Sebastian County Hazard Mitigation Plan Update
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Adoption Resolution
County, Participating Jurisdictions and School Districts

Sample Resolution

RESOLUTION #

A RESOLUTION ADOPTING THE SEBASTIAN COUNTY HAZARD MITIGATION PLAN FOR THE CITY/COUNTY/SCHOOL DISTRICT IN SEBASTIAN COUNTY ARKANSAS.

WHEREAS, certain areas of Sebastian County are subject to periodic flooding and other natural and man-caused hazards with the potential to cause damages to people's properties with the area; and

WHEREAS, the City/County/School District desires to prepare and mitigate for such circumstances; and
WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) required that local jurisdictions have in place a FEMA-approved Hazard Mitigation Action Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, to assist cities and counties in meeting this requirement, [illegible] County with the assistance of West Central Arkansas Planning and Development District, has initiated development of county wide, multi-jurisdiction Hazard Mitigation Plan the county and all jurisdictions in the county specifically the cities and school districts;

NOW, THEREFORE, BE IT RESOLVED BY THE City/Quorum/Board of City/County/School District.

That the City/County/School District, Arkansas adopts those portions of the Plan relating to and protecting its jurisdictional area against all hazards (date) and

Appoints the Emergency Management Director to assure that the Hazard Mitigation Plan be reviewed at least annually and that any needed adjustment to the Hazard Mitigation Plan be developed and presented to the governing board for consideration; and

Agrees to take such other official action as may be reasonably necessary to carry out the objectives of the Hazard Mitigation Plan.

APPROVED and ADOPTED on this _____ day of _____, 2014

APPROVED:

_____
Mayor/Judge/Superintendent

ATTEST:

_____
Secretary

SECTION 1
Planning Process

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:*
201.6(b)(1)	*(1) An opportunity for the public to comment on the plan during the drafting stage and Prior to plan approval*
201.6(b)(2)	*(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; and*
201.6(b)(3)	*(3) Review and incorporation if appropriate of existing plans, studies, reports, and technical information*
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*
201.6 (c)(4)(i)	*[The plan maintenance process shall include a]section describing the method and schedule of monitoring, evaluation, and updating the mitigation plan within a five-year cycle.*
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*

1.1 Plan Introduction

Hazard mitigation is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards. Hazard mitigation planning is the process State, Tribal, and local governments use to identify risks and vulnerabilities associated with natural disasters, and to develop long-term strategies for protecting people and property from future hazard events.

The occurrence of floods, hurricanes, tornadoes, winter storms, earthquakes, wildfires and other hazardous events are inevitable. These events can cause damage to the ecological environment; fire can destroy forests, high winds and tornadoes can uproot trees, earthquakes can alter the landscape, and floods can quickly reclaim natural floodplains.

We cannot prevent natural hazards; we do have some means to reduce some of their adverse consequences. We have tools and techniques which allow us to avoid the worst-case scenario when a hazard does occur. By managing the characteristic of the existing and future human environment in a community before a hazardous event occurs, we can mitigate many of its negative impacts so that a disaster is less likely to result or will at least be of diminished magnitude.

1.1.1 Disaster Mitigation Act of 2000

In the past, federal legislation has provided funding for disaster relief, recovery, and some hazard mitigation planning. The Disaster Mitigation Act of 2000 (DMA 2000) is the latest legislation to improve this planning process. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous Mitigation Planning section (409) and replacing it with a new Mitigation Planning section (322). This new section emphasizes the

need for State, Tribal, and local entities to closely coordinate mitigation planning and implementation efforts. The new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, this Act establishes a pre-disaster hazard mitigation program (PDM) and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). It also requires that communities must have an approved hazard mitigation plan to receive Stafford Act assistance, excluding assistance provided pursuant to emergency provisions.

The goals of this Sebastian County Hazard Mitigation plan are to:

Goal 1: Reduce the potential for loss of life and personal injury from natural disasters.

Goal 2: Protect existing and future properties from natural disasters.

The Sebastian County Hazard Mitigation Plan is being re-evaluated and rewritten to assess the ongoing natural hazard mitigation activities in Sebastian County, to evaluate additional mitigation measures that should be undertaken, and to outline a strategy for implementation of mitigation projects. This plan is multi-jurisdictional with a planning area that includes all unincorporated Sebastian County, municipalities of Barling, Bonanza, Central City, Fort Smith, Greenwood, Hackett, Hartford, Huntington, Mansfield, Midland, Lavaca, and the school districts of Fort Smith, Greenwood, Hackett, Mansfield, and Lavaca. Also participating are Future School of Fort Smith, University of Arkansas-Fort Smith and Arkansas College of Osteopathic Medicine.

The Sebastian County Hazard Mitigation Plan was first adopted in 2005 and updated in 2011. Since that time, there has been few changes in development and any new development has occurred outside of high-risk areas. Mitigation actions have been taken since that time to decrease the vulnerability of each jurisdiction.

Sebastian County replaced the Slaytonville Bridge to mitigate flooding issues. Bonanza also completed an extensive drainage project and Fort Smith completed a revitalization project with the Fort Smith Housing Authority. Sebastian County, Fort Smith Schools, Lavaca Schools, Mansfield Schools, Greenwood Schools, and Hackett Schools all constructed safe rooms. The priorities for this Sebastian County Hazard Mitigation Plan remain the same as when the plan was adopted in 2011; safe rooms and infrastructure projects remain the top priority.

Formal adoption and implementation of a hazard mitigation plan presents many benefits to Sebastian County and its residents. By identifying problems and possible solutions in advance of a disaster, Sebastian County and participating communities and school districts will be in a better position to obtain pre- and post-disaster funding. Specifically, the Disaster Mitigation Act of 2000 establishes a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). It requires that states and communities have a FEMA approved hazard mitigation plan in place prior to receiving post-disaster HMGP funds. Adoption of this hazard mitigation strategy will also increase Sebastian County's eligibility for assistance from FEMA's Flood Mitigation Assistance (FMA) program. Sebastian County and participating communities will also gain additional credit points under FEMA's Community Rating System (CRS) program, which provides discounts on National Flood Insurance Program (NFIP) flood insurance premiums for residents of communities that voluntarily participate in this program. Most importantly, Sebastian County will be able to recover faster and more wisely from a disaster. Through planning and acting on local mitigation strategies, the city will reduce vulnerability to disasters and identify opportunities for mitigation. In addition, the communities may meet comprehensive planning and other planning requirements and achieve community goals.

Purpose and Authority

The purpose of the Sebastian County Hazard Mitigation Plan is to provide guidance for hazard mitigation activities in Sebastian County. The Sebastian County Office of Emergency Management has the responsibility to coordinate all local activities relating to hazard evaluation and mitigation and to prepare and submit to FEMA a Local Mitigation Plan following the criteria established in 44 CFR 201.4 and Section 322 of the Disaster Mitigation Act of 2000 (Public Law 106-390). The Disaster Mitigation Act of 2000 became law on October 30, 2000, and amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the "Stafford Act") (Public Law 93-288, as amended). Regulations for this activity can be found in Title 44 of the Code of Federal Regulations Part 206, Subpart M.

This plan meets requirements for a local mitigation plan under Interim Final Rule 44 CFR 201.4, published in the Federal Register by the Federal Emergency Management Agency (FEMA) on February 28, 2002. Meeting the requirements of the regulations cited above keeps Sebastian County qualified to obtain all disaster assistance including hazard mitigation grants available through the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended.

Sebastian County initiated the Hazard Mitigation planning process by securing a FEMA FMA grant to complete the Plan. Sebastian County worked with Western Arkansas Planning and Development District, Inc. (WAPDD) to complete the plan. Sebastian County Office of Emergency Management and WAPDD worked together to engage the county, cities, communities and school districts in the planning process.

