergency Services, prevention
Action or Project Description:	Create and update tornado/severe storm plans and identify refuge areas that comply with FEMA public 431 Selecting Refuge Areas in Buildings, in schools, large facilities, and other establishments serving the public
Estimated Cost:	\$0 - \$500
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	Emergency managers
Supporting Organization/Department:	Public safety officials
Action/Project Priority:	H: 36
Timeline for Completion:	6 months – 1 year
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Local emergency operations plan
Progress Report	
Action Status:	Continue in progress
Report of Progress:	The Clever Schools has installed a 2 nd FEMA shelter since last plan. This has covered most of the in-town population. Ongoing due to identifying areas outside the city limits that will need servicing

Action Worksheet	
Name of Jurisdiction:	City of Clever
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme Temperatures
Problem being Mitigated:	Extreme temperature fatalities
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Clever 1.6
Name of Action or Project:	Community Extreme Temperature Refuge Areas
Mitigation Category:	Emergency Services
Action or Project Description:	Identify and designate heating and cooling refuge areas in community buildings and make these locations available to the public during extreme temperature events
Estimated Cost:	\$0
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	Local emergency managers
Supporting Organization/Department:	n/a
Action/Project Priority:	M:27
Timeline for Completion:	6 months – 1 year
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing, not started
Report of Progress:	City Hall is a refuge, but no progress has been made in the area of finding and implementing other areas to be available to the public in the event City Hall is closed

Action Worksheet	
Name of Jurisdiction:	Billings Special Road District
Risk / Vulnerability	
Hazard(s) Addressed:	Flood
Problem being Mitigated:	Adequate public alert to hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	Billings Special Road District 1.1
Name of Action or Project:	Low water crossing markings
Mitigation Category:	Prevention
Action or Project Description:	Install, replace, and maintain low water markings and gauges in flood prone areas
Estimated Cost:	\$800 per sign
Benefits:	\$10,000 per auto salvaged, \$5,000 - \$10,000 per water rescue, cost of one life saved
Plan for Implementation	
Responsible Organization/Department:	Road District Secretary
Supporting Organization/Department:	Christian County Commission
Action/Project Priority:	H: 35
Timeline for Completion:	6 months – 2 years
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Major road plans, road improvement plans
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Replacement of old roadway signs with high intensity facings for better visibility began in 2015 and continues

Action Worksheet	
Name of Jurisdiction:	Ozark School District
Risk / Vulnerability	
Hazard(s) Addressed:	Severe t-storm, hail, lightning, severe winter weather, tornado, wildfire
Problem being Mitigated:	Adequate public alert to hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	Ozark School District 1.1
Name of Action or Project:	Hazard Awareness Program for Schools
Mitigation Category:	Education and Outreach
Action or Project Description:	Continue to promote and expand educational programs regarding natural hazard mitigation and preparedness in school newsletters and seek to integrate information on natural hazards into school curriculum where feasible
Estimated Cost:	\$0 - \$1,000
Benefits:	Increased public safety and awareness for vulnerable populations
Plan for Implementation	
Responsible Organization/Department:	School administrators
Supporting Organization/Department:	Curriculum planners
Action/Project Priority:	H: 39
Timeline for Completion:	12 months
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Curriculum plans
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	We work to education families on different weather hazards and risks throughout the year utilizing our weekly newsletter and social media. Weather is integrated throughout our curriculum

Action Worksheet	
Name of Jurisdiction:	Ozark School District
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of community preparedness
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Ozark School District 1.2
Name of Action or Project:	Citizen Preparedness
Mitigation Category:	Prevention; Emergency Services
Action or Project Description:	Increase, promote, establish and maintain participation in citizen preparedness activities, such as; Citizen Corps, CERT, COAD, Neighborhood Watch, Fire Corps, Amateur Radio, etc.
Estimated Cost:	\$0 - \$1,000
Benefits:	Better prepared and informed citizens are less susceptible to disaster losses.
Plan for Implementation	
Responsible Organization/Department:	School police officers
Supporting Organization/Department:	School administration
Action/Project Priority:	High: 40
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	We work with local agencies to help share information regarding citizen preparedness activities and participate when feasible

Action Worksheet	
Name of Jurisdiction:	Ozark School District
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado
Problem being Mitigated:	Loss of life and injury reduction during tornado and high wind events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Ozark School District 1.3
Name of Action or Project:	Safe room construction
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentrations where feasible
Estimated Cost:	\$700,000 - \$1,500,000
Benefits:	Lives saved. Have a safe refuge from severe weather events or persons that would not otherwise have a place to go will prevent injuries and save lives
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	n/a
Action/Project Priority:	37
Timeline for Completion:	1 – 3 years
Potential Fund Sources:	Local general revenue, Hazard Mitigation Funds, SEMA/FEMA Gants, HMGP, PDM, FMA
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting, grant writing and application, master plans, capital improvement plans
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Safe rooms have been added at our four elementary schools and junior high school. We are also implementing safe rooms in our upcoming early childhood expansion and second high school campus construction.

Action Worksheet	
Name of Jurisdiction:	Ozark School District
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events
Problem being Mitigated:	Identifying safe refuge areas in existing facilities
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	Ozark School District 1.4
Name of Action or Project:	Safe Refuge Area Plan
Mitigation Category:	Education and Outreach
Action or Project Description:	Create and update tornado/severe storm plans and identify refuge areas that comply with FEMA publication 431
Estimated Cost:	\$0 - \$500
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	n/a
Action/Project Priority:	H:36
Timeline for Completion:	6 months – 1 year
Potential Fund Sources:	Local
Local Planning Mechanisms to be Used in Implementation, if any:	Emergency operations plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	We review and update our emergency operations plan annually. Safe rooms have been added at our four elementary schools and junior high school. We are also implementing safe rooms in our upcoming early childhood expansion and second high school campus construction.

Action Worksheet	
Name of Jurisdiction:	Ozark School District
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme Temperatures
Problem being Mitigated:	Extreme temperature fatalities
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Ozark School District 1.5
Name of Action or Project:	OACAC Programs
Mitigation Category:	Prevention
Action or Project Description:	Encourage local community organizations to continue and augment programs to provide fans, air conditioners, and winter weatherization for those at risk.
Estimated Cost:	\$1,000 – \$5,000
Benefits:	Lives saved.
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	n/a
Action/Project Priority:	H:33
Timeline for Completion:	1 – 2 yeas
Potential Fund Sources:	Local funds
Local Planning Mechanisms to be Used in Implementation, if any:	N/A
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	We work with organizations such as Care to Learn and Ozark Cares Network to ensure needs are met when identified

Action Worksheet	
Name of Jurisdiction:	Ozark School District
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events
Problem being Mitigated:	Injuries and fatalities that occur from tornado and high wind events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Ozark School District 1.6
Name of Action or Project:	Protective filming and blast proof doors
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Retrofit doors to all vulnerable facilities with metal doors, or place protective film on glass doors and windows
Estimated Cost:	\$30,000 - \$50,000 per structure
Benefits:	Lives saved and structure damage avoided
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	Building and grounds staff
Action/Project Priority:	H:37
Timeline for Completion:	1 – 2 yeas
Potential Fund Sources:	Local funds
Local Planning Mechanisms to be Used in Implementation, if any:	Critical facilities plan, crisis management plan
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Our safe rooms include protective doors and windows, which have been added at all four elementary buildings and our junior high school. We are also implementing safe rooms in our upcoming early childhood expansion and second high school campus construction.

Action Worksheet	
Name of Jurisdiction:	Nixa Public Schools
Risk / Vulnerability	
Hazard(s) Addressed:	Severe t-storm, hail, lightning, severe winter weather, tornado, and wildfire
Problem being Mitigated:	Lack of public awareness of hazard vulnerability and mitigation measures
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Nixa School District 1.1
Name of Action or Project:	Hazard Awareness program for schools
Mitigation Category:	Education and outreach
Action or Project Description:	Continue to promote and expand education programs regarding natural hazard and preparedness in school newsletter and seek to integrate information on natural hazards into school curriculum where feasible
Estimated Cost:	\$5000 yearly
Benefits:	Increased public knowledge and safety for vulnerable populations
Plan for Implementation	
Responsible Organization/Department:	Communication Department
Supporting Organization/Department:	Curriculum writers
Action/Project Priority:	H: 36
Timeline for Completion:	Ongoing
Potential Fund Sources:	In budget and possible grants
Local Planning Mechanisms to be Used in Implementation, if any:	Curriculum plans
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	We are regularly adding in safety information into our updates to parents. The curriculum department is looking for ways to add in activities into the curriculum that will incorporate safety lessons.

Action Worksheet	
Name of Jurisdiction:	Nixa Public Schools
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado
Problem being Mitigated:	Loss of life and injury during tornado and high wind events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Nixa School District 1.2
Name of Action or Project:	Safe room construction
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentrations where feasible
Estimated Cost:	\$10,000,000 to add to current facilities and \$2,000,000 per new facility
Benefits:	Lives saved. Have a safe refuge from severe weather events or persons that would not otherwise have a place to go will prevent injuries and save lives
Plan for Implementation	
Responsible Organization/Department:	Facilities Department
Supporting Organization/Department:	Communication/Safety
Action/Project Priority:	H:37
Timeline for Completion:	As funding allows
Potential Fund Sources:	Bond Issues and grants
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting, grant writing and application
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	The district is adding a tornado shelter area onto the Century Elementary addition. Out of the 12 buildings in the district, 7 will have a FEMA safe room or tornado shelter once Century is completed.

Action Worksheet	
Name of Jurisdiction:	Nixa Public Schools
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events
Problem being Mitigated:	Identifying safe refuge areas in existing facilities
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Nixa School District 1.3
Name of Action or Project:	Safe refuge area plan
Mitigation Category:	Prevention; emergency services
Action or Project Description:	Create and update tornado/severe storm plans and identify refuge areas that comply with FEMA publication 431 Selecting Refuge Areas in Buildings, in schools, large facilities and other establishments serving the public.
Estimated Cost:	\$2,000
Benefits:	Identifying the best place to seek shelter from severe weather events will save lives
Plan for Implementation	
Responsible Organization/Department:	Safety Department
Supporting Organization/Department:	School officials
Action/Project Priority:	H:39
Timeline for Completion:	Already completed and reviewed yearly
Potential Fund Sources:	Current budget
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	All buildings have been reviewed and safe areas identified. This is reviewed on a yearly basis

Action Worksheet	
Name of Jurisdiction:	Nixa Public Schools
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme Temperatures
Problem being Mitigated:	Extreme temperature fatalities
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	Nixa School District 1.4
Name of Action or Project:	OACAC Programs
Mitigation Category:	Prevention
Action or Project Description:	Encourage local community organizations to continue and augment programs to provide fans, air conditioners, and winter weatherization for those at risk.
Estimated Cost:	\$10,000 a year
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	Safety Department
Supporting Organization/Department:	School administrators
Action/Project Priority:	M:27
Timeline for Completion:	Ongoing
Potential Fund Sources:	Grants, Care To Learn
Local Planning Mechanisms to be Used in Implementation, if any:	Grant writing, budgeting
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	We will review our ability to provide this items through grants to our students and staff in need.

Action Worksheet	
Name of Jurisdiction:	Nixa Public Schools
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind injuries and fatalities
Problem being Mitigated:	Tornado, high wind events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	Nixa School District 1.5
Name of Action or Project:	Protective filming and blast proof doors
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Retrofit doors to all vulnerable facilities with metal doors, or place protective film on glass doors and windows
Estimated Cost:	\$30,000 - \$50,000 per structure
Benefits:	protective doors will properly secure the building and prevent damages to both property and persons
Plan for Implementation	
Responsible Organization/Department:	Facilities Department
Supporting Organization/Department:	n/a
Action/Project Priority:	H:40
Timeline for Completion:	Ongoing, as funding allows
Potential Fund Sources:	Grants
Local Planning Mechanisms to be Used in Implementation, if any:	Grant writing
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	All of our exterior doors have been replaced and glass areas around those have been fitting with impact resistant film. Windows just have their normal glaze on them that is not for storm protection.