1.1.2 Parts of the Plan

The Sebastian County Hazard Mitigation Plan is divided into sections to address FEMA requirements for a local multi-jurisdictional plan. These sections are:

1. Planning Process
2. Hazard Identification and Risk Assessment
3. Mitigation Strategy
4. Acronyms
5. Plan Adoption

This plan is multi-jurisdictional with a planning area that includes all unincorporated Sebastian County, municipalities of Barling, Bonanza, Central City, Fort Smith, Greenwood, Hackett, Hartford, Huntington, Mansfield, Midland, Lavaca, and the school districts of Fort Smith, Greenwood, Hackett, Mansfield, and Lavaca. Also participating are Future School of Fort Smith, University of Arkansas-Fort Smith and Arkansas College of Osteopathic Medicine.

All jurisdictions and school districts listed above actively participated in the planning process from its inception. Each jurisdiction provided a representative to participate on the planning team or if a representative was unable to attend, they chose to be represented by the Sebastian County Office of Emergency Management. Planning team members actively participated in meetings, solicited input from members of their communities, and ensured that all jurisdiction information was reflected in the plan.

1.1.3 Involvement of Local Governments

Sebastian County's mitigation planning process was initiated in July 2015, when the County, through the efforts of the Sebastian County Office of Emergency Management (OEM) and Western Arkansas Planning and Development District, applied for a Flood Mitigation Assistance (FMA) Grant by FEMA through ANRC. Sebastian County was awarded the grant to complete the plan January 21, 2016. Sebastian County contracted with Western Arkansas Planning and Development District to facilitate their mitigation planning efforts. Western Arkansas Planning and Development District served as facilitator and David Hudson, County Judge of Sebastian County, led the planning effort.

Once all participating cities and school districts for which the Sebastian County OEM is responsible formally agreed to participate, an initial planning team comprised of representatives from Sebastian County and participating jurisdiction was organized. This initial team was instructed to solicit interested persons from their community to participate on the planning team. This solicitation led to the addition of several additional planning team members. The planning team members include representatives from county government, local city governments, public works officials, emergency management officials, fire districts, and school districts. All participating jurisdictions actively participated in the planning process through soliciting input from their communities and participation in meetings. If a city or school district could not attend a meeting, all materials were mailed out to the jurisdiction.

Multiple planning events were scheduled throughout the planning process. Western Arkansas Planning and Development District also utilized technical assistance provided by the Arkansas Department of Emergency Management by receiving training at workshops provided by ADEM and FEMA. Guidelines for the mitigation plan were discussed as well as training for entering data and how to locate and research the data needed for the mitigation plan. It was stressed to have public involvement and to work together with cities, schools, and county.

The first planning meeting was held on September 13, 2016 that included the initial planning team.

Additional meetings were held with the Future School of Fort Smith on October 18 and 24, 2017 for their inclusion in the plan.

1.1.4 Neighboring Community Involvement

During the Mitigation Planning Process for Sebastian County, neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development were informed of the meetings and invited personally by Sebastian County OEM to attend planning meetings.

In summary, the planning process consisted of the following items:

- A planning committee consisting of mayors and city personnel, school personnel, fire department members, emergency workers, and planning and development district employees
- County engaged Western Arkansas Planning and Development District (WAPDD), the regional planning organization, to provide staff support in conducting the planning process and preparing the plan.
- Meetings were held with committee members to understand and agree on planning processes and steps required, including organizing resources, assess hazards, develop a mitigation plan, and implement the plan and mentor progress.
- WAPDD staff attended workshops presented by FEMA and ADEM on the preparation of the mitigation plan.
- Western Arkansas Planning and Development District staff also had numerous subsequent discussions about the planning process with ADEM and ANRC staff. The WAPDD staff also discussed planning process issues with others in the state that were involved in the preparation of other hazard mitigation plans such as UALR which prepared the State Hazard Mitigation Plan, other Planning and Development Districts.

September 13, 2016 -- First Planning Meeting – Each aspect of the Planning Process was discussed. (Tasks 1-8 Planning Area, Planning Team, Outreach Strategy, Community Capabilities, Risk Assessment, Mitigation Strategy, Keeping the Plan Current, Reviewing and Adopting the Plan)

Individual meetings were held with each participating jurisdiction as needed.

Surveys were distributed to the public through various outlets. Draft of plan was also made available to the public via the Western Arkansas Planning and Development District website. Despite these public outreach efforts, no public feedback was received.

Prevention actions that keep problems from getting worse *(zoning codes, such as an overlay zone that limits developing in a floodplain-open space preservation and development of parks and recreation areas in hazard prone areas-land development regulations, such as requiring large lot sizes to ensure a minimum amount of impervious surface area-storm water management regulation that call for retention/detention basins and clearing of ditches- capital improvements planning that prevents extension of public infrastructure into hazard areas-building or fire codes that require certain types of roofing* or sprinkler systems)

Property Protection action that address individual buildings *(acquisition, relocation, retrofitting, flood proofing)*

Public Education and Awareness actions that inform the public *(providing hazard maps and hazard information-developing Web sites that make hazard information publicly available, developing and implementing outreach programs that provide hazard and mitigation information to the public- asking business owners to provide mitigation information to employees-mail outs about hazards-hazard information in newspaper-designing education program for school age children or adults)*

Natural Resource Protection actions that protect natural resources (*erosion and sediment control programs-wetland protection programs-expanding public open space-environmental restoration or freshwater and sediment diversion programs)*

Emergency Services Protection actions that will protect emergency services before, during and immediately after an occurrence (*Protection of warning system capability-protection or hardening of critical facilities, such as fire stations and hospitals-protect of infrastructure, such as road that are needed for emergency response)*

Structural Projects actions that will control the hazard *(reservoirs to store drinking water-levees, floodwalls, to reduce the likelihood of flooding-diversion of stormwater away from developed areas-channel modification to move stormwater away from development more quickly)*

1.1.5 Public Review

After the completion of planning meetings, the draft plan was provided for the public viewing for comment before submission to the Arkansas Department of Emergency Management.

1.1.6 Plan Developers

Team Member/Title	Agency/Organization	Level of Involvement
Tracee McKenna/Director of Comm. Dev.	WAPDD	Collected NCDC data, Facilitated meetings, Collected local data
Ashley Garris/Project Coordinator	WAPDD	Facilitated meetings, Collected local data
Boyd Waters/Assistant Chief	Fort Smith Fire	Attended meetings, Provided local data, Assisted with Mitigation Actions
Mark Talley/Division Chief	Fort Smith Fire	Attended meetings, Provided local data, Assisted with Mitigation Actions
Phil Christensen/Chief	Fort Smith Fire	Attended meetings, Provided local data, Assisted with Mitigation Actions
Tom Webb/Vice President & COO	AR Colleges for Health Ed.	Attended meetings, Provided local data, Assisted with Mitigation Actions
Serina Tustin/Administrative Superintendent	Fort Smith Sanitation	Attended meetings, Provided local data, Assisted with Mitigation Actions
Charity Gregory/Purchasing	Sebastian County	Attended meetings, Provided local data, Assisted with Mitigation Actions
Jim Carter/Road Department	Sebastian County	Attended meetings, Provided local data, Assisted with Mitigation Actions
Darren Edwards/Water Superintendent	City of Hackett	Attended meetings, Provided local data, Assisted with Mitigation Actions
Chuck Fortson	City of Hackett	Provided local data, Assisted with Mitigation Actions
Larry Ranells/Major	Fort Smith Police	Attended meetings, Provided local data, Assisted with Mitigation Actions
Edward Ray/Superintendent	Hackett Schools	Attended meetings, Provided local data, Assisted with Mitigation Actions
Mitch Parker/Residential Manager	City of Fort Smith	Attended meetings, Provided local data, Assisted with Mitigation Actions
Lance McAvoy/Dep. Director of Operations	City of Fort Smith Utilities	Attended meetings, Provided local data, Assisted with Mitigation Actions
Greg Rily/Director Street/Traffic Control	City of Fort Smith	Attended meetings, Provided local data, Assisted with Mitigation Actions
Larry Austin/Mayor	City of Mansfield	Attended meetings, Provided local data, Assisted with Mitigation Actions

Susan Hayden/Mayor's Assistant	City of Lavaca	Attended meetings, Provided local data, Assisted with Mitigation Actions
Nathan Griffin/Firefighter	Fort Smith Fire	Attended meetings, Provided local data, Assisted with Mitigation Actions
Steve Core/Director Public Works	City of Barling	Attended meetings, Provided local data, Assisted with Mitigation Actions
Dennis Siebenmorgan/Building & Grounds	Fort Smith Schools	Attended meetings, Provided local data, Assisted with Mitigation Actions
Jim Best/Principal Mansfield H.S.	Mansfield Schools	Attended meetings, Provided local data, Assisted with Mitigation Actions
John Ciesla/Superintendent	Greenwood Schools	Attended meetings, Provided local data, Assisted with Mitigation Actions
Kevin Hesslen/Asst. Superintendent	Greenwood Schools	Attended meetings, Provided local data, Assisted with Mitigation Actions
Gordon Floyd/Superintendent	Fort Smith Schools	Attended meetings, Provided local data, Assisted with Mitigation Actions
Wally Bailey/Dir. Developmental Services	Fort Smith School	Attended meetings, Provided local data, Assisted with Mitigation Actions
Simon Wiley/Street Director	City of Greenwood	Attended meetings, Provided local data, Assisted with Mitigation Actions
Will Dawson/Chief	Greenwood Police	Attended meetings, Provided local data, Assisted with Mitigation Actions
Danny Baker/Patrol Operations Captain	Fort Smith Police	Attended meetings, Provided local data, Assisted with Mitigation Actions
Tammy Briley/Executive Assistant	City of Greenwood	Attended meetings, Provided local data, Assisted with Mitigation Actions
Sonny Bell/Planning Director	City of Greenwood	Attended meetings, Provided local data, Assisted with Mitigation Actions
Stewart Bryan/Chief	Greenwood Fire	Attended meetings, Provided local data, Assisted with Mitigation Actions
Kevin Nickson/Major of Operations	Sebastian County Sheriff	Attended meetings, Provided local data, Assisted with Mitigation Actions
Scott Stubblefield/County Administrator	Sebastian County	Attended meetings, Provided local data, Assisted with Mitigation Actions
David Hudson/County Judge	Sebastian County	Attended meetings, Provided local data, Assisted with Mitigation Actions
Gary Lawrence/Mayor	City of Huntington	Provided local data, Assisted with Mitigation Actions
Teresa Harris	City of Central City	Provided local data, Assisted with Mitigation Actions
Travis Cooper/OEM	Sebastian County	Provided local data, Assisted with Mitigation Actions
Brandon Cox/School Board Member	Future School of Fort Smith	Attended meetings, Provided local data, Assisted with Mitigation Actions
Trish Flanagan/Superintendent	Future School of Fort Smith	Attended meetings, Provided local data, Assisted with Mitigation Actions

1.2 Plan Maintenance Process

1.2.1 Monitoring, Evaluation and Updating the Plan

Although FEMA regulations require a plan update within five years, Sebastian County has developed a method to ensure that monitoring, evaluation, and updating of the Sebastian County Hazard Mitigation Plan occurs annually or as needed. The plan will be submitted to FEMA within five-years for review.

The County, with assistance from WAPDD, will conduct an annual review of the Plan. Each participating jurisdiction will be asked to participate in the annual review by providing an update on the progress of each mitigation action item as it pertains to their jurisdiction.

The responsible party for overseeing and assuring plan updates is the Sebastian County Office of Emergency Management. Each jurisdiction's representative will be responsible for monitoring and evaluating the progress of the mitigation strategies in the plan.

The County will also review and evaluate the risk assessment portion of the plan to determine if this information should be updated or modified. The parties or agencies responsible for the various implementation actions (identified in Section 3) will report on the status of their projects and will evaluate which implementation processes worked well, any difficulties encountered, how coordination efforts were proceeding, and which strategies should be revised.

This process will also inform the county citizens on any changes or revisions of the Sebastian County Hazard Mitigation Plan.

In addition, the Sebastian County Hazard Mitigation Plan will be integrated into other plans. Integrating hazard mitigation into the local comprehensive plan thereby establishes resilience as an overarching value of a community and provides the opportunity to continuously manage development in a way that does not lead to increased hazard vulnerability.

Land Use and Development Plans will guide future growth and development away from areas with known hazards, or to ensure design standards for new or improved construction take potential hazards into account. Land use policies can build community resilience by taking information on location, frequency and severity of hazards unto consideration and setting forth recommendations that influence development in a way that does not increase risks to life and property.

Transportation Plans can build community resilience by adopting policies that direct growth away from known hazard areas. Also, by insuring that transportation systems and other critical infrastructure are designed to withstand the effect of known hazards so they still function in the event of an emergency or disaster.

Housing Plans can help strengthen community resilience by ensuring that the location and design of new or improved housing complies not only with existing building codes, but with potential hazards. Opportunities to strengthen or replace structures unidentified as vulnerable to hazard can be promoted through existing maintenance or rehabilitation programs, and particularly through policies regarding non-conforming, substantially damaged, or substantially improved properties.

Economic Development Plans can promote commercial or industrial expansion in area that are not vulnerable to damage or disruption from hazard and by making community resilience a key feature in attracting, expanding and retaining businesses and industry.

Public Facilities and Infrastructure Plans policies can be adopted to ensure critical facilities such as police and fire stations, as well as key infrastructure such as water and wastewater treatment plants, are protected from the effects of hazards. This provides opportunities to establish goals and policies in support of mitigation projects such as stormwater drainage improvements or the public acquisition of hazard areas for open space.

Natural Resource Protection Plans have policies designed to preserve or enhance environmental areas of concern, such as wetlands, riparian corridors, and floodplains, often include the added benefit of avoiding or minimizing development in hazard areas. These types of policies build community resilience by protecting lives and property and maintaining natural and beneficial functions of systems that act as buffers against hazardous events.

Historic Properties and Cultural Resources Plans are designed to protect and preserve historic and cultural sites, buildings, and other resources and can be linked with mitigation strategies to prevent damage and losses from hazardous events.

The Hazard Mitigation Plan will consider any changes in these plans and incorporate the information accordingly in its next update.

Since future plans and government regulations might need to be adopted into the Hazard Mitigation Plan, Sebastian County Quorum Court will be informed of any necessary changes to the plan by the County Judge, to be adopted into the Plan by county resolution. The Arkansas Department of Emergency Management will be contacted as necessary for professional and technical advice as needed.

1.2.2. Incorporation into Existing Planning Mechanisms

Sebastian County and plan participants currently use state laws pertaining to compliance with the National Flood Insurance Program as well as state fire codes, to encourage compliance with its hazard mitigation programs. These existing mechanisms have hazard mitigation strategies integrated into them. Sebastian County, as every other county in the State, has a current Emergency Operations Plan. The Hazard Mitigation Plan will become an annex of the EOP for future submissions. The Sebastian County Hazard Mitigation Plan will be available for public view on the Western Arkansas Planning and Development District's website www.wapdd.org for any entity or citizen who wishes to view or make a copy of it. Copies will also be made available at the Sebastian County Courthouses in Fort Smith and Greenwood and the city hall's in Barling, Bonanza, Central City, Fort Smith, Greenwood, Hackett, Hartford, Huntington, Lavaca, Mansfield, and Midland. Each participating school district (Fort Smith, Greenwood, Hackett, Lavaca, and Mansfield) will also be provided a copy along with Future School of Fort Smith, University of Arkansas-Fort Smith and the Arkansas College of Osteopathic Medicine.