Action Worksheet	
Name of Jurisdiction:	City of Sparta
Risk / Vulnerability	
Hazard(s) Addressed:	Severe t-storm, tornado, riverine flood, severe winter weather, extreme temperatures
Problem being Mitigated:	Lack of awareness and education of the citizens about severe weather
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Sparta 1.1
Name of Action or Project:	Natural Hazard Community Expos
Mitigation Category:	Education and Outreach
Action or Project Description:	An expo with community leaders and experts to provide education about hazards, emphasizing how to save lives and protect homes/other community buildings
Estimated Cost:	\$0
Benefits:	Save lives and mitigate damage to buildings
Plan for Implementation	
Responsible Organization/Department:	City administration
Supporting Organization/Department:	Christian County Department of Emergency Management
Action/Project Priority:	H: 41
Timeline for Completion:	3 months
Potential Fund Sources:	Budgeting/grants
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budget
Progress Report	
Action Status:	New
Report of Progress:	n/a

Action Worksheet	
Name of Jurisdiction:	City of Sparta
Risk / Vulnerability	
Hazard(s) Addressed:	Severe thunderstorm, tornado, flood, severe winter weather
Problem being Mitigated:	There are currently no refuge areas established for us in emergency situations
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Sparta 1.2
Name of Action or Project:	Establish refuge areas for use during/after severe weather
Mitigation Category:	Emergency services
Action or Project Description:	Establish refuge areas for use during/after severe weather
Estimated Cost:	\$0
Benefits:	Prevent loss of life
Plan for Implementation	
Responsible Organization/Department:	City of Sparta administration
Supporting Organization/Department:	Sparta school system, Christian County Department of Emergency Management
Action/Project Priority:	H: 33
Timeline for Completion:	6 months
Potential Fund Sources:	n/a
Local Planning Mechanisms to be Used in Implementation, if any:	n/a
Progress Report	
Action Status:	New
Report of Progress:	n/a

Action Worksheet	
Name of Jurisdiction:	City of Sparta
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme temperatures
Problem being Mitigated:	Lack of air conditioning and winter-readiness in some homes
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Sparta 1.3
Name of Action or Project:	Fan-drives and weatherization
Mitigation Category:	Prevention
Action or Project Description:	Work with chamber of commerce to distribute fans to those in need
Estimated Cost:	Varies depending on need
Benefits:	Prevent loss of life
Plan for Implementation	
Responsible Organization/Department:	City of Sparta Chamber of Commerce
Supporting Organization/Department:	City administration
Action/Project Priority:	H: 33
Timeline for Completion:	Ongoing
Potential Fund Sources:	Budgeting
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	The Chamber of Commerce hosts a yearly fan-drive event

Action Worksheet	
Name of Jurisdiction:	Spokane School District
Risk / Vulnerability	
Hazard(s) Addressed:	Severe t-storm, hail, lightning, severe winter weather, tornado, wildfire
Problem being Mitigated:	Lack of adequate public alert to hazard events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Spokane School District 1.1
Name of Action or Project:	Hazard awareness program for schools
Mitigation Category:	Education and outreach
Action or Project Description:	Continue to promote and expand educational programs regarding natural hazard mitigation and preparedness in school newsletter, and seek to integrate information on natural hazards into school curriculum where feasible
Estimated Cost:	\$0 - \$1,000
Benefits:	Increased public safety and awareness for vulnerable populations
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	Curriculum planners
Action/Project Priority:	H: 34
Timeline for Completion:	12 months
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Curriculum plans
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	We conduct emergency drills on a regular basis after teaching the procedures. Plans are updated and shared. All drills are documented

Action Worksheet	
Name of Jurisdiction:	Spokane School District
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of community preparedness
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Spokane School District 1.2
Name of Action or Project:	Citizen Preparedness
Mitigation Category:	Prevention; Emergency Services
Action or Project Description:	Increase, promote, establish and maintain participation in citizen preparedness activities, such as; Citizen Corps, CERT, COAD, Neighborhood Watch, Fire Corps, Amateur Radio, etc.
Estimated Cost:	\$0 - \$1,000
Benefits:	Better prepared and informed citizens are less susceptible to disaster losses.
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	n/a
Action/Project Priority:	M: 26
Timeline for Completion:	Ongoing, yearly activity
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Work with municipalities to ensure procedures allow for and support working with police/fire

Action Worksheet	
Name of Jurisdiction:	Spokane School District
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado
Problem being Mitigated:	Loss of life and injury reduction during tornado and high wind events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Spokane School District 1.3
Name of Action or Project:	Safe room construction
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentrations where feasible
Estimated Cost:	\$700,000 - \$1,500,000
Benefits:	Lives saved. Have a safe refuge from severe weather events for persons that would not otherwise have a place to go will prevent injuries and save lives
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	n/a
Action/Project Priority:	M: 27
Timeline for Completion:	1 – 3 years
Potential Fund Sources:	Local general revenue, Hazard Mitigation Funds, SEMA/FEMA Gants, HMGP, PDM, FMA
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting, grant writing and application, master plans, capital improvement plans
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Safe room added to Highlandville campus. Plan to try to add saferoom to the Spokane campus

Action Worksheet	
Name of Jurisdiction:	Spokane School District
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events
Problem being Mitigated:	Identifying safe refuge areas in existing facilities
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	Spokane School District 1.4
Name of Action or Project:	Safe Refuge Area Plan
Mitigation Category:	Education and Outreach
Action or Project Description:	Create and update tornado/severe storm plans and identify refuge areas that comply with FEMA publication 431
Estimated Cost:	\$0 - \$500
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	n/a
Action/Project Priority:	M: 28
Timeline for Completion:	6 months – 1 year
Potential Fund Sources:	Local, annual budgeting
Local Planning Mechanisms to be Used in Implementation, if any:	Emergency operations plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Buildings were identified and added to the plan at the Spokane campus. The plan will continue to evolve and buildings/spaces will be added as our needs change

Action Worksheet	
Name of Jurisdiction:	Spokane School District
Risk / Vulnerability	
Hazard(s) Addressed:	Extreme Temperatures
Problem being Mitigated:	Extreme temperature fatalities
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Spokane School District 1.5
Name of Action or Project:	OACAC Programs
Mitigation Category:	Prevention
Action or Project Description:	Encourage local community organizations to continue and augment programs to provide fans, air conditioners, and winter weatherization for those at risk.
Estimated Cost:	\$1,000 – \$5,000
Benefits:	Lives saved.
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	n/a
Action/Project Priority:	L: 24
Timeline for Completion:	1 – 2 years
Potential Fund Sources:	Local funds/annual budgeting
Local Planning Mechanisms to be Used in Implementation, if any:	N/A
Progress Report	
Action Status:	Continuing, no progress
Report of Progress:	Coordination with Silver Dollar City Cares for Kids Foundation. The city also works with local churches to promote this program. Not much progress has been made recently, but we expect to continue this outreach moving forward

Action Worksheet	
Name of Jurisdiction:	Spokane School District
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events
Problem being Mitigated:	Injuries and fatalities that occur from tornado and high wind events
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	Spokane School District 1.6
Name of Action or Project:	Protective filming and blast proof doors
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Retrofit doors to all vulnerable facilities with metal doors, or place protective film on glass doors and windows
Estimated Cost:	\$30,000 - \$50,000 per structure
Benefits:	Lives saved and structure damage avoided
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	Building and grounds staff
Action/Project Priority:	L: 24
Timeline for Completion:	Ongoing project. Progress is made as needed/when funding allows
Potential Fund Sources:	Local funds
Local Planning Mechanisms to be Used in Implementation, if any:	Critical facilities plan, crisis management plan
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Protective film has been added at all campuses, replacing doors on all campuses is done as needed/when funding allows

Action Worksheet	
Name of Jurisdiction:	City of Ozark
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Public awareness of hazard vulnerability and mitigation measures.
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Ozark 1.1
Name of Action or Project:	Ozark Expo
Mitigation Category:	Education and Outreach
Action or Project Description:	Continue collaboration between local government, community organization, and businesses to host community expos to promote public awareness health and safety during natural hazard events.
Estimated Cost:	\$500
Benefits:	Reduction of loss of life, injury, and property during hazard events.
Plan for Implementation	
Responsible Organization/Department:	Ozark Chamber of Commerce
Supporting Organization/Department:	Public works, Police, Fire, Planning and Zoning, PIO
Action/Project Priority:	35
Timeline for Completion:	Annual event
Potential Fund Sources:	General revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budget process, community collaboration
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Annual event hosted every year. Local EMDs and city staff promote information on residential saferooms, sinkhole training, severe storm preparedness, and other information.

Action Worksheet	
Name of Jurisdiction:	City of Ozark
Risk / Vulnerability	
Hazard(s) Addressed:	Wildfire
Problem being Mitigated:	Damaged caused by wildfires
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihood of all citizens
Action/Project Number:	City of Ozark 1.2
Name of Action or Project:	Fire resistant construction and landscaping
Mitigation Category:	Prevention; structure and infrastructure projects
Action or Project Description:	Increase public awareness on techniques to reduce risk, such as the use of fire-resistant materials in construction, landscaping techniques, and planting materials that are more resistant to the spread of wildfires
Estimated Cost:	Can be accomplished with regular staff and funding levels
Benefits:	\$20,000 - \$75,000 (cost of one structure)
Plan for Implementation	
Responsible Organization/Department:	Planning and Zoning
Supporting Organization/Department:	Fire
Action/Project Priority:	M: 28
Timeline for Completion:	Ongoing
Potential Fund Sources:	General revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Various public events throughout the year and on the city's website
Progress Report	
Action Status:	Continue in progress
Report of Progress:	Articles have been posted on the city's website and pamphlet's available at city offices

Action Worksheet	
Name of Jurisdiction:	City of Ozark
Risk / Vulnerability	
Hazard(s) Addressed:	Sinkhole, Flood
Problem being Mitigated:	Property Loss
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Ozark 1.3
Name of Action or Project:	Private Property Hazard Insurance
Mitigation Category:	Education and Outreach
Action or Project Description:	Promote homeowner purchase of flood insurance and Missouri FAIR Plan sinkhole loss policies for dwellings in hazard prone areas.
Estimated Cost:	Can be accomplished with regular staff and funding levels
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	Public works
Supporting Organization/Department:	Planning and Zonings
Action/Project Priority:	H: 42
Timeline for Completion:	Ongoing
Potential Fund Sources:	Storm water budget
Local Planning Mechanisms to be Used in Implementation, if any:	Storm water policies and ordinances
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Education through various events throughout the year. Articles posted on the city's website

Action Worksheet	
Name of Jurisdiction:	City of Ozark
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of community preparedness
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Ozark 1.4
Name of Action or Project:	Citizen Preparedness
Mitigation Category:	Prevention
Action or Project Description:	Increase, promote, establish, and maintain participation in citizen preparedness activities, such as: Citizen Corps, CERT, COAD, Neighborhood Watch, Fire Corps, Amateur Radio, etc
Estimated Cost:	\$0 - \$1,000
Benefits:	Community Resilience, dollar amount unknown
Plan for Implementation	
Responsible Organization/Department:	Police Department
Supporting Organization/Department:	Public works
Action/Project Priority:	H: 32
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local general revenue through Christian county
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Currently weekly activity on social media pages, occasional local paper articles on current threats, hazards, and impending hazards

Action Worksheet	
Name of Jurisdiction:	City of Ozark
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events
Problem being Mitigated:	Identifying safe refuge areas in existing facilities
Action or Project	
Applicable Goal Statement:	Goal 1: Protect the lives and livelihoods of all citizens
Action/Project Number:	City of Ozark 1.5
Name of Action or Project:	Safe refuge area plan
Mitigation Category:	Emergency Services, prevention
Action or Project Description:	Create and update tornado/severe storm plans and identify refuge areas that comply with FEMA public 431 Selecting Refuge Areas in Buildings, in schools, large facilities, and other establishments serving the public
Estimated Cost:	\$0 - \$500
Benefits:	Lives saved
Plan for Implementation	
Responsible Organization/Department:	Safety Coordinator, PIO
Supporting Organization/Department:	Christian County Emergency Management
Action/Project Priority:	H: 36
Timeline for Completion:	Ongoing
Potential Fund Sources:	General revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continue in progress
Report of Progress:	The Ozark Community Center has a FEMA storm shelter and the Ozark School district safe rooms for their students, which are open to the public

Action Worksheet	
Name of Jurisdiction:	City of Ozark
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado
Problem being Mitigated:	Loss of life and injury reduction during tornado and high wind events.
Action or Project	
Applicable Goal Statement:	Protect the lives and livelihoods of all citizens.
Action/Project Number:	City of Ozark 1.6
Name of Action or Project:	Safe Room Construction
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Integrate safe room construction in new community buildings, schools, large facilities, and other establishments serving the public in areas of population concentration where feasible.
Estimated Cost:	\$50,000 - \$1 million
Benefits:	Lives saved. Safe place to shelter during tornado and high wind events
Plan for Implementation	
Responsible Organization/Department:	Planning and Zoning Committee
Supporting Organization/Department:	City Administration
Action/Project Priority:	38 (H)
Timeline for Completion:	5 years
Potential Fund Sources:	Local, HMGP, PDM
Local Planning Mechanisms to be Used in Implementation, if any:	Comprehensive Plans, capital improvement plan, local emergency plan, building codes
Progress Report	
Action Status:	New
Report of Progress:	