Sebastian County, the municipalities of Barling, Bonanza, Central City, Fort Smith, Greenwood, Hackett, Hartford, Huntington, Mansfield, Midland, Lavaca, and the school districts of Fort Smith, Greenwood, Hackett, Mansfield, and Lavaca and along with the Future School of Fort Smith, University of Arkansas-Fort Smith and the Arkansas College of Osteopathic Medicine will be adopting the approved Hazard Mitigation Plan and incorporating it into their existing plans that are relevant to Hazard Mitigation either by ordinance or resolution as dictated by the plan in which the Hazard Mitigation Plan is being incorporated. After passage of the Sebastian County Hazard Mitigation Plan in 2011, participating jurisdictions incorporated the Plan into their annual budgets in order to plan for future mitigation actions and also into disaster response plans, and the floodplain management programs for those jurisdictions participating in NFIP (Sebastian County and the cities of Barling, Bonanza, Fort Smith, Greenwood, Hackett, Hartford, Lavaca, Mansfield, and Midland), the same will be done with the passage of this update.

In addition, the cities of Barling, Fort Smith, Greenwood, Hackett, Lavaca, and Mansfield all have Zoning and Subdivision Management Plans that will be updated to reflect the Hazard Mitigation Plan Update and include the Mitigation Actions that contain ordinances or regulations affecting zoning and subdivision management. Sebastian County and the cities of Barling, Bonanza, Fort Smith, Greenwood, Hackett, Hartford, Lavaca, Mansfield, and Midland all participate in NFIP and have floodplain management plans that will reflect any Mitigation Actions that concern flooding and development in the flood zones. The cities of Bonanza, Central City, Hartford, Huntington, and Midland do not have Zoning or Subdivision Management Plans, but will continue to incorporate the Sebastian County Hazard Mitigation Plan into their annual budgets in order to plan for and complete their mitigation actions. WAPDD will work with these cities developing zoning and subdivision management plans. The school districts of Fort Smith, Greenwood, Hackett, Mansfield, and Lavaca and along with the Future School of Fort Smith, University of Arkansas-Fort Smith and the Arkansas College of Osteopathic Medicine all have capital improvement plans that will be updated to reflect the Sebastian County Hazard Mitigation Plan and to include the Mitigation Actions that affect new structures. The cities of Barling, Fort Smith, Greenwood, Hackett, and Mansfield all have Land Use Plans that can be updated to incorporate the Mitigation Actions from the Sebastian County Hazard Mitigation Plan Update. The remaining cities will be will be encouraged to develop land use plans to incorporate and accomplish mitigation strategies. Additional capabilities are outlined for each participating jurisdiction on pages 108-113.

After each update of the Sebastian County Hazard Mitigation Plan, each incorporating participant will be informed of the changes so they can reflect these changes in their plans also.

The Sebastian County Hazard Mitigation Plan will be incorporated into the State of Arkansas Hazard Mitigation Plan. The risk assessment and mitigation strategies will be incorporated into the State Hazard Mitigation Plan during their updating process every three years. After passage of the Sebastian County Hazard Mitigation Plan in 2011, Sebastian County incorporated the Sebastian County Hazard Mitigation Plan into the Sebastian County Emergency Operations Plan and county land use ordinances and/or plans following the laws set forth by the county government and the same will be

done with passage of this plan update. Incorporating the plan into other plans will be done by vote at the regular meetings of the governing body of each participating jurisdiction and passed by resolution or ordinance depending on the plan in which the Hazard Mitigation Plan is being incorporated.

1.2.3 Continuous Public Involvement

Sebastian County is dedicated to involving the public directly in the continual reshaping and updating of the Sebastian County Hazard Mitigation Plan. The Sebastian County Judge and Office of Emergency Management are responsible for the annual monitoring, evaluation, and update of the plan. Although they represent the public to some extent, the public will be able to directly comment on and provide feedback about the plan.

Copies of the FEMA approved Sebastian County Hazard Mitigation Plan will be available at www.wapdd.org . Contained in the plan are the address, phone number, and e-mail of the Director of the Sebastian County Office of Emergency Management, the primary point of contact for the plan.

Copies will also be made available at the Sebastian County Courthouse in Fort Smith and Greenwood and the city hall of each participating jurisdiction.

Public comment will be solicited via the Sebastian County and WAPDD websites and also through public notice prior to any plan maintenance or plan updates.

Public notice regarding the plans availability and opportunities to participate in maintenance and implementation activities will be posted in local post offices and libraries in addition to the county courthouses and city halls. Notices will also be published in the Times Record, Greenwood Democrat, and Mansfield Citizen newspapers.

SECTION 2
Hazard Identification and Risk Assessment

Risk Assessment: 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.*

Requirement 201.6 (c) (2) (1)*; [The risk assessment shall include a] description of the type...of all natural hazards that can affect the jurisdiction.*

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*

Requirement 201.6(c) (2) (ii): *[The risk assessment shall include a] description of the jurisdictions 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. [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods*

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 locate in the identified hazard area*

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)(ii)(A) of this section and a description of the methodology used to prepare the estimate*

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*

201.6 (c)(2)(iii): *For multi-jurisdictional plans, the risk assessment* ***must*** *assess each jurisdiction's risk where they vary from the risks facing the entire planning area*

2.1 Hazard Identification and Prioritization

Hazard identification, the process of identifying hazard that threatens a given area, is the first step in the risk assessment process. Sebastian County has identified several natural hazards that, because they pose a threat to the county and its residents, have warranted a complete profile in this hazard mitigation plan.

The following hazards were identified from historical information provided by planning team members, newspapers, review of plans and reports, internet research, the State Mitigation Plan, and FEMA publication "Multi-Hazard-Identification and Risk Assessment", and information provided by FEMA and ADEM.

Hazards	Hazard Events (2010-2015) NCDC Storm Events Database
Dam/Levee Failure	No Known Events
Drought	15 events; No Damage, No Deaths, No Injuries
Earthquake	No Known Events
Expansive Soil	No Known Events
Extreme Heat	20 events; No Damage, No Deaths, 1 Injury
Flood	40 events; $420K in Damages, No Deaths, No Injuries
Hail Storm	31 events; $170K in Damages, No Deaths, No Injuries
Landslide	No Known Events
Lightning	2 events; $200K in Damages, No Deaths, 1 Injury
Thunderstorm Winds	69 events; $445K in Damages, No Deaths, 1 Injury
Tornado	3 events; $500K in Damages, No Deaths, No Injuries
Wildfire	2 events; $6.15 Million in Damages, No Deaths, No Injuries
Winter Storms	12 events; $600K in Damages (from a single ice storm), No Deaths, No Injuries

Presidential Disaster Declarations in Sebastian County

Disaster	Description and Date of Incident
EM 3301	Severe Winter Storm/January 26, 2009
DR 4160	Severe Winter Storm/December 5-6, 2013
DR 4226	Severe Storms, Tornadoes, Straight-line Winds, and Flooding/May 7-June 15, 2015

2.2 Vulnerable Structures/Facilities in Sebastian County

Structural Asset Inventory by Jurisdiction						
Jurisdiction	Residential Structural Value	Commercial Structural	Industrial Structural	Agriculture Structural	School Facilities	Total Value of Structures
Barling	22,828,130	7,076,810	0	234,560	0	**30,139,500**
Bonanza	3,006,510	227,670	0	337,230	0	**3,571,410**
Central City	2,532,990	162,870	0	503,800	0	**3,199,660**
Fort Smith	471,299,770	358,757,630	0	370,590	0	**830,427,990**
Greenwood	64,676,490	13,075,539	0	926,220	0	**78,678,249**
Hackett	3,700,080	719,920	0	93,970	0	**4,513,970**
Hartford	2,354,460	239,360	0	94,910	0	**2,688,730**
Huntington	1,949,230	303,120	0	23,740	0	**2,276,090**
Mansfield	2,577,400	303,030	0	144,350	0	**3,024,780**
Midland	947,680	27,600	0	0	0	**975,280**
Lavaca	14,478,690	1,794,820	0	391,670	0	**16,665,180**
Fort Smith School District	494,729,510	384,221,633	0	756,870	0	**879,708,013**
Greenwood School District	164,034,110	35,769,564	0	23,729,850	0	**549,012,613**
Hackett School District	21,710,580	1,686,990	0	10,257,150	0	**33,654,720**
Mansfield School District	12,134,880	896,360	0	9,627,590	0	**22,658,830**
Lavaca School District	27,841,440	2,200,040	0	7,086,640	0	**37,128,120**

Source: Sebastian County Assessor's Office

Summary of Physical Location of Critical Facilities by jurisdiction in Sebastian County (2017)

		Sebastian County (unincorporated)	Barling	Bonanza	Central City	Fort Smith	Greenwood	Hackett	Hartford	Huntington	Mansfield	Midland	Lavaca	County Total
Vulnerable Populations	**Schools**	0	1	0	0	28	3	2	2	0	3	0	3	**41**
	Child Care	0	2	0	0	28	2	0	0	1	1	0	1	**35**
	Retirement, Nursing, Convalescent Homes	0	2	0	0	7	2	0	0	0	1	0	0	**12**
Emergency Response / Medical	**Law Enforcement (Police or Sheriff)**	0	1	1	1	2	1	1	1	1	1	0	1	**11**
	Fire Stations	8	1	1	1	11	2	1	1	1	1	1	1	**30**
	Emergency Operations Centers	0	0	0	0	2	0	0	0	0	0	0	0	**2**
	Hospitals	0	0	0	0	2	0	0	0	0	0	0	0	**2**
	Water Treatment Plants	2	0	0	0	1	1	0	0	0	1	0	0	**5**
	Waste Water Treatment Plants	0	1	0	0	1	1	1	1	1	1	0	1	**8**
	Historic Properties	3	1	0	0	40	3	4	3	1	1	0	0	**56**
	Total Critical Facilities	**13**	**9**	**2**	**2**	**122**	**15**	**9**	**8**	**5**	**10**	**1**	**7**	**202**

2.3 Vulnerability and Risk Assessment by Hazard

The Sebastian County Hazard Mitigation Plan includes a description or profile, location, and extent of all natural hazards that can affect each jurisdiction. (44 CFR 201.6(c)(2)(i) and 44 CFR 201.6(c)(2)(iii).

Description describes the natural hazard that can affect the jurisdictions in the planning area.

Location (Geographic Area Affected) is where geographic areas in the planning area that are affected by the hazard, and when possible maps were used to illustrate the location. But for some hazards, such as tornados, the plan stated that the entire planning area is equally at risk to that hazard.

> ***Negligible***: Less than 10 percent of planning area or isolated single-point occurrences
> ***Limited*****:** 10 to 25 percent of planning area or limited single-point of occurrences
> ***Significant***: 25 to 75 percent of planning area or consistent single-point occurrences
> ***Extensive*****:** 75 to 100 percent of planning area or consistent single-point of occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)

Weak: Limited classification on scientific scale, slow speed of onset or short duration of event resulting in little to no damage.
Moderate: Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of service for days
Severe: Severe classification on scientific scale, fast speed of onset or long duration of event, resulting in devastating damage and loss of services for weeks or months.
Extreme: Extreme classification on scientific scale, immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.

Previous Occurrences of hazard events for each jurisdiction (44 CFR 201.6 (c)(2)(i) have been addressed.

Probability of Future Events means the likelihood of the hazard occurring in the future and may be defined in terms of general descriptors, historical frequencies, and statistical probabilities. Statistical probabilities often refer to events of a specific size or strength. Hazard likelihood can also be compared using general descriptions or rankings. For the purpose of this plan we will use the general descriptors to describe the likelihood of hazard events based on historical frequency.

Unlikely: Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.
Occasional: 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.
Likely: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
Highly Likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of 1 year.

Overall Significance
Low: Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area. This rating is sometimes used for hazard with a minimal or unknown record or occurrences or for hazard with minimal mitigation potential.
Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometime used for hazards with a high extent rating but very low probability rating.
High: The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

A description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction (44 CFR 201.6 (c)(2)(ii) was included in the [] County Hazard Mitigation Plan.

Impact – is the consequence or effect of the hazard on the community and its assets. Impacts will be described by referencing historical disaster impacts and/or an estimate of potential future losses, such as percent damage of total exposure.

Vulnerability of Estimating Potential Loss- identifies structures, systems, populations or other community assets as defined by the community that are susceptible to damage and loss from hazard events. It is a list of key issues or problem statements that clearly describes the community's greatest vulnerabilities and that will be address in the mitigation strategy.

Repetitive Loss Properties and Severe Repetitive Loss Properties- addresses NFIP insured structures describing the types (residential, commercial, institutional, etc.) and estimates the number of repetitive loss properties located in the identified flood hazard areas. (44 CFR 201.6(c)(2)(ii)

2.4 Methodology used in Estimating Potential Loss

The methodology used in this plan for the potential loss estimate was developed by using past hazard events data from The National Climatic Data Center (NCDC) Storm Events Database.

If we were unable to obtain information of a certain type past hazard event, we did not estimate a potential loss due to the lack of information.

2.5 Natural Hazards Affecting Sebastian County

This plan is multi-jurisdictional with a planning area that includes all unincorporated Sebastian County, municipalities of Barling, Bonanza, Central City, Fort Smith, Greenwood, Hackett, Hartford, Huntington, Mansfield, Midland, Lavaca, and the school districts of Fort Smith, Greenwood, Hackett, Mansfield, and Lavaca. Also participating are Future School of Fort Smith, University of Arkansas-Fort Smith and Arkansas College of Osteopathic Medicine.

The Hazards which have affected Sebastian County in the past or could possibly affect Sebastian County in the near future are; Dam Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flooding, Landslide, Thunderstorms, Tornado, Wildfire, and Winter Storms.

2.5.1. Dam Failure

2.5.1.1 Description of Dam Failure

A dam failure is the collapse, breach, or other failure resulting in downstream flooding. A dam impounds water in the upstream area, referred to as the reservoir. The amount of water impounded is measured in acre-feet. An acre-foot is the volume of water that covers an acre of land to a depth of one foot. As a function of upstream topography, even a very small dam may impound or detain many acre-feet of water. Two factors influence the potential severity of a full or partial dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream.

2.5.1.2 Location of Dams in Sebastian County

Major Dam location data is derived from the Geo Stor GIS database (maintained by the State of Arkansas Geographic Information Office (AGIO). Based on Geo Stor GIS data, there are 5 dams in Sebastian County that carry a High or Significant Hazard Ranking. These Significant and High Hazard ranked dams will be profiled in their potential dam failure hazard Impact and Extent.