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

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Wildfire
Problem being Mitigated:	Public's knowledge of the risk of wildfires
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:	Christian County 2.1
Name of Action or Project:	Fire resistant construction and landscaping
Mitigation Category:	Prevention; structure and infrastructure projects
Action or Project Description:	Increase public awareness on techniques to reduce risk, such as the use of fire-resistant materials in construction, landscaping techniques, and planting materials that are more resistant to the spread of wildfires
Estimated Cost:	Public education materials can be acquired from various federal agencies for free to distribute to the public as well as utilizing existing social media accounts
Benefits:	Slow down the spread of wildfires and prevent the fire from entering a structure
Plan for Implementation	
Responsible Organization/Department:	Christian County Planning and Resource Management Department
Supporting Organization/Department:	Christian County Emergency Management along with all the various PIO's throughout the county
Action/Project Priority:	M: 29
Timeline for Completion:	Ongoing
Potential Fund Sources:	Can be accomplished with currently staffing levels and funding levels and publications from various federal agencies
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continue in progress
Report of Progress:	Continuing on social media platforms during vulnerable times. Some publications in stock

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, sinkholes
Problem being Mitigated:	Non-insured losses.
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:	Christian County 2.2
Name of Action or Project:	Private property hazard insurance
Mitigation Category:	Prevention; Education and Outreach
Action or Project Description:	Promote homeowner purchase of flood insurance and Missouri FAIR Plan sinkhole loss policies for dwellings in hazard prone areas
Estimated Cost:	Negligible. This can be accomplished utilizing current staff using readily available social media avenues. Public Education materials can be acquired from various Federal Agencies for free to distribute to the public.
Benefits:	Without flood insurance, most residents will have to pay out of pocket or take out loans to repair and replace damaged items. With flood insurance, they will be able to recover faster and more fully
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management
Supporting Organization/Department:	Christian County Planning and Resource Management
Action/Project Priority:	High: 30
Timeline for Completion:	Continuous / Constant
Potential Fund Sources:	Can be accomplished with current staffing levels and funding levels and publications from various federal agencies.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Continuing on Social Media platforms during vulnerable times. Some publications in stock and being distributed.

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Riverine/flash flood
Problem being Mitigated:	Loss of life and property damage caused by flooding
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:	Christian County 2.3
Name of Action or Project:	Low water crossing improvements
Mitigation Category:	Prevention, structure and infrastructure projects
Action or Project Description:	Replace and improve low water crossings where identified as effective
Estimated Cost:	Could range from \$10,000 to over \$500,000 depending upon location
Benefits:	Improving low water crossings will potentially save lives and reduce the amount of rescues needed during and after severe flooding
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management
Supporting Organization/Department:	Christian County Highway Department
Action/Project Priority:	H: 32
Timeline for Completion:	Ongoing
Potential Fund Sources:	General revenue, hazard mitigation grants, MDC, DNR, USDA, EDA grants
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan, planning and zoning regulations
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Some progress has been made in upgrading crossings. The county continues to work with local jurisdictions to identify improvement areas

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Riverine/flash flooding, sinkholes
Problem being Mitigated:	Damages caused by flooding and sinkholes
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:	Christian County 2.4
Name of Action or Project:	Hazard area property protection
Mitigation Category:	Prevention, structure and infrastructure projects
Action or Project Description:	Acquire, elevate, or flood-proof properties and critical infrastructure within hazard areas
Estimated Cost:	\$6,500 annually
Benefits:	Lives saved. Visual display of water levels to encourage residents not to cross high-water areas
Plan for Implementation	
Responsible Organization/Department:	Christian County Floodplain Administrator
Supporting Organization/Department:	County Road Department
Action/Project Priority:	M: 26
Timeline for Completion:	Ongoing
Potential Fund Sources:	General revenue, hazard mitigation grants, MDC, DNR, USDA, EDA grants
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Great strides have been made by the County Road Department in placing these signs in high risk areas. Most are marked at this time. There are some areas outside the county's jurisdiction that remain un-marked. Maintenance and upkeep remains a problem from vandals and damage from flooding/accidents

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, sinkholes
Problem being Mitigated:	Damage to natural areas cause by flooding and sinkholes
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:	Christian County 2.5
Name of Action or Project:	Natural area preservation in hazard prone areas
Mitigation Category:	Natural systems protection
Action or Project Description:	Develop an open space acquisition, reuse, and preservation plan targeting hazard areas
Estimated Cost:	Unknown, could potentially be accomplished with current staff and funding levels
Benefits:	Preservation of natural areas
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management
Supporting Organization/Department:	n/a
Action/Project Priority:	M: 29
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing not started
Report of Progress:	Potential barriers include lack of funding and appropriate staffing

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Wildfire
Problem being Mitigated:	Damage to structures and loss of life caused by wildfire
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:	Christian County 2.6
Name of Action or Project:	Burn bans
Mitigation Category:	Prevention
Action or Project Description:	Implement burn restrictions during times of weather conditions conducive to the spread of wildfires
Estimated Cost:	Public education materials can be acquired from various federal agencies for free to distribute to the public as well as utilizing existing social media accounts
Benefits:	Mitigate damage caused by wildfires
Plan for Implementation	
Responsible Organization/Department:	Christian County Planning and Resource Management Department
Supporting Organization/Department:	Christian County Emergency Management along with the various PIOs throughout the county
Action/Project Priority:	Medium: 29
Timeline for Completion:	Ongoing
Potential Fund Sources:	Can be accomplished with current staffing and funding levels, as well as free publications from federal agencies
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan
Progress Report	
Action Status:	Continuing, not started
Report of Progress:	State fire Marshall states that they county does not have the jurisdiction to impose burn bans. Only the fire districts do. The county must coordinate with them to implement the ban

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	High impact of natural disasters to property, infrastructure, and the local economy
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:	Christian County 2.7
Name of Action or Project:	Monitor Funding Programs
Mitigation Category:	Education and Outreach
Action or Project Description:	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities
Estimated Cost:	Less than \$5,000 annually
Benefits:	Lives saved, property saved, less impact on local infrastructure, economy, etc.
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management
Supporting Organization/Department:	Each political subdivision in the county
Action/Project Priority:	H: 33
Timeline for Completion:	Ongoing
Potential Fund Sources:	General revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan. Annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	County staff continue to monitor local, state, and federal programs for potentially new fund sources

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Dam failure, Flood, Sinkhole, Wildfire
Problem being Mitigated:	Track previous disasters, analyze potential future impacts
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:	Christian County 2.8
Name of Action or Project:	Geographic Information
Mitigation Category:	Prevention
Action or Project Description:	Continue development of GIS database to further identify, analyze, map, and track the impact of natural hazards to enhance decision-making and facilities management for agencies and stakeholders
Estimated Cost:	\$40,000 - \$70,000 annually. Cost of dedicated GIS staff
Benefits:	Create database of hazards in the county to track patterns and reduce the impact of future disasters
Plan for Implementation	
Responsible Organization/Department:	Christian County Assessor's Office
Supporting Organization/Department:	Christian County Highway Department, Christian County Emergency Management
Action/Project Priority:	H: 31
Timeline for Completion:	Ongoing
Potential Fund Sources:	County general revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting, GIS applications
Progress Report	
Action Status:	New
Report of Progress:	County GIS map continues to be updated with current information; new layers being developed to track and analyze hazards

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Lack of GIS implementation and knowledge
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 Nixa 2.1
Name of Action or Project:	Geographic Information
Mitigation Category:	Education and Outreach
Action or Project Description:	Continue development of Geographic Information Systems (GIS) to further identify, analyze, map and track the impact of natural hazards to enhance decision making and facilities management for agencies and stakeholders.
Estimated Cost:	Could be accomplished with current staff and funding levels
Benefits:	Knowledge of local geography
Plan for Implementation	
Responsible Organization/Department:	Administration / Planning and Development Director
Supporting Organization/Department:	Public Works
Action/Project Priority:	35 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	General Fund
Local Planning Mechanisms to be Used in Implementation, if any:	Annual Budget Process
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Full-Time GIS Technician on staff with access to the latest GIS tools.

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Funding for hazard mitigation projects.
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 Nixa 2.2
Name of Action or Project:	Monitor Funding Programs
Mitigation Category:	Education and Outreach
Action or Project Description:	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities.
Estimated Cost:	
Benefits:	Financial assistance for hazard mitigation projects.
Plan for Implementation	
Responsible Organization/Department:	Administration
Supporting Organization/Department:	Finance Director
Action/Project Priority:	32 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	Annual Budget Process
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Monitoring potential funding sources.

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Drought
Problem being Mitigated:	Water shortages during severe drought events.
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 Nixa 2.3
Name of Action or Project:	Water Conservation
Mitigation Category:	Prevention
Action or Project Description:	Develop an ordinance to restrict the use of public water resources for non-essential usage, such as landscaping, washing cars, filling swimming pools, etc.
Estimated Cost:	\$0
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	Public Works
Supporting Organization/Department:	Water and Sewer Superintendent
Action/Project Priority:	29 (M)
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local
Local Planning Mechanisms to be Used in Implementation, if any:	Public Safety Ordinances
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Under consideration

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe Thunderstorms, Hail, Lightning, Severe Winter Weather
Problem being Mitigated:	Power outages during hazard events.
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 Nixa 2.4
Name of Action or Project:	Underground Utilities
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Encourage electrical utilities to use underground construction methods where possible to reduce disruptions of service due to natural hazard events.
Estimated Cost:	Cost of new service
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	Public Works
Supporting Organization/Department:	Electric Superintendent
Action/Project Priority:	39 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local
Local Planning Mechanisms to be Used in Implementation, if any:	New Construction Review, Building Permit Process
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Providing underground electric for new developments.

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, Sinkholes
Problem being Mitigated:	Future property losses in hazard prone areas.
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 Nixa 2.5
Name of Action or Project:	Hazard Area Property Protection
Mitigation Category:	Structure and Infrastructure Projects
Action of Project Description:	Acquire, elevate or flood-proof properties and critical infrastructure within hazard areas.
Estimated Cost:	TBD
Benefits:	Future loss avoidance
Plan for Implementation	
Responsible Organization/Department:	Planning and Development Staff
Supporting Organization/Department:	n/a
Action/Project Priority:	30 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local, HMGP, FMA
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Management Ordinances
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Created park space of stormwater detention in existing sinkhole areas.

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Property protection
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 Nixa 2.6
Name of Action or Project:	NFIP Participation
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain management requirements, including regulating all new and substantially improved construction in the Special Flood Hazard Areas (SFHAs), floodplain identification and mapping, including local requests for map updates
Estimated Cost:	Cost can be calculated into the salary of the floodplain manager
Benefits:	Being aware of local floodplains.
Plan for Implementation	
Responsible Organization/Department:	Floodplain administrator
Supporting Organization/Department:	Planning and Development Staff
Action/Project Priority:	31 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Management Ordinance
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Participation in NFIP

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe Thunderstorms, Hail, Lightning, Severe Winter Weather
Problem being Mitigated:	Vulnerability to severe weather events
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 Nixa 2.7
Name of Action or Project:	Storm Ready
Mitigation Category:	Prevention
Action or Project Description:	Maintain Storm Ready status with the National Weather Service.
Estimated Cost:	Estimate still being developed
Benefits:	Lives saved.
Plan for Implementation	
Responsible Organization/Department:	Planning and Zoning
Supporting Organization/Department:	Administration
Action/Project Priority:	34 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local
Local Planning Mechanisms to be Used in Implementation, if any:	Emergency Operations Plan
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Maintain Storm Ready status

Action Worksheet	
Name of Jurisdiction:	City of Fremont Hills
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Property damage caused by flooding
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 Fremont Hills 2.1
Name of Action or Project:	NFIP Participation
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain management requirements, including regulating all new and substantially improved construction in the Special Flood Hazard Areas (SFHAs), floodplain identification and mapping, including local requests for map updates
Estimated Cost:	TBD
Benefits:	Prevent damage to personal property and the city's wastewater treatment plant
Plan for Implementation	
Responsible Organization/Department:	City of Fremont Hills Mayor
Supporting Organization/Department:	Board of Aldermen
Action/Project Priority:	Low: 24
Timeline for Completion:	Ongoing
Potential Fund Sources:	General operating funds
Local Planning Mechanisms to be Used in Implementation, if any:	NFIP policies and guidelines
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Currently evaluating flood plain mapping

Action Worksheet	
Name of Jurisdiction:	City of Fremont Hills
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, severe thunderstorm, flooding, severe winter weather
Problem being Mitigated:	Unpreparedness of residents
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 Fremont Hills 2.2
Name of Action or Project:	Storm ready community
Mitigation Category:	Prevention
Action or Project Description:	Maintain storm ready status with the National Weather Service
Estimated Cost:	TBD
Benefits:	Prevent the loss of life and property
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Department:	Board of Aldermen
Action/Project Priority:	M: 25
Timeline for Completion:	Ongoing
Potential Fund Sources:	General operating funds
Local Planning Mechanisms to be Used in Implementation, if any:	Periodic emails to residents on Swift 911 services
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Distribute information to residents via email on an as-needed basis