Data Limitation: Updated Inundation Zone Studies have not been completed for the dam locations in Sebastian County, Arkansas. A mitigation action item has been included in this mitigation plan revision to complete inundation zone studies for dams in Sebastian County.

Below is a table outlining major dam locations in Sebastian County.

Dam	**Jurisdiction** ***Primary Location** ****Secondary Impact**	**Latitude**	**Longitude**	**Hazard Ranking**
James W. Trimble Dam (L&D 13)	*City of Barling **Central City **Sebastian County	35.35	-94.2917	Significant
Vache Grasse Creek Dam	*City of Greenwood **Sebastian County	35.1933	-94.25	Significant
Sugar Loaf Lake Dam	*Sebastian County	35.0944	-94.395	High
Shadow Lake Dam	*Sebastian County	35.2333	-94.3067	High
James Fork Lake Dam	*Sebastian County	34.9906	-94.3269	High

The following jurisdictions are not vulnerable to dam failure due to their location and lack of proximity to any of the Significant and High Hazard ranked dams:

City of Bonanza
City of Hackett
City of Lavaca
City of Fort Smith
City of Mansfield
City of Hartford
City of Midland
City of Huntington
Hackett School District
Lavaca School District
Fort Smith School District
Future School of Fort Smith
University of Arkansas-Fort Smith
Arkansas College of Osteopathic Medicine
Greenwood School District
Mansfield School District

The James W. Trimble Dam (Lock 13)

Extent

The James W. Trimble Dam (Lock 13) (pictured above) is located to the East of Fort Smith and North of Barling. This portion of the Arkansas River flows from the West to East, therefore eliminating any exposure to the City from a possible dam breach to Lock 13. James W. Trimble Dam (Lock 13) would release 59100 acre-feet of water into an undetermined inundation area in the event of a total dam failure.

Vulnerability by Jurisdiction

Jurisdictions that carry an exposure in a dam breach to Lock 13 include:

1. The City of Barling including:
   Lock and Dam Road and Springhill Park and Campground
   H Street and Barling City Park
   Residential Developments on Frontier Road and along Highway 59
   Highway 255

2. Small Portion of Sebastian County including:
   Area North of Highway 255

3. Northern Tip of Central City including:
   Area North of Highway 255
   Reeder Road and Butler Street
   Vache Grasse Public Use Area

To further reduce the potential impact of a dam failure event, most property located directly down river from Lock 13 is owned by the Army Corps of Engineers and is not populated with significant infrastructure.

No school district property is exposed to a possible dam failure to James W. Trimble Dam.

The Shadow Lake Dam

Extent

The Shadow Lake Dam (pictured above) is located to the West of the city limits of Greenwood. This is an earthen dam that does have significant development around the lake shore. Shadow Lake Dam would release 3326 acre-feet of water into an undetermined inundation area in the event of a total dam failure.

Vulnerability by Jurisdiction

Jurisdictions that carry an exposure in a dam breach to the Shadow Lake Dam include:

1. Small Portion of Sebastian County including:
   Highway 71 and commercial development Highway 71 Pit Stop and Philpot's Automotive
   Residential Development along Lakeside Drive, Edgewater Drive, and Shadow Lake Drive

No school district property is exposed to a possible dam failure to Shadow Lake Dam.

The Vache Grasse Creek Dam

Extent

The Vache Grasse Creek Dam (pictured above) is located along the southern city limits of the City of Greenwood. This is an earthen dam that does not have significant development around the lake shore. The area below the dam, also, does not have any major population or development exposure to date. Vache Grasse Creek Dam would release 950 acre-feet of water into an undetermined inundation area in the event of a total dam failure.

Vulnerability by Jurisdiction

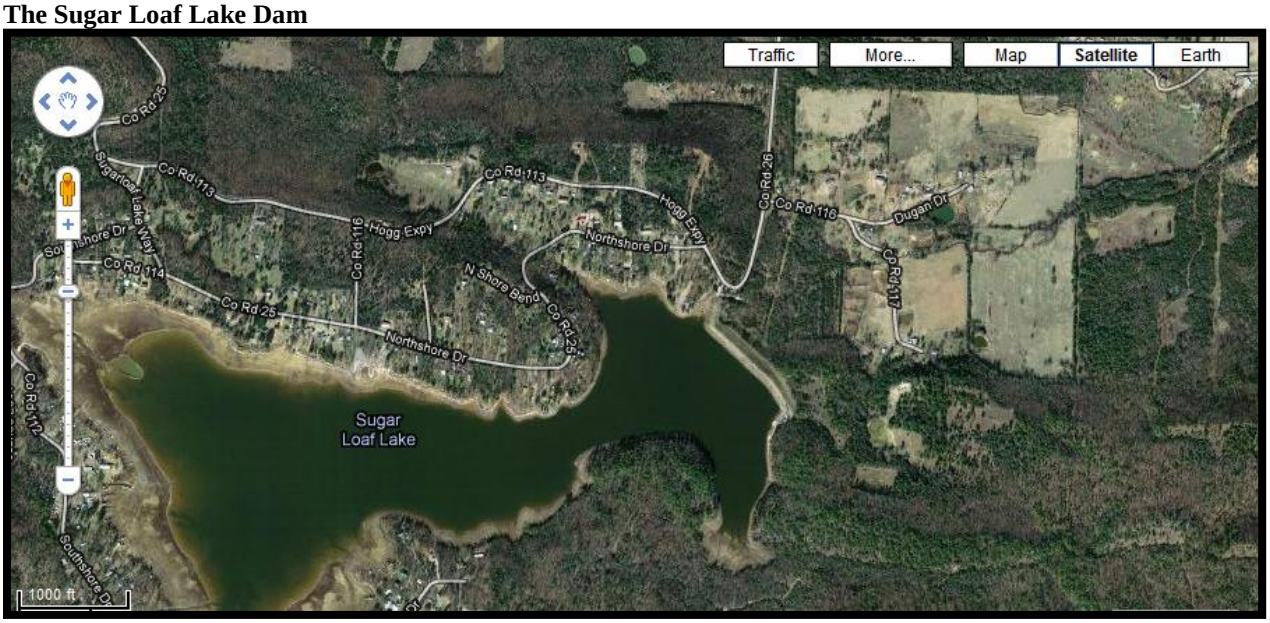
Jurisdictions that carry an exposure in a dam breach to the Vache Grasse Creek Dam include:

1. The City of Greenwood including:
   Residential Development along Stewart Court

2. Small Portion of Sebastian County including:
   Residential Development along Steward Court

No school district property is exposed to a possible dam failure to Vache Grasse Creek Dam.

The Sugar Loaf Lake Dam



Extent

The Sugar Loaf Lake Dam (pictured above) is located to the east of the city limits of Midland. This is an earthen dam that does have significant residential development around the lake shore. The area below the dam also has some residential development as well as farmland that would be exposed in a possible dam failure scenario. Although no critical facilities are in the exposure zone, houses located along county roads 116, 117, and 26 could be affected in a dam breach or failure. Sugar Loaf Lake Dam would release 11150 acre-feet of water into an undetermined inundation area in the event of a total dam failure.

Vulnerability by Jurisdiction

Jurisdictions that carry an exposure in a dam breach to the Sugar Loaf Lake Dam include:

1. Small Portion of Sebastian County including:
   Residential Structures along County Road 116/Dugan Drive, County Road 117/Dugan Way, and County Road 26/Tyro Road

No school district property is exposed to a possible dam failure to the Sugar Loaf Lake Dam.

The James Fork Lake Dam

Extent

The James Fork Lake Dam (pictured above) is located to the South East of the city limits of Hartford. This dam does not have significant residential development around the lake shore or below the dam. There is a water treatment plant located below the dam that is exposed to a dam failure event. James Fork Lake Dam would release 8390 acre-feet of water into an undetermined inundation area in the event of a total dam failure.

Vulnerability by Jurisdiction

Jurisdictions that carry an exposure in a dam breach to the James Fork Lake Dam include:

1. Small Portion of Sebastian County including:
   James Fork Water Treatment Plant
   West Harmony Road
   Ouachita National Forest

No school district property is exposed to a possible dam failure to the James Fork Lake Dam.

2.5.1.3 Extent, Magnitude or Severity of Dam Failure

As there have been no failures to date, future events are impossible to predict; however, based on Dam Classification Parameters, the area could expect to see the following in the event of a complete failure of each classification: Failure of a class A (low hazard) dam would see no loss of life, damages would be less than $100,000 and limited to the dam owners land and no structures should be affected; class B (significant hazard) dam failure would result in potential loss of life, between $100,000 and $500,000 in damages to nearby land, structures, and roads; class C (high hazard) dam failure would result in fatalities, over $500,000 in damages to land, structures, and roads, and would require major mitigation (if possible) to re-build.

Dam failure can be a life-threatening event. In the event of a dam failure, the energy of the water stored behind even a small dam can cause loss of life and great property damage if there are people downstream of the dam.

The Hazard Potential Table below shows potential losses for each class of dam and how each of the profiled dams is classified.

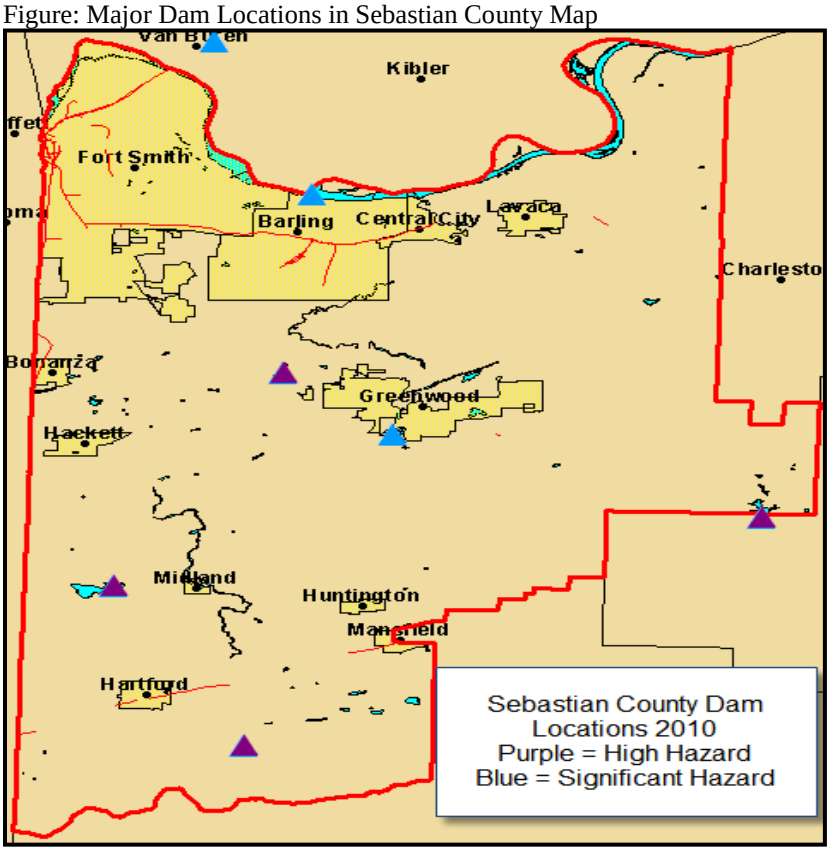
HAZARD POTENTIAL CLASSIFICATION FOR CIVIL WORKS PROJECTS			
CATEGORY	LOW (CLASS A)	SIGNIFICANT (CLASS B) (2 Dams)	HIGH (CLASS C) (3 Dams)
Sebastian County Dams	Not Profiled	James W. Trimble Dam (Lock & Dam 13)	Sugar Loaf Lake Dam
		Vache Grasse Creek Dam	Shadow Lake Dam
			James Fork Lake Dam
Direct Loss of Life	None expected (due to rural location with no permanent structures for human habitation)	Uncertain (rural location with few residences and only transient or industrial development)	Certain (one or more extensive residential, commercial or industrial development)
Lifeline Losses	No disruption of services-repairs are cosmetic or rapidly repairable damage	Disruption of essential facilities and access	Disruption of critical facilities and access
Property Losses	Private, agricultural lands, equipment and isolated buildings	Major public and private facilities	Extensive public and private facilities
Environmental Losses	Minimal incremental damage	Major mitigation required	Extensive mitigation cost or impossible to mitigate
Economic Losses	Less than $100K	Between $100K & $500K	Over $500K

Table 7 from DS0-99-06 (Graham) Recommended Fatality Rates for Loss of Life from Dam Failure				
Flood Severity	Warning Time (minutes)	Flood Severity Understanding	Fatality Rate (Fraction of people at risk expected to die)	
			Suggested	Suggested Rate
HIGH	No warning	No applicable	0.75	0.30 to 1.00
	15 to 60	Vague	Use the values shown above and apply to the number of people who remain in the dam failure floodplain after warnings are issued. No guidance is provided on how many people will remain in the floodplain.	
		Precise		
	More than 60	Vague		
		Precise		
MEDIUM	No Warning	Not applicable	0.15	0.003 to 0.35
	15 to 60	Vague	0.04	0.01 to 0.08
		Precise	0.02	0.005 to 0.04
	More than 60	Vague	0.03	0.005 to 0.06
		Precise	0.01	0.002 to 0.02
LOW	No Warning	Not Applicable	0.01	0.0 to 0.02
	15 to 60	Vague	0.007	0.0 to 0.015
		Precise	0.002	0.0 to 0.0004
	More than 60	Vague	0.0003	To 0.0006
		Precise	0.0002	0.0 to 0.0004

2.5.1.4. Multi-Jurisdictional Risk Assessment and Impact

According to data from the Arkansas Soil and Water Conservation Commission Dam Safety Program, no failure of a permitted dam has occurred in Sebastian County or anywhere in the State of Arkansas. Permitted dams are those that exceed 25 feet in height and impound at least 50 acre-feet of water. Smaller, non-permitted dams have failed or been overtopped on occasion in Arkansas, although records of these events are not kept. These non-permitted dams are generally low hazard dams that lacked engineering design and have not caused significant damage in the past. Based on this limited data and considering current design and inspection requirements, failure of permitted dams is an extremely unlikely event. Failure of small, non-permitted dams may occur, but the effects are not expected to be significant.

Figure: Major Dam Locations in Sebastian County Map



A general description of vulnerability and impact follows. A more detailed account of vulnerability and impact per dam and jurisdiction is in included in section 2.5.1.2 which details the location of the dams in Sebastian County.

Excerpt from State of Arkansas All-Hazards Mitigation Plan (September 2013):
To complete an analysis of vulnerability to dam failure as well as attempt to describe vulnerability in terms of the jurisdictions most threatened by dam failure, points were assigned to each type of dam and then aggregated for a total point score for each county. Points were assigned as follows for each dam:

- *Low Hazard Dams, 1 point,*
- *Significant Hazard Dams, 2 points,*
- *High Hazard Dams, 3 points,*
- *High Hazard Dams without an EAP, an additional 2 points.*

This analysis does not intend to demonstrate vulnerability in terms of dam structures that are likely to fail, but rather provides a general overview of the counties that have a high number of dams, with weighted consideration given to dams whose failure would result in greater damages.