Action Worksheet	
Name of Jurisdiction:	City of Highlandville
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, severe thunderstorms, hail, lightning, severe winter weather
Problem being Mitigated:	Power outages during hazard events
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 Highlandville 2.1
Name of Action or Project:	Underground Utilities
Mitigation Category:	Structure and infrastructure Projects
Action or Project Description:	Encourage electrical utilities to use underground construction methods where possible to reduce disruptions of service cause by hazard events
Estimated Cost:	\$15,000
Benefits:	Mitigate damage to power lines and prevent an interruption of service
Plan for Implementation	
Responsible Organization/Department:	Power and Water
Supporting Organization/Department:	n/a
Action/Project Priority:	M: 29
Timeline for Completion:	2 years
Potential Fund Sources:	DR 4552
Local Planning Mechanisms to be Used in Implementation, if any:	city ordinances and building codes
Progress Report	
Action Status:	New
Report of Progress:	No barriers have bene encountered so far

Action Worksheet	
Name of Jurisdiction:	City of Highlandville
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, severe thunderstorms, hail, lightning, severe winter weather
Problem being Mitigated:	Vulnerability to severe weather events
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 Highlandville 2.2
Name of Action or Project:	Storm ready
Mitigation Category:	Emergency Services
Action or Project Description:	Maintain countywide Storm Ready status with the National Weather Service
Estimated Cost:	\$0, could be accomplished with current staff and funding levels
Benefits:	Save lives
Plan for Implementation	
Responsible Organization/Department:	Emergency Management
Supporting Organization/Department:	n/a
Action/Project Priority:	M: 28
Timeline for Completion:	3 yeas
Potential Fund Sources:	Grants
Local Planning Mechanisms to be Used in Implementation, if any:	Local emergency operations plans
Progress Report	
Action Status:	New
Report of Progress:	NWS coordinating with R-VII School District and SW MO Skywarn

Action Worksheet	
Name of Jurisdiction:	City of Highlandville
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Property protection
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 Highlandville 2.3
Name of Action or Project:	NFIP Participation
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain management requirements, including regulating all new and substantially improved construction in the Special Flood Hazard Areas (SFHAs), floodplain identification and mapping, including local requests for map updates
Estimated Cost:	Cost can be included in salary of floodplain manager
Benefits:	Avoid property damage caused by flooding
Plan for Implementation	
Responsible Organization/Department:	Floodplain administrators
Supporting Organization/Department:	Planning and Development Staff
Action/Project Priority:	H:36
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Management Ordinance, annual budgeting
Progress Report	
Action Status:	New
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	Flood
Problem being Mitigated:	Exposure of structures to flooding
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:	Village of Saddlebrooke 2.1
Name of Action or Project:	NFIP Requirement Enforcement
Mitigation Category:	Prevention
Action or Project Description:	Enforcement of floodplain management requirements, including regulating all new and substantially improved construction in the Special Flood Hazard Areas
Estimated Cost:	\$2,000 - \$5,000
Benefits:	Mitigate the damage to structures in flooding events
Plan for Implementation	
Responsible Organization/Department:	Trustee of the village
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 38
Timeline for Completion:	Immediate and ongoing
Potential Fund Sources:	General fund
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain management ordinances
Progress Report	
Action Status:	Revised, continuing
Report of Progress:	Enforcement of flood plain requirements continues

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	Flood
Problem being Mitigated:	Poor maintenance of 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:	Village of Saddlebrooke 2.2
Name of Action or Project:	Waterway Maintenance
Mitigation Category:	Prevention
Action or Project Description:	Work with regulatory agencies to obtain appropriate permits to maintain waterways in order to reduce the impact of flooding
Estimated Cost:	Negligible
Benefits:	Reduce the impact and extent of flooding
Plan for Implementation	
Responsible Organization/Department:	Trustees of the Village
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 38
Timeline for Completion:	Immediate and ongoing
Potential Fund Sources:	General funds
Local Planning Mechanisms to be Used in Implementation, if any:	Drainage ordinances, subdivision regulations
Progress Report	
Action Status:	New
Report of Progress:	n/a

Action Worksheet	
Name of Jurisdiction:	City of Clever
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Property protection
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 Clever 2.1
Name of Action or Project:	NFIP Participation
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain management requirements, including regulating all new and substantially improved construction in the Special Flood Hazard Areas (SFHAs), floodplain identification and mapping, including local requests for map updates
Estimated Cost:	Cost can be included in salary of floodplain manager
Benefits:	Avoid property damage caused by flooding
Plan for Implementation	
Responsible Organization/Department:	Floodplain administrators
Supporting Organization/Department:	Planning and Development Staff
Action/Project Priority:	H:40
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Management Ordinance, annual budgeting
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	This is currently part of our Codes and will continue to be. The city is an active member and attends trainings when possible

Action Worksheet	
Name of Jurisdiction:	City of Clever
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe Thunderstorms, Hail, Lightning, Severe Winter Weather
Problem being Mitigated:	Vulnerability to severe weather events
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 Clever 2.2
Name of Action or Project:	Storm Ready
Mitigation Category:	Prevention
Action or Project Description:	Maintain Storm Ready status with the National Weather Service.
Estimated Cost:	\$0
Benefits:	Lives saved.
Plan for Implementation	
Responsible Organization/Department:	Local Emergency Managers
Supporting Organization/Department:	n/a
Action/Project Priority:	L:11
Timeline for Completion:	1 – 5 years
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Emergency Operations Plan
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Mutual aid with Christian County EMA

Action Worksheet	
Name of Jurisdiction:	City of Clever
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, high wind events, earthquakes
Problem being Mitigated:	Integrating mitigation measures in construction of new buildings
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 Clever 2.3
Name of Action or Project:	Hurricane straps and structural integrity
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Adopt the International Building Code (IBC) and International Residence Code (IRC)
Estimated Cost:	Case by case methodology
Benefits:	\$10,000 - \$100,000 of property damage to future structures
Plan for Implementation	
Responsible Organization/Department:	Building officials
Supporting Organization/Department:	n/a
Action/Project Priority:	H:41
Timeline for Completion:	6 months – 1 year
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Building codes
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	The City has updated to the IBC and IRC and is now working on staying current with them

Action Worksheet	
Name of Jurisdiction:	Billings Special Road District
Risk / Vulnerability	
Hazard(s) Addressed:	Flood
Problem being Mitigated:	Frequently flooded low water crossings
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:	Billings Special Road District 2.1
Name of Action or Project:	Low water crossings improvements
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Replace and improve low water crossings where identified as effective
Estimated Cost:	\$150,000 - \$300,000
Benefits:	\$10,000 per auto salvaged, \$5,000 - \$10,000 per water rescue, cost of one life saved \$6,000,000
Plan for Implementation	
Responsible Organization/Department:	Road District Commissioners
Supporting Organization/Department:	Christian County Commission
Action/Project Priority:	High: 35
Timeline for Completion:	18 months – 3 years
Potential Fund Sources:	Local funding, local “no cash” funding, CDBG, USDA Rural Development, HMGP, PDM, FMA
Local Planning Mechanisms to be Used in Implementation, if any:	Major road plans, capital improvement plans
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Culvert replacements and bridge improvements continue to progress in the district

Action Worksheet	
Name of Jurisdiction:	City of Sparta
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Damages and injuries caused by flooding
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 Sparta 2.1
Name of Action or Project:	Floodplain administration (NFIP Participation)
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain management requirements, including regulating all new and substantially improved construction in the Special Flood Hazard Areas (SFHAs), floodplain identification and mapping, including local requests for map updates
Estimated Cost:	\$0 - \$10,000
Benefits:	Prevent loss of life and damage to infrastructures/buildings in the community
Plan for Implementation	
Responsible Organization/Department:	City administration. Mayor is floodplain administrator
Supporting Organization/Department:	Missouri State Emergency Management Agency
Action/Project Priority:	H: 41
Timeline for Completion:	Ongoing
Potential Fund Sources:	Budgeting and grants
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting and grant writing. Floodplain ordinances. NFIP policies
Progress Report	
Action Status:	New
Report of Progress:	Gathering information about administering floodplains, requiring floodplain permits to do any digging/construction in those areas

Action Worksheet	
Name of Jurisdiction:	City of Sparta
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding, severe t-storm, tornado
Problem being Mitigated:	Lack of preparedness for storms
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 Sparta 2.2
Name of Action or Project:	Maintain countywide Storm Ready status
Mitigation Category:	Prevention
Action or Project Description:	Main sure that citizens, businesses, and organizations are prepared for severe weather
Estimated Cost:	\$0 - \$10,000
Benefits:	Prevent loss of life and damages caused to structures and property
Plan for Implementation	
Responsible Organization/Department:	City administration
Supporting Organization/Department:	Christian County Emergency Management
Action/Project Priority:	H: 40
Timeline for Completion:	6 months
Potential Fund Sources:	Budgeting, cost-sharing with other organizations
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	New
Report of Progress:	n/a

Action Worksheet	
Name of Jurisdiction:	City of Ozark
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Property protection
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 Ozark 2.1
Name of Action or Project:	NFIP Participation
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain management requirements, including regulating all new and substantially improved construction in the Special Flood Hazard Areas (SFHAs), floodplain identification and mapping, including local requests for map updates
Estimated Cost:	Unknown, could be calculated into the salary of the flood plain manager
Benefits:	Being aware of local floodplains.and mitigating future damage
Plan for Implementation	
Responsible Organization/Department:	Public works, safety coordinator, Planning and Zoning
Supporting Organization/Department:	Christian County Emergency Management
Action/Project Priority:	H:40
Timeline for Completion:	Ongoing
Potential Fund Sources:	Stormwater budget
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain ordinances, NFIP guidelines and policies
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Prior to flooding, roads are closed and equipment is moved from buildings located in the flood zone

Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Flash/Riverine Flooding
Problem being Mitigated:	Floodplain management enforcement
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Christian County 3.1
Name of Action or Project:	NFIP Participation
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain management requirements, including regulating all new and substantially improved construction in the Special Flood Hazard Areas (SPFAs), floodplain identification and mapping, including local requests for map updates.
Estimated Cost:	Minimal, using existing staffing levels
Benefits:	Reduction in flood damage to current and future development
Plan for Implementation	
Responsible Organization/Department:	Christian County Floodplain Administrator
Supporting Organization/Department:	Christian County Emergency Management
Action/Project Priority:	High: 38
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local general revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, local zoning laws and regulations. NFIP policies
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	The county continues to help monitor and enforce NFIP requirements in the participating jurisdictions

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe T-Storm, Hail, Lightning, Severe Winter Weather
Problem being Mitigated:	Lack of a coordinated response to severe weather threats
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Christian County 3.2
Name of Action or Project:	Storm Ready
Mitigation Category:	Emergency Services
Action or Project Description:	Maintain countywide Storm Ready status with the National Weather Service
Estimated Cost:	Minimal, can be accomplished with current staff and funding levels
Benefits:	This will ensure that there is a coordinated, well-informed, and prompt response to the threat of severe weather
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management
Supporting Organization/Department:	Christian County 911 as well as each fire district and city within the county
Action/Project Priority:	High: 33
Timeline for Completion:	Renews every 3 years
Potential Fund Sources:	Local revenue, EMPG
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan, County EOP, annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Storm ready designation has been accomplished every cycle since 2004

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, Tornado, Severe T-Storm, Hail, Lightning, Severe Winter Weather
Problem being Mitigated:	Lack of community preparedness and response
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Christian County 3.3
Name of Action or Project:	NIMS Training
Mitigation Category:	Education and Outreach
Action or Project Description:	Encourage all elected officials, public administrators, community stakeholders and responders to participate in National Incident Management System (NIMS) training and compliance programs.
Estimated Cost:	Minimal, can be accomplished with current staff and FEMA/SEMA training
Benefits:	High quality training according to national standards allows the county to receive certain funding and provides for a coordinated approach to disaster response
Plan for Implementation	
Responsible Organization/Department:	County Clerk's Office
Supporting Organization/Department:	Christian County Emergency Management
Action/Project Priority:	High: 34
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local revenue, SEMA/FEMA training funds
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP, County/City NIMS resolutions
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	It is estimated that 80% of applicable jurisdictions are compliant. Ongoing ICS classes in the county as well as the region. Sheriff has mandated ICS training for all staff. EM has to maintain ICS standards to keep EMGP funding