Dam Failure Vulnerability Analysis Results For Sebastian County

County	# of Low Hazard Dams (x1 point)	# of Significant Hazard Dams (x2 points)	# of High Hazard Dams (x3 points)	# of High Hazard Dams w/o EAP (x2 points)	Weighted Vulnerability Analysis Score
Sebastian County	6	4	7	2	39

Source: Analysis by AMEC utilizing data from: Arkansas Natural Resources Commission

The State of Arkansas All-Hazards Mitigation Plan (September 2013) also includes loss estimates for state regulated dams. Loss estimates were derived from the Hazard Class Definitions that the Arkansas Natural Resources Commissions assigns to all state regulated dams.

- High Hazard—Potential for loss of human life and/or excessive public, industrial, commercial, or agricultural development in inundation areas. Losses could be over **$500,000**. Emergency Action Plans are required for all High Hazard Dams.
- Significant Hazard—No potential for loss of human life. But, significant structures, industrial, or commercial development, or cropland in inundation areas. Losses could be **$100,000 to $500,000.**
- Low Hazard. No potential for loss of human life. No significant structures in inundation areas. Primarily pastures, woodland, or undeveloped land. Losses expected to be less than **$100,000**

With these definitions in mind, loss estimates were calculated for each county as follows:

- ($500,000) * the number of High Hazard Dams,
- ($250,000) * the number of Significant Hazard Dams, and
- ($50,000) * the number of Low Hazard Dams.

Dam Failure Loss Estimates by County

County	Loss Estimates
Sebastian County	$4,800,000

2.5.2 Drought

2.5.2.1 Description of Drought

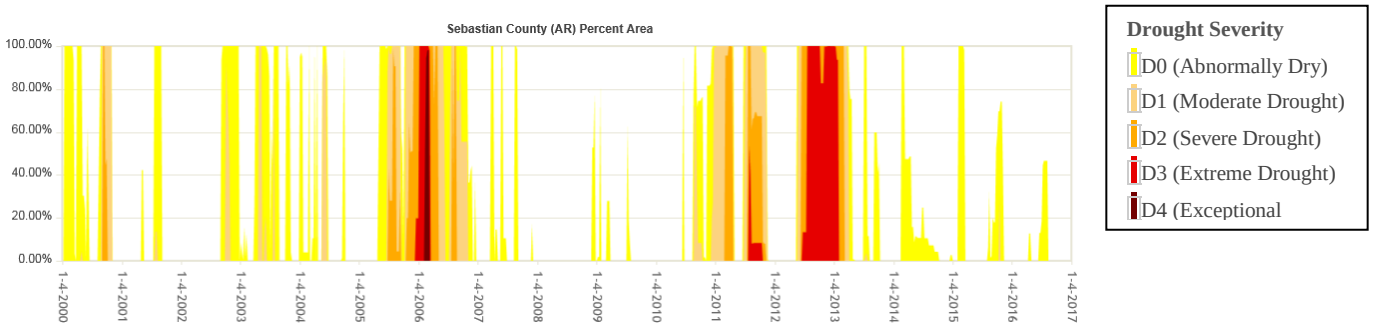
A drought is a period of unusually persistent dry weather that persists long enough to cause serious deficiencies in water supply (surface or underground). Droughts are slow onset hazard, but over time they can severely affect crops, municipal water supplies, recreation resources and wildlife. If drought conditions extend over several years, the direct and indirect economic impacts can be significant. High temperatures, high winds, and low humidity can worsen drought conditions and make areas more susceptible to wildfire. In addition, human actions and demands for water resources can accelerate drought-related impacts.

2.5.2.2 Location of Drought Events

All participating jurisdictions of the entire planning area are equally likely to experience severe drought, there is no defined geographic hazard boundary.

2.5.2.3 Extent, Magnitude or Severity of Drought

A useful measure of a particular area's drought severity at particular points in time is the Drought Severity Monitor, which is published by the U. S. Department of Agriculture at http://drought.uni.edu/dm. The Drought Monitor displays day-by-day drought conditions for areas within the U.S. and within individual states, using the following Drought Conditions table. As noted, "D0" represents abnormally dry, "D1" moderate, "D2" Severe, "D3" Extreme, and "D4" Exceptional. Since 2000, the entire planning area has experienced drought anywhere from D0 to D4 and can expect to experience similar droughts in the future based on previous drought occurrences.



When drought begins, the agricultural sector is usually the first to be affected because of its heavy dependence on stored soil water. Soil water can be rapidly depleted during extended dry periods. If precipitation deficiencies continue, then people dependent on other sources of water will begin to feel the effects of the shortage. Those who rely on surface water (i.e., reservoirs and lakes) and subsurface water (i.e., ground water), for example, are usually the last to be affected. A short-term drought that persists for 3 to 6 months may have little impact on these sectors, depending on the characteristics of the hydrologic system and water use requirements.

The Palmer Index is most effective in determining long term drought—a matter of several months—and is not as good with short-term forecasts (a matter of weeks). It uses a 0 as normal, and drought is shown in terms of minus numbers; for example, minus 2 is moderate drought, minus 3 is severe drought, and minus 4 is extreme drought. The advantage of the Palmer Index is that it is standardized to local climate, so it can be applied to any part of the country to demonstrate relative drought or rainfall conditions.

Palmer Drought Severity Index (PDSI)	
4.0 or more	**Extremely wet**
3.0 to 3.99	**Very wet**
2.0 to 2.99	**Moderately wet**
1.0 to 1.99	**Slightly wet**
0.5 to 0.99	**Incipient wet spell**
0.49 to -0.49	**Near normal**
-0.5 to -0.99	**Incipient dry spell**
-1.0 to -1.99	**Mild drought**
-2.0 to -2.99	**Moderate drought**
-3.0 to -3.99	**Severe drought**
-4.0 or less	**Extreme drought**

2.5.2.4 Previous Drought Occurrences

There have been 15 event(s) reported between January 1, 2010 and December 31, 2015. All 15 of these events occurred in 2011 through 2013 with zero occurrences in 2010, 2014, and 2015.

2.5.2.5 Probability of Future Drought Events

Location (All participating jurisdictions within the entire planning area)
***Extensive*:** 75 to 100 percent of planning area or consistent single-point of occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)
Weak: Limited classification on scientific scale, slow speed of onset or short duration of event resulting in little to no damage. Of the 15 drought events occurring since 2010, zero have resulted in death, injury, property or crop damage.

Probability of Future Events
Likely:10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years. Previous drought events have occurred in 2011, 2012, and 2013.

Overall Significance
Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometime used for hazards with a high extent rating but very low probability rating.

2.5.2.6 Impact of Drought

Drought produces impacts that affect the social, environmental, and economical standard of living. Some direct impacts of drought are reduced crop, rangeland, and forest productivity; reduced water levees; increased fire hazard; increased livestock and wildlife death rates; and damage to wildlife and fish habitat. A reduction in crop productivity usually results in less income for farmers, retailers, and increased prices for food. The likelihood that businesses beyond row-crop agriculture operations would be seriously affected by drought is low, because municipal water impoundments in the county are large enough to continue supplying drinking and industrial process water through 100-year drought conditions.

Environmental losses are caused by damages to plant and animal species. Wildlife habitat and air and water quality are usually damaged due to a lack of water and an increase in forest and range fires, insect infestations, plan disease and wind erosion. Most of the effects of drought are short-term, and as the drought comes to an end many problems are solved.

2.5.2.7 Vulnerability and Estimating Potential Loss

Though the county is within a region of the country that is highly susceptible to severe drought, it would be unusual for the condition to pose serious, direct threats to structures. Extreme and prolonged drought conditions can result in soil constriction or shrinkage that can cause building foundations to settle, possibly cracking foundations and walls