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, Tornado, Severe T-Storm, Hail, Lightning, Severe Winter Storm, Wildfire.
Problem being Mitigated:	Public safety officials being unable to locate residences in the county
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Christian County 3.4
Name of Action or Project:	911 Addressing for structures
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Enforce highly visible 911 addressing for residences and businesses through building and business permitting as well as public education of existing ordinances.
Estimated Cost:	Unknown
Benefits:	Faster response to local emergencies
Plan for Implementation	
Responsible Organization/Department:	Christian County Commission. Each political subdivision. Christian County Emergency Services
Supporting Organization/Department:	Christian County Emergency Management
Action/Project Priority:	Medium: 28
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan, annual budgeting
Progress Report	
Action Status:	Continuing not started
Report of Progress:	Has not been started yet. Potential barriers include lack of funding and staffing to enforce requirements

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, Tornado, Severe T-Storm, Hail, Lightning, Severe Winter Storm.
Problem being Mitigated:	Identification of debris disposal and burning locations in the county
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Christian County 3.5
Name of Action or Project:	Debris disposal plan
Mitigation Category:	Education and Outreach; Emergency Services
Action or Project Description:	Identify debris disposal and burning locations in the county to facilitate recovery from large scale hazard events
Estimated Cost:	Can be accomplished with current staff and funding levels
Benefits:	Being able to provide services and debris removal in a timely manner
Plan for Implementation	
Responsible Organization/Department:	Christian County Emergency Management, Christian County Commission
Supporting Organization/Department:	Each municipal government
Action/Project Priority:	High: 33
Timeline for Completion:	September 2021
Potential Fund Sources:	Local general revenue
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Ongoing project. Property changes hand, development takes place

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Tornado, Severe T-Storm, Hail, Lightning, Severe Winter Storm.
Problem being Mitigated:	Damage to trees and vegetation during storms which may impact easements and rights of way
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Christian County 3.6
Name of Action or Project:	Tree Ordinance
Mitigation Category:	Prevention
Action or Project Description:	Enhance strategies and coordinate with utility providers to manage encroachment of vegetation in easements and rights of way.
Estimated Cost:	Unknown
Benefits:	Lessen the impacts of natural disasters
Plan for Implementation	
Responsible Organization/Department:	Christian County Highway Department
Supporting Organization/Department:	
Action/Project Priority:	Medium: 29
Timeline for Completion:	Ongoing – continuous
Potential Fund Sources:	Local general revenue, private company revenue, hazard mitigation grants
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP, Hazard Mitigation Plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Have coordinated with utilities to place infrastructure at back of right-of-way

Action Worksheet	
Name of Jurisdiction:	Christian County
Risk / Vulnerability	
Hazard(s) Addressed:	Riverine/Flash Flood, Severe Winter Storm
Problem being Mitigated:	Impacted travel during severe weather events
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Christian County 3.7
Name of Action or Project:	Snow and debris clearing
Mitigation Category:	Prevention
Action or Project Description:	Plan for and maintain adequate snow and debris clearing capabilities.
Estimated Cost:	Unknown. Can be accomplished with current staff and funding levels depending on the severity of the storm
Benefits:	Emergency services being able to reach residents. Residents being able to travel for work, school, etc
Plan for Implementation	
Responsible Organization/Department:	Public works, highway departments, MODOT
Supporting Organization/Department:	Christian County Emergency Management
Action/Project Priority:	High: 35
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local revenue. Potential federal funding during declared disasters
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP, hazard mitigation plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Municipalities continue to upgrade equipment, stockpile supplies. County coordinated with each jurisdiction to help with needs. Standard operating procedure for county's highway department

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, tornado, severe t storm, hail, lightning, severe winter weather
Problem being Mitigated:	Community Preparedness and Response
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 Nixa 3.1
Name of Action or Project:	NIMS Training
Mitigation Category:	Education and Outreach
Action or Project Description:	Encourage all elected officials, public administrators, community stakeholders and responders to participate in National Incident Management System (NIMS) training and compliance programs.
Estimated Cost:	\$0 - \$1,000
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	City Administration
Supporting Organization/Department:	Local Emergency Planning Committee
Action/Project Priority:	37 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	General Fund
Local Planning Mechanisms to be Used in Implementation, if any:	Emergency Operations Plan
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	All elected officials and Senior management receive NIMS training.

Action Worksheet	
Name of Jurisdiction:	City of Nixa
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, severe winter weather
Problem being Mitigated:	Functional integrity of critical lifelines
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 Nixa 3.2
Name of Action or Project:	Snow and Debris Clearing
Mitigation Category:	Prevention
Action or Project Description:	Plan for and maintain adequate snow and debris clearing capabilities.
Estimated Cost:	\$0 - \$1,000
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	Public Works
Supporting Organization/Department:	Streets Superintendent
Action/Project Priority:	41 (H)
Timeline for Completion:	Ongoing
Potential Fund Sources:	General Fund, Street Fund, HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	Road maintenance plans
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Public Works routinely clear debris after flood events and maintain plows and salt for roadway clearance.

Action Worksheet	
Name of Jurisdiction:	City of Highlandville
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, Tornado, Severe T-Storm, Hail, Lightning, Severe Winter Storm, Wildfire
Problem being Mitigated:	Emergency response capability
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 Highlandville 3.1
Name of Action or Project:	911 Addressing for Structures
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Enforce highly visible 911 addressing for residences and businesses through building and business permitting as well as public education of existing ordinances
Estimated Cost:	\$4,000
Benefits:	Save lives
Plan for Implementation	
Responsible Organization/Department:	Board of Alderman
Supporting Organization/Department:	administration
Action/Project Priority:	M: 27
Timeline for Completion:	2 year
Potential Fund Sources:	Sales tax
Local Planning Mechanisms to be Used in Implementation, if any:	Subdivision ordinances
Progress Report	
Action Status:	New
Report of Progress:	Barriers encountered: lack of sales tax

Action Worksheet	
Name of Jurisdiction:	City of Highlandville
Risk / Vulnerability	
Hazard(s) Addressed:	Drought
Problem being Mitigated:	Water shortages during severe events
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 Highlandville 3.2
Name of Action or Project:	Water conservation
Mitigation Category:	Prevention
Action or Project Description:	Develop an ordinance restricting the use of public water resources for non-essential usages, such as landscaping, washing cars, filling swimming pools, etc.
Estimated Cost:	\$1,000
Benefits:	\$4,000
Plan for Implementation	
Responsible Organization/Department:	Power and Water
Supporting Organization/Department:	administration
Action/Project Priority:	M: 25
Timeline for Completion:	2 year
Potential Fund Sources:	Sales tax
Local Planning Mechanisms to be Used in Implementation, if any:	Public safety ordinances
Progress Report	
Action Status:	New
Report of Progress:	Barriers encountered: lack of sales tax

Action Worksheet	
Name of Jurisdiction:	City of Highlandville
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Adequate funding sources for mitigation activities
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 Highlandville 3.3
Name of Action or Project:	Monitor Funding Program
Mitigation Category:	Prevention
Action or Project Description:	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities
Estimated Cost:	\$10,000
Benefits:	\$40,000. Access to new funding sources for mitigation activities
Plan for Implementation	
Responsible Organization/Department:	Highlandville Mayor
Supporting Organization/Department:	City Clerk
Action/Project Priority:	M: 25
Timeline for Completion:	Ongoing
Potential Fund Sources:	Sales tax
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	New
Report of Progress:	Barriers encountered: lack of sales tax

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of training for municipal officials
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Village of Saddlebrooke 3.1
Name of Action or Project:	MINS training
Mitigation Category:	Prevention
Action or Project Description:	Promote and provide NIMS training and/or information for all elected officials, public administrators, school administrators, and community stakeholders
Estimated Cost:	\$3,000 - \$5,000
Benefits:	Training for officials will improve response to hazard to events
Plan for Implementation	
Responsible Organization/Department:	Trustees of the village
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 37
Timeline for Completion:	Ongoing
Potential Fund Sources:	General funds
Local Planning Mechanisms to be Used in Implementation, if any:	Local emergency operations plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Poor 911 addressing makes emergency response difficult
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Village of Saddlebrooke 3.2
Name of Action or Project:	911 Addressing
Mitigation Category:	Emergency Services
Action or Project Description:	Educate the public on the importance of and enforce visible 911 addressing
Estimated Cost:	\$50 - \$100
Benefits:	Improved emergency response during and after hazard events
Plan for Implementation	
Responsible Organization/Department:	Trustees of the village
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 43
Timeline for Completion:	Ongoing
Potential Fund Sources:	General funds
Local Planning Mechanisms to be Used in Implementation, if any:	Subdivision Regulations
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Public education continues

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of hazard mitigation principles in city and county plans
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Village of Saddlebrooke 3.3
Name of Action or Project:	Hazard mitigation in plans
Mitigation Category:	Prevention
Action or Project Description:	Integrate hazard mitigation into comprehensive plans and storm water management policies
Estimated Cost:	\$50 - \$200
Benefits:	Plans will include hazard mitigation principles, improving resilience to hazard events
Plan for Implementation	
Responsible Organization/Department:	Trustees of the village
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 36
Timeline for Completion:	Two years
Potential Fund Sources:	General funds
Local Planning Mechanisms to be Used in Implementation, if any:	Local Emergency Operations Plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Plans are being incorporated

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of funding for hazard mitigation projects
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Village of Saddlebrooke 3.4
Name of Action or Project:	Funding Identification
Mitigation Category:	Education and Outreach
Action or Project Description:	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities
Estimated Cost:	\$200 - \$500
Benefits:	Increased opportunities for finding hazard mitigation activities
Plan for Implementation	
Responsible Organization/Department:	Trustees of the village
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 43
Timeline for Completion:	Continuous over 5 years
Potential Fund Sources:	General funds
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing
Report of Progress:	Monitoring continues

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	Flood
Problem being Mitigated:	Poor coordination about infrastructure development can lead to flood damage
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Village of Saddlebrooke 3.5
Name of Action or Project:	Infrastructure Coordination
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Continue coordination to promote infrastructure development practices that reduce damage from flooding
Estimated Cost:	\$50 - \$300
Benefits:	Decrease damage during flood events
Plan for Implementation	
Responsible Organization/Department:	Trustees of the village
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 44
Timeline for Completion:	Continuous over 5 years
Potential Fund Sources:	General funds
Local Planning Mechanisms to be Used in Implementation, if any:	Subdivision regulations, following building permit process
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Coordination continues

Action Worksheet	
Name of Jurisdiction:	Village of Saddlebrooke
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of data for decision making and facilities management
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Village of Saddlebrooke 3.6
Name of Action or Project:	GIS Development
Mitigation Category:	Prevention
Action or Project Description:	Continue development of GIS database to further identify, analyze, and map hazard prone areas to enhance decision making and facilities management
Estimated Cost:	\$2,500 - \$4,000
Benefits:	More and better data will help with mitigation related decision making
Plan for Implementation	
Responsible Organization/Department:	Trustees of the village
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 38
Timeline for Completion:	36 months
Potential Fund Sources:	General funds
Local Planning Mechanisms to be Used in Implementation, if any:	Capital improvements, street plans, online mapping
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	GIS database development continues

Action Worksheet	
Name of Jurisdiction:	City of Clever
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, tornado, severe t-storm, hail, lightning, severe winter weather
Problem being Mitigated:	Community Preparedness and Response
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 Clever 3.1
Name of Action or Project:	NIMS Training
Mitigation Category:	Education and Outreach
Action or Project Description:	Encourage all elected officials, public administrators, community stakeholders and responders to participate in National Incident Management System (NIMS) training and compliance programs.
Estimated Cost:	\$0 - \$100
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	Local emergency planning committee
Supporting Organization/Department:	n/a
Action/Project Priority:	H:42
Timeline for Completion:	0 – 18 months
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Emergency Operations Plan
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	Continuing to work with elected officials, public administrators, community stakeholders, and responders on training. Responders and public admin have the training required

Action Worksheet	
Name of Jurisdiction:	City of Clever
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, Tornado, Severe T-Storm, Hail, Lightning, Severe Winter Storm, Wildfire
Problem being Mitigated:	Emergency response capability
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 Clever 3.2
Name of Action or Project:	911 Addressing for Structures
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Enforce highly visible 911 addressing for residences and businesses through building and business permitting as well as public education of existing ordinances
Estimated Cost:	\$0
Benefits:	Save lives, community resiliency
Plan for Implementation	
Responsible Organization/Department:	Planning and Development staff
Supporting Organization/Department:	Building officials
Action/Project Priority:	H:40
Timeline for Completion:	6 to 18 months
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Subdivision ordinances, building permitting process
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Working with the local Fire District and the program they have on signage. Have not updated ordinances to require this action but are using public meetings and social media to educate the public on ordinances in place

Action Worksheet	
Name of Jurisdiction:	Christian County Ambulance District
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, tornado, severe t-storm, hail, lightning, severe winter weather
Problem being Mitigated:	Community preparedness and response
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster
Action/Project Number:	Christian County Ambulance District 3.1
Name of Action or Project:	NIMS training
Mitigation Category:	Education and Outreach
Action or Project Description:	Encourage all selected officials, public administrators, community stakeholders, and responders to participate in NIMS training and compliance programs
Estimated Cost:	\$0 - \$100
Benefits:	Community resilience, dollar amount unknown
Plan for Implementation	
Responsible Organization/Department:	CCAD
Supporting Organization/Department:	Christian County EMA
Action/Project Priority:	38
Timeline for Completion:	ongoing
Potential Fund Sources:	Local and state grants, scholarships
Local Planning Mechanisms to be Used in Implementation, if any:	Local emergency operations plan
Progress Report	
Action Status:	Continue in progress
Report of Progress:	CCAD continues to be an advocate for NIMS training, and our leadership staff participates in continuing education in those areas.

Action Worksheet	
Name of Jurisdiction:	Christian County Ambulance District
Risk / Vulnerability	
Hazard(s) Addressed:	Drought, extreme temperatures, flood, sinkholes, severe t-storm, hail, lightning, severe winter weather, tornado, wildfire
Problem being Mitigated:	Adequate funding sources for mitigation activities
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster
Action/Project Number:	Christian County Ambulance District 3.2
Name of Action or Project:	Monitor funding programs
Mitigation Category:	Prevention
Action or Project Description:	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities
Estimated Cost:	\$0
Benefits:	Community resilience, dollar amount unknown
Plan for Implementation	
Responsible Organization/Department:	CCAD
Supporting Organization/Department:	Christian County EMA
Action/Project Priority:	41
Timeline for Completion:	Ongoing
Potential Fund Sources:	State and Federal
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continue in progress
Report of Progress:	CCAD Director monitors for grant opportunities for all areas related to the county and CCAD. No new funding obtained recently regarding hazard mitigation planning.

Action Worksheet	
Name of Jurisdiction:	Billings Special Road District
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, tornado, severe t-storm, hail, lightning, severe winter weather
Problem being Mitigated:	Community preparedness and response
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster
Action/Project Number:	Billings Special Road District 3.1
Name of Action or Project:	NIMS Training
Mitigation Category:	Education and outreach
Action or Project Description:	Encourage all elected officials, public administrators, community stakeholders, and responders to participate in NIMS training and compliance programs
Estimated Cost:	\$0 - \$100
Benefits:	Community resilience, dollar amount unknown
Plan for Implementation	
Responsible Organization/Department:	Local emergency planning committee
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 42
Timeline for Completion:	0 – 18 months
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Local emergency operations plan, annual budgeting
Progress Report	
Action Status:	Continue in progress
Report of Progress:	NIMS training continues for relevant officials and new hires

Action Worksheet	
Name of Jurisdiction:	Billings Special Road District
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, severe winter weather
Problem being Mitigated:	Functional integrity of critical lifelines
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster
Action/Project Number:	Billings Special Road District 3.2
Name of Action or Project:	Snow and debris cleaning
Mitigation Category:	Emergency services
Action or Project Description:	Plan for and maintain adequate snow and debris clearing capabilities
Estimated Cost:	\$50,000 - \$100,000
Benefits:	Community resilience, dollar amount unknown
Plan for Implementation	
Responsible Organization/Department:	Billings Special Road District Secretary
Supporting Organization/Department:	Public works director
Action/Project Priority:	H: 38
Timeline for Completion:	Annually ongoing
Potential Fund Sources:	Local funding, HMGP
Local Planning Mechanisms to be Used in Implementation, if any:	Road maintenance plan
Progress Report	
Action Status:	Continue in progress
Report of Progress:	Road districts and public works routinely clear debris after flood events and maintains plows and salt for roadway clearance

Action Worksheet	
Name of Jurisdiction:	Billings Special Road District
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Adequate funding sources for mitigation activities
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions, and critical infrastructure in a disaster
Action/Project Number:	Billings Special Road District 3.3
Name of Action or Project:	Monitor funding programs
Mitigation Category:	Education and outreach
Action or Project Description:	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities
Estimated Cost:	\$0 – can be accomplished with regular staff
Benefits:	Access to new funding sources
Plan for Implementation	
Responsible Organization/Department:	Road district secretary
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 41
Timeline for Completion:	Annually ongoing
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budget
Progress Report	
Action Status:	Continue in progress
Report of Progress:	The road district continues to monitor potential funding sources

Action Worksheet	
Name of Jurisdiction:	Ozark School District
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, tornado, severe t storm, hail, lightning, severe winter weather
Problem being Mitigated:	Community Preparedness and Response
Action or Project	
Applicable Goal Statement:	Goal 3. Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Ozark School District 3.1
Name of Action or Project:	NIMS Training
Mitigation Category:	Education and Outreach
Action or Project Description:	Encourage all elected officials, public administrators, community stakeholders and responders to participate in National Incident Management System (NIMS) training and compliance programs.
Estimated Cost:	\$0 - \$100
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	n/a
Action/Project Priority:	H:42
Timeline for Completion:	0 – 18 months
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Emergency Operations Plan
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	We work to ensure members of the Emergency Management Committee are trained in NIMS and provide support to city/county agencies seeking to do the same.

Action Worksheet	
Name of Jurisdiction:	Ozark School District
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Adequate funding sources for mitigation activities
Action or Project	
Applicable Goal Statement:	Goal 3. Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Ozark School District 3.2
Name of Action or Project:	Monitor funding program
Mitigation Category:	Prevention
Action or Project Description:	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities
Estimated Cost:	\$0. Can be included in current staff duties
Benefits:	Access to new funding sources
Plan for Implementation	
Responsible Organization/Department:	School administration
Supporting Organization/Department:	n/a
Action/Project Priority:	H: 41
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	We seek and take advantage anytime funding becomes available for hazard mitigation activities

Action Worksheet	
Name of Jurisdiction:	Nixa Public Schools
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, tornado, severe t storm, hail, lightning, severe winter weather
Problem being Mitigated:	Community Preparedness and Response
Action or Project	
Applicable Goal Statement:	Goal 3. Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Nixa School District 3.1
Name of Action or Project:	NIMS Training
Mitigation Category:	Education and Outreach
Action or Project Description:	Encourage all elected officials, public administrators, community stakeholders and responders to participate in National Incident Management System (NIMS) training and compliance programs.
Estimated Cost:	\$5,000
Benefits:	Community Resilience/having trained professionals on site
Plan for Implementation	
Responsible Organization/Department:	Administration
Supporting Organization/Department:	Safety Office
Action/Project Priority:	H:39
Timeline for Completion:	Summer 2021 and ongoing as new staff are hired
Potential Fund Sources:	Safety budget
Local Planning Mechanisms to be Used in Implementation, if any:	Safety plans
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	All staff have been trained through NIMS 300 or below that need it. NIMS 400 will be offered in the summer of 2021 or 2022. COVID-19 has delayed plans to complete the class.

Action Worksheet	
Name of Jurisdiction:	Nixa Public Schools
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Adequate funding sources for mitigation activities
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure continued operation of government, emergency functions and critical infrastructure in a disaster.
Action/Project Number:	Nixa School District 3.2
Name of Action or Project:	Monitor Funding Program
Mitigation Category:	Prevention
Action or Project Description:	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities
Estimated Cost:	\$10,000
Benefits:	Access to new funding sources
Plan for Implementation	
Responsible Organization/Department:	Finance Office
Supporting Organization/Department:	Safety Office
Action/Project Priority:	H:31
Timeline for Completion:	Ongoing
Potential Fund Sources:	Current budget or grants
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	The district has a grant writer and the finance office is consistently looking for funding opportunities.

Action Worksheet	
Name of Jurisdiction:	City of Sparta
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of preparedness for storms
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure the continued operation of government, emergency functions, and critical infrastructure
Action/Project Number:	City of Sparta 3.1
Name of Action or Project:	Enforce Visible 911 Addressing
Mitigation Category:	Emergency services
Action or Project Description:	Enforce better 911 addressing through a combination of information, city ordinances, and building permitting process
Estimated Cost:	\$0 - \$5,000
Benefits:	Prevents the loss of life
Plan for Implementation	
Responsible Organization/Department:	City administration
Supporting Organization/Department:	Building Department
Action/Project Priority:	H: 35
Timeline for Completion:	1 year
Potential Fund Sources:	Local funds
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	New
Report of Progress:	n/a

Action Worksheet	
Name of Jurisdiction:	City of Sparta
Risk / Vulnerability	
Hazard(s) Addressed:	Severe winter weather
Problem being Mitigated:	Accumulation of snow and ice during winter weather events
Action or Project	
Applicable Goal Statement:	Goal 3: Ensure the continued operation of government, emergency functions, and critical infrastructure
Action/Project Number:	City of Sparta 3.2
Name of Action or Project:	Snow Clearing Plan
Mitigation Category:	Emergency Services
Action or Project Description:	Outfit the public works department with the appropriate equipment to clear roads during winter weather events
Estimated Cost:	\$10,000 - \$30,000
Benefits:	Prevent injury and loss of life related to accidents cause by dangerous road conditions
Plan for Implementation	
Responsible Organization/Department:	Public works department
Supporting Organization/Department:	City administration
Action/Project Priority:	H: 39
Timeline for Completion:	2 months
Potential Fund Sources:	Local funds
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Soliciting quotes for the necessary equipment

Action Worksheet	
Name of Jurisdiction:	City of Ozark
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, tornado, severe t storm, hail, lightning, severe winter weather
Problem being Mitigated:	Lack of community preparedness and response
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 Ozark 3.1
Name of Action or Project:	NIMS Training
Mitigation Category:	Education and Outreach
Action or Project Description:	Encourage all elected officials, public administrators, community stakeholders and responders to participate in National Incident Management System (NIMS) training and compliance programs.
Estimated Cost:	Unknown. Could be accomplished with regular staff and funding levels
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	Safety coordinator
Supporting Organization/Department:	Public works
Action/Project Priority:	H:30
Timeline for Completion:	Ongoing
Potential Fund Sources:	Training and safety budget
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting, training guidelines
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	The City of Ozark's MS4 Coordinator encourages everyone to partake in NIMS training

Action Worksheet	
Name of Jurisdiction:	City of Ozark
Risk / Vulnerability	
Hazard(s) Addressed:	Drought
Problem being Mitigated:	Water shortages during severe drought events.
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 Ozark 3.2
Name of Action or Project:	Water Conservation
Mitigation Category:	Prevention
Action or Project Description:	Develop an ordinance to restrict the use of public water resources for non-essential usage, such as landscaping, washing cars, filling swimming pools, etc.
Estimated Cost:	Unknown, could be accomplished with regular staff and funding levels
Benefits:	Community Resilience
Plan for Implementation	
Responsible Organization/Department:	Public works
Supporting Organization/Department:	n/a
Action/Project Priority:	M:28
Timeline for Completion:	No date has been set
Potential Fund Sources:	Public works budget
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in Progress
Report of Progress:	In the last 5 years there has been no need for this. Staff will review surrounding areas

Action Worksheet	
Name of Jurisdiction:	City of Ozark
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of adequate funding sources for mitigation activities
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 Ozark 3.3
Name of Action or Project:	Monitor Funding Program
Mitigation Category:	Prevention
Action or Project Description:	Continue to monitor and identify funding from state and federal programs for hazard mitigation activates
Estimated Cost:	Unknown, could be accomplished with current staff and funding levels
Benefits:	Community resiliency
Plan for Implementation	
Responsible Organization/Department:	Public works
Supporting Organization/Department:	Christian County Emergency Management
Action/Project Priority:	H:30
Timeline for Completion:	Ongoing
Potential Fund Sources:	General revenue, FEMA grants, local general revenue through Christian County
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	The city seeks this on an as-needed basis

Action Worksheet	
Name of Jurisdiction:	City of Ozark
Risk / Vulnerability	
Hazard(s) Addressed:	All
Problem being Mitigated:	Lack of data for decision making and facilities management
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 Ozark 3.4
Name of Action or Project:	GIS Development
Mitigation Category:	Prevention
Action or Project Description:	Continue development of GIS database to further identify, analyze, and map hazard prone areas to enhance decision making and facilities management
Estimated Cost:	Unknown. Could be accomplished with current staff and funding levels
Benefits:	More and better data will help with mitigation related decision making
Plan for Implementation	
Responsible Organization/Department:	GIS
Supporting Organization/Department:	Public works
Action/Project Priority:	L:24
Timeline for Completion:	Ongoing
Potential Fund Sources:	Water, sewer, and stormwater budgets
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	Currently water, sewer, and stormwater pipes, fittings, and joints have had the GPS locations put into out asset database. During flooding, elevation points are taken on a regular basis to track the flood levels of the Finley River. Sinkhole locations are also tracked

Action Worksheet	
Name of Jurisdiction:	City of Fremont Hills
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, tornado, severe t-storm, hail, lightning, severe winter weather
Problem being Mitigated:	Lack of community preparedness and response
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 Fremont Hills 3.1
Name of Action or Project:	NIMS Training
Mitigation Category:	Education and outreach
Action or Project Description:	Encourage all elected officials, public administrators, community stakeholders, and responders to participate in National Incident Management System (NIMS) training and compliance programs
Estimated Cost:	\$0 - \$1000
Benefits:	High quality training according to national standards allows the city to receive certain funding and provides for a coordinated approach to disaster response
Plan for Implementation	
Responsible Organization/Department:	Emergency planning committee
Supporting Organization/Department:	Administration
Action/Project Priority:	L: 20
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Annual budgeting, emergency operations plan
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	NIMS training is provided when time and funding allows

Action Worksheet	
Name of Jurisdiction:	City of Fremont Hills
Risk / Vulnerability	
Hazard(s) Addressed:	Flood, tornado, severe t-storm, hail, lightning, severe winter weather, wildfire
Problem being Mitigated:	Emergency response capability
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 Fremont Hills 3.2
Name of Action or Project:	911 addressing for structures
Mitigation Category:	Structure and infrastructure projects
Action or Project Description:	Enforce highly visible 911 addressing for residences and businesses through building and business permitting as well as public education of existing ordinances
Estimated Cost:	\$0, can be accomplished with current staff and funding levels
Benefits:	Faster and better response by emergency services to disasters
Plan for Implementation	
Responsible Organization/Department:	Administration
Supporting Organization/Department:	n/a
Action/Project Priority:	M: 27
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local funding
Local Planning Mechanisms to be Used in Implementation, if any:	Building code
Progress Report	
Action Status:	Continuing in progress
Report of Progress:	The city continues to enforce proper 911 addressing with clearly visible signage

Table 4.4. Mitigation Action Matrix

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
	Prevention Public Education							
1.2	Increase, promote, establish, and maintain participation in citizen preparedness activities	Christian County	38	1	All			
1.3	Seek funding for and maintain program providing low-cost NOAA radios	Christian County	36	1	All			
1.6	Create and update tornado/severe storm plans and identify refuge areas	Christian County	34	1	Tornado, high wind events	✓	✓	
1.7	Encourage community organization programs to provide winter weatherization for at risk pop.	Christian County	27	1	Extreme Temperatures	✓	✓	
1.8	Encourage local organizations to make space available in their facility for at risk pop	Christian County	24	1	Extreme Temperatures	✓	✓	
1.6	Encourage community organization programs to provide winter weatherization for at risk pop.	City of Nixa	30	1	Extreme Temperatures	✓	✓	
1.2	Purchase and install NOAA weather radios in schools, government buildings, parks, and other public facilities	Village of Saddlebrooke	36	1	Tornado, tstorm, flood, winter weather, drought, heat			
1.5	Create/update tornado/severe tstorm plans and identify strong, safe places in public facilities	Village of Saddlebrooke	36	1	Tornado, t-storm	✓	✓	
1.1	Increase, promote, establish, and maintain participation in citizen preparedness activities	CC Ambulance District	41	1	All			
1.2	Create and update tornado/severe t-storm plans and identify refuge areas that comply with FEMA publication 431	CC Ambulance District	27	1	Tornado, high wind events	✓	✓	
1.2	Increase, promote, establish, and maintain participation in citizen preparedness groups	City of Clever	40	1	All			
1.1	Install, replace, and maintain low water crossing markings and gauges	Billings Special Road District	35	1	Flood	✓	✓	
1.2	Increase, promote, establish, and maintain participation in citizen preparedness groups	Ozark School District	40	1	All			
1.5	Encourage community organization programs to provide winter weatherization for at risk pop.	Ozark School District	33	1	Extreme temperatures	✓	✓	
1.3	Create/update tornado and severe storm plans and identify refuge areas	Nixa School District	39	1	Tornado, high wind events	✓	✓	
1.4	Encourage community organization programs to provide winter weatherization for at risk pop	Nixa Public Schools	27	1	Extreme temperatures	✓	✓	

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.3	Work with chamber of commerce to distribute fans to those in need	City of Sparta	33	1	Extreme temperatures			
1.2	Increase, promote, establish, and maintain participation in citizen preparedness activities	Spokane School District	26	1	All			
1.5	Encourage community organization programs to provide winter weatherization for at risk pop	Spokane School District	24	1	Extreme temperatures	✓	✓	
1.1	Continue collaboration between government and community organizations/businesses to host community expos promoting hazard awareness	City of Ozark	35	1	All			
1.2	Increase public awareness on techniques to reduce the risk of the spread of wildfires	City of Ozark	28	1	Wildfire			
1.4	Increase, promote, establish, and maintain participation in citizen preparedness activities	City of Ozark	32	1	All			
2.1	Increase public awareness to techniques to reduce the risk of the spread of wildfires	Christian County	29	2	Wildfire			
2.2	Promote homeowner purchase of flood insurance and Missouri FAIR Plan sinkhole loss policies	Christian County	30	2	Flood, sinkholes/land subsidence			
2.6	Implement burn restrictions during times of weather conditions conducive to the spread of wildfires	Christian County	29	2	Wildfire			
2.8	Continue development of GIS database	Christian County	31	2	Dam failure, flood, sinkhole, wildfire			
2.3	Develop an ordinance to restrict the use of public water resources for non-essential usage	City of Nixa	29	2	Drought			
2.6	Enforce floodplain management requirements	City of Nixa	31	2	Flooding	✓	✓	✓
2.7	Maintain Storm Ready status with the National Weather Service	City of Nixa	34	2	Tornado, severe t-storm, hail, lightning, severe winter weather			
2.1	Enforce floodplain management requirements	City of Fremont Hills	24	2	Flooding	✓	✓	✓
2.2	Maintain Storm Ready status with the National Weather Service	City of Fremont Hills	25	2	Tornado, severe t-storm, flooding, severe winter weather			
2.3	Enforce floodplain management requirements	City of Highlandville	36	2	Flooding	✓	✓	✓
2.1	Enforce floodplain management requirements	Village of Saddlebrooke	38	2	Flooding			✓

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
2.2	Work with regulatory agencies to obtain appropriate permits to maintain waterways in order to reduce impact of flooding	Village of Saddlebrooke	38	2	Flood	✓	✓	
2.1	Enforce floodplain management requirements	City of Clever	40	2	Flooding	✓	✓	✓
2.2	Maintain Storm Ready status with the National Weather Service	City of Clever	11	2	Tornado, severe t-storm, hail, lightning, severe winter weather			
2.1	Enforce floodplain management requirements (NFIP)	City of Sparta	41	2	Flooding	✓	✓	✓
2.2	Maintain Storm Ready status	City of Sparta	40	2	Flooding, severe t-storm, tornado			
2.1	Enforce floodplain management requirements	City of Ozark	40	2	Flooding	✓	✓	✓
3.1	Enforce floodplain management requirements	Christian County	38	3	Flooding	✓	✓	✓
3.6	Enhance strategies and coordinate with utility providers to manage encroachment of vegetation in easements and rights of way	Christian County	29	3	Tornado, severe t-storm, hail, lightning, severe winter storm			
3.7	Plan for and maintain adequate snow and debris clearing capabilities	Christian County	35	3	Flooding, severe winter storm			
3.2	Plan for and maintain adequate snow and debris clearing capabilities	City of Nixa	41	3	Flood, severe winter weather			
3.2	Develop an ordinance to restrict the use of public water resources for non-essential usage	City of Highlandville	25	3	Drought			
3.3	Continue to monitor and identify funding from state and federal programs	City of Highlandville	25	3	All		✓	
3.1	Promote and provide NIMS training	Village of Saddlebrooke	37	3	All			
3.3	Integrate hazard mitigation into comp plan and storm water management policies	Village of Saddlebrooke	36	3	All			
3.6	Continue development of GIS database to enhance decision making abilities	Village of Saddlebrooke	38	3	All			
3.2	Continue to monitor and identify funding from state and federal programs	CC Ambulance District	41	3	All		✓	
3.2	Continue to monitor and identify funding from state and federal programs	Ozark School District	41	3	All		✓	
3.2	Continue to monitor and identify funding from state and federal programs	Nixa School District	31	3	All		✓	

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
3.2	Develop an ordinance to restrict the use of public water resources for non-essential usage	City of Ozark	28	3	Drought			
3.3	Continue to monitor and identify funding from state and federal programs	City of Ozark	30	3	All		✓	
3.4	Continue development of GIS database	City of Ozark	24	3	All			
	Structure and Infrastructure Projects							
1.4	Install, replace, and maintain low water markings in flood prone areas	Christian County	37	1	Flooding	✓	✓	
1.5	Integrate safe room construction in community buildings	Christian County	32	1	Tornado	✓	✓	
1.9	Promote and distribute FEMA publication 320	Christian County	29	1	Tornado, high wind events			
1.1	Integrate safe room construction in community buildings	City of Nixa	38	1	Tornado	✓	✓	
1.8	Enforce visible 911 addressing for residences and buildings	City of Nixa	37	1	All	✓	✓	
1.1	Increase the number of warning sirens in developing areas	City of Highlandville	28	1	Tornado, t-storm, hail, lightning	✓	✓	
1.2	Integrate safe room construction in community buildings	City of Highlandville	28	1	tornado	✓	✓	
1.1	Update fire alarm and security systems	OTC	37	1	All	✓	✓	
1.2	Retrofit doors to vulnerable facilities with metal doors or place protective glass film on glass doors and windows	OTC	38	1	Tornado, severe thunderstorm	✓	✓	
1.3	Increase number of warning sirens in developing areas and make all sirens radio-activated	City of Clever	32	1	Tornado, severe t-storm, hail, lightning	✓	✓	
1.4	Integrate safe room construction in community buildings	City of Clever	37	1	Tornado	✓	✓	
1.3	Integrate safe room construction in community buildings	Ozark School District	37	1	tornado	✓	✓	
1.5	Retrofit doors to all vulnerable facilities with metal doors, or place protective film on glass doors and windows	Ozark School District	37	1	Tornado, high wind events	✓		
1.2	Integrate safe room construction in community buildings	Nixa School District	37	1	Tornado	✓	✓	
1.5	Retrofit doors to all vulnerable facilities with metal doors, or place protective film on glass doors and windows	Nixa School District			Tornado, high wind events	✓		

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.3	Integrate safe room construction in community buildings	Spokane School District	27	1	tornado	✓	✓	
1.6	Retrofit doors to all vulnerable facilities with metal doors, or place protective film on glass doors and windows	Spokane School District	24	1	Tornado, high wind events	✓		
1.4	Integrate safe room construction in community buildings	City of Fremont Hills	38	1	Tornado	✓	✓	
1.6	Integrate safe room construction in community buildings	City of Ozark	38	1	Tornado	✓	✓	
1.4	Update/rebuild facility in Nixa and relocated Ozark facility to a more central location	Christian County Ambulance District	35	1	All	✓	✓	
2.3	Replace and improve low water crossings where identified as effective	Christian County	32	2	Riverine/flash flooding	✓	✓	
2.4	Acquire, elevate, or flood-proof properties and critical infrastructure within hazard areas	Christian County	26	2	River/flash flooding, sinkholes	✓		
2.4	Encourage electrical utilities to use underground construction methods where possible to reduce disruption of service	City of Nixa	39	2	Tornado, severe t-storm, hail, lightning, severe winter weather	✓		
2.5	Acquire, elevate, or flood-proof properties and critical infrastructure within hazard areas	City of Nixa	30	2	Flood, sinkholes	✓		
2.1	Encourage electrical utilities to use underground construction methods where possible to reduce disruption of service	City of Highlandville	29	2	Tornado, severe t-storm, hail, lightning, severe winter weather	✓		
2.3	Adopt the IBC and IRC	City of Clever	41	2	Tornado, high wind events, earthquakes	✓	✓	
2.1	Replace and improve low water crossings where identified as effective	Billings Special Road District	35	2	Flood	✓	✓	
3.4	Enforce highly visible 911 addressing for residences and businesses	Christian County	28	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather, wildfire	✓	✓	

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
3.1	Enforce highly visible 911 addressing for residences and businesses	City of Highlandville	27	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather, wildfire	✓	✓	
3.5	Continue coordination to promote infrastructure development practices that reduce damage from flooding	Village of Saddlebrooke	44	3	Flood		✓	
3.2	Enforce highly visible 911 addressing for residences and businesses	City of Clever	40	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather, wildfire	✓	✓	
3.2	Enforce highly visible 911 addressing for residences and businesses	City of Fremont Hills	27	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather, wildfire	✓	✓	
	Natural Systems Protection							
2.5	Develop an open space acquisition, reuse, and preservation plan targeting hazard areas	Christian County	29	2	Flood, sinkholes	✓	✓	
	Emergency Services							
1.7	Identify and make available refuge areas in community buildings	City of Nixa	32	1	Extreme Temperatures	✓	✓	
1.2	Create and update tornado/storm plans and identify refuge areas	City of Fremont Hills	26	1	Tornado, severe t storms	✓	✓	
1.3	Create and update tornado/storm plans and identify refuge areas	City of Highlandville	28	1	Tornado, high wind events	✓	✓	
1.4	Identify and make available refuge areas in community buildings	City of Highlandville	36	1	Extreme temperatures	✓	✓	
1.1	Construction of FEMA safe room	Sparta School District	37	1	Tornado, severe t-storm		✓	
1.5	Create and update tornado/storm plans and identify refuge areas	City of Clever	36	1	Tornado, high wind events	✓	✓	
1.6	Identify/designate heating/cooling refuge areas in community buildings and make these locations available to the public	City of Clever	27	1	Extreme temperatures	✓	✓	

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.2	Establish refuge areas for use during/after severe weather	City of Sparta	33	1	Severe t-storm, tornado, flood, severe winter weather	✓	✓	
1.5	Create and update tornado/storm plans and identify refuge areas	City of Ozark	36	1	Tornado, high wind events	✓	✓	
2.2	Maintain countywide Storm Ready status with the National Weather Service	City of Highlandville	28	2	Tornado, severe t-storm, hail, lightning, severe winter weather			
3.2	Maintain countywide Storm Ready status with the National Weather Service	Christian County	33	3	Tornado, severe t-storm, hail, lightning, severe winter weather			
3.2	Educate the public on the importance of and enforce visible 911 addressing	Village of Saddlebrooke	43	3	All	✓	✓	
3.2	Plan for and maintain adequate snow and debris clearing capabilities	Billings Special Road District	38	3	Flood, severe winter weather			
3.1	Enforce better 911 addressing	City of Sparta	35	3	All	✓	✓	
3.2	Outfit the public works department with the appropriate equipment to clear roads during winter weather events	City of Sparta	39	3	Severe winter weather			
	Education and Outreach							
1.1	Social Media and Public Information	Christian County	37	1	All	✓	✓	
1.2	Increase, promote, establish, and maintain participation in citizen preparedness activities	City of Nixa	36	1	All			
1.3	Promote homeowner purchase of flood insurance and MO FAIR Plan sinkhole loss policy	City of Nixa	30	1	Land subsidence, flood			
1.4	Continue hosting expo to promote public awareness, health, and safety	City of Nixa	33	1	All			
1.5	Create and update tornado/storm plans and identify refuge	City of Nixa	34	1	Tornado, high wind events	✓	✓	
1.1	Promote purchase of flood insurance and MO FAIR Plan sinkhole loss policies	City of Fremont Hills	25	1	Sinkhole/land subsidence			
1.3	Increase, promote, establish, and maintain participation in citizen preparedness activities	City of Fremont Hills	29		All			
1.1	Use local traditional and social media platforms to raise awareness of mitigation activities	Village of Saddlebrooke	35	1	All			

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
1.3	Promote the use of NOAA weather radios by all residents and businesses	Village of Saddlebrooke	36	1	Tornado, tstorm, flood, winter weather, drought, heat			
1.4	Promote local severe weather alert applications for mobile devices	Village of Saddlebrooke	36	1	Tornado, tstorm, flood, winter weather, drought, heat			
1.3	Encourage community organization programs to provide winter weatherization for at risk pop	CC Ambulance District	42	1	Extreme temperatures	✓	✓	
1.1	Promote homeowner purchase of flood insurance and Missouri FAIR Plan sinkhole loss policies	City of Clever	36	1	Land subsidence, Flood			
1.1	Promote/expand education programs regarding hazard mitigation in school newsletter and curriculum	Ozark School District	39	1	Severe t-storm, hail, lightning, severe winter weather, tornado, wildfire			
1.4	Create/update tornado/severe storm plans and identify refuge areas	Ozark School District	36	1	Tornado, high wind events	✓	✓	
1.1	Continue to promote education programs regarding natural hazards in school newsletter and curriculum	Nixa School District	36	1	Severe t-storm, hail, lightning, severe winter weather, tornado, wildfire			
1.1	Host an expo with community leaders and experts to provide education about hazards	City of Sparta	41	1	All			
1.1	Continue to promote education programs regarding natural hazards in school newsletter and curriculum	Spokane School District	34	1	Severe t-storm, hail, lightning, severe winter weather, tornado, wildfire			
1.4	Create/update tornado/severe storm plans and identify refuge areas	Spoke School District	28	1	Tornado, high wind events	✓	✓	
1.3	Promote purchase of flood insurance and Missouri FAIR Plan sinkhole loss policies	City of Ozark	42	1	Sinkhole, flood			
2.7	Continue to monitor and identify funding from state and federal programs	Christian County	33	2	All		✓	
2.1	Continue development of GIS database	City of Nixa	35	2	All			
2.1	Continue to monitor and identify funding from state and federal programs	City of Nixa	32	2	All		✓	

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
3.3	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	Christian County	34	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.5	Identify debris disposal and burning locations in the county to facilitate recovery from large scale hazard events	Christian County	33	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	City of Nixa	37	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.4	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities	Village of Saddlebrooke	43	3	All		✓	
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	City of Clever	42	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	CC Ambulance District	38	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	Billings Special Road District	42	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.3	Continue to monitor and identify funding from state and federal programs for hazard mitigation activities	Billings Special Road District	41	3	All		✓	
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	Ozark School District	42	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			

#	Action Description	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	Nixa School District	39	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	City of Fremont Hills	20	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			
3.1	Encourage all elected officials, public administrators, community stakeholders and responders to participate in NIMS training	City of Ozark	30	3	Flood, tornado, severe t-storm, hail, lightning, severe winter weather			

5 PLAN MAINTENANCE PROCESS

5 PLAN MAINTENANCE PROCESS5.1

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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 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 Christian 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; and
- 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

The MPC agrees to meet annually and after a state or federally declared hazard event as appropriate to monitor progress and update the mitigation strategy. The Christian 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, the Emergency Management Director will be responsible for initiating a five-year written update of the plan to be submitted to the Missouri State Emergency Management Agency (SEMA) and FEMA Region VII per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule.

5.1.3 Plan Maintenance Process

Progress on the proposed actions can be monitored by evaluating changes in vulnerabilities identified in the plan. The MPC (or other designated responsible entity) during the annual meeting should review changes in vulnerability identified as follows:

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

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

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

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

- Each proposed action in the plan identified an individual, office, or agency responsible for action implementation. This entity will track and report on an annual basis to the jurisdictional MPC (or designated responsible entity) member on action status. The entity will provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing risk.

- If the action does not meet identified objectives, the jurisdictional MPC (or designated responsible entity) member will determine necessary remedial action, making any required modifications to the plan.

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

5.2 Incorporation into Existing Planning Mechanisms

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

Where possible, plan participants, including school and special districts, will use existing plans and/or programs to implement hazard mitigation actions. Those existing plans and programs were described in Section 2.2 of this plan. Based on the capability assessments of the participating jurisdictions, communities in Christian 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:

- Comprehensive plans of participating jurisdictions
- Ordinances of participating jurisdictions;
- Christian 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

The MPC (or designated responsible entity) members involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate. The MPC (or designated responsible entity) is also responsible for monitoring this integration and incorporation of the appropriate information into the five-year update of the multi-jurisdictional hazard mitigation plan.

Additionally, after the annual review of the Hazard Mitigation Plan, the Christian County Emergency Management Director will provide the updated Mitigation Strategy with current status of each mitigation action to the County (Boards of Supervisors or Commissions) as well as all Mayors, City Clerks, and School District Superintendents. The 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
Unincorporated Christian County	Comprehensive Plan County Emergency Plan County Recovery Plan County Mitigation Plan Economic Development Plan Transportation Plan Land Use Plan Zoning Ordinances Building Code Floodplain Ordinance Storm Water Ordinance	Site plan review Building permit process Landscaping ordinance Road improvement plan Capital improvement plan Emergency operations plan Floodplain ordinance Comprehensive plan Land use plan	Annual budget Hazard mitigation plan Local ordinance Local building codes Planning and zoning regulations GIS applications NFIP policies County emergency plan NIMS resolutions
City of Clever	Comprehensive plan Emergency plan County emergency plan Local mitigation plan Debris management plan Zoning ordinance Building codes Floodplain ordinance Storm water ordinance Site plan review requirements	Site plan review Building permit process Hazard awareness program Capital improvement plan Emergency operations plan Floodplain ordinance Comprehensive plan Land use plan	Site plan review Building permit process Annual budgeting Master plans Capital improvement plans Crisis management plans Emergency plans Floodplain ordinances Subdivision ordinances
City of Fremont Hills	Comprehensive plan Land use plan Zoning ordinance Building code Floodplain ordinance Storm water ordinance	Site plan review Hazard awareness program Building permit process Capital improvement plan Emergency operations plan Floodplain ordinance Storm water plans Comprehensive plan	County sinkhole map Annual budgeting NFIP policies Emergency plan Building code
City of Highlandville	Local emergency plan County emergency plan County mitigation plan Land use plan Zoning ordinance Building code Floodplain ordinance Storm water ordinance Site plan review requirements	The City of Highlandville did not participate in the previous plan	Annual budgeting City ordinances Building codes Emergency plan Subdivision ordinances Public safety ordinance
City of Nixa	Comprehensive plan Capital improvement plan County emergency plan County recovery plan County mitigation plan Land use plan Watershed plan Zoning ordinance Building code Storm water ordinance Site plan review requirements	Site plan review Building permit process Landscaping ordinance Hazard awareness plan Emergency operations plan Floodplain ordinance Road maintenance plans Public safety ordinance	Annual budgeting Public safety ordinances Comprehensive plan Capital improvement plan Crisis management plan Site plan review Building permit process Emergency plan Floodplain ordinances Road maintenance plans
City of Ozark	Comprehensive plan Capital improvement plan Emergency plan Recovery plan Mitigation plan Land use plan Watershed plan Zoning ordinance Building code Floodplain ordinance	Site plan review Building permit process Landscaping ordinance Hazard awareness program Capital improvement plan Emergency operations plan Floodplain ordinance Public safety ordinance	Annual budget Storm water ordinance Floodplain ordinance NFIP policies

	Stormwater ordinance,		
City of Sparta	Building code Floodplain ordinance Storm water ordinance Site plan review requirements	The City of Sparta did not participate in the previous plan	Annual budget Floodplain ordinance NFIP policies
Village of Saddlebrooke	Land use plan Zoning ordinance Building code Floodplain ordinance Site plan review requirements	The Village of Saddlebrooke did not participate in the previous plan	Annual budgeting
Nixa School District	Master plan Capital improvement plan Emergency plan	Curriculum plan Capital improvement plan Emergency operations plan Critical facilities plan	Curriculum plans Annual budgeting Safety plans
Ozark School District	Capital improvement plan Emergency plan	Curriculum plans Capital improvement plan	Curriculum plans Annual budgeting Safety plans Master plan Capital improvement plan Emergency operations plan Critical facilities plan Crisis management plan
Sparta School District	Capital improvement plan Emergency plan	Sparta School District did not participate in the previous plan	Annual budget
Spokane School District	Master plan Capital improvement plan Emergency plan	Curriculum plans Capital improvement plan Emergency operations plan Critical facilities plan	Curriculum plans Annual budgeting Safety plans Master plan Capital improvement plan Emergency operations plan Critical facilities plan Crisis management plan
Ozarks Technical Community College – Richwood Valley	Master plan Capital improvement plan Emergency plan	Curriculum plans Capital improvement plan Emergency operations plan Critical facilities plan	Annual budgeting
Billings Special Road District	Billings Special Road District did not supply this information	Major road plans Road improvement plans Capital improvement plans Emergency operations plan Road maintenance plan	Major road plans Road improvement plans Capital improvement plan Emergency operations plan Road maintenance plan Annual budgeting
Christian County Ambulance District	Emergency plan Continuity of operations plan Evacuation route map Capital improvement plan	Capital improvement plan Emergency operations plan	Annual budgeting Emergency operations plan

Source: Data collection questionnaire, action sheets

5.3 Continued Public Involvement

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

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

When the MPC reconvenes for the five-year update, it will coordinate with all stakeholders participating in the planning process. Included in this group will be those who joined the MPC after the initial effort, to update and revise the plan. Public notice will be posted and public participation will be actively solicited, at a minimum, through available website postings and press releases to local media outlets, primarily newspapers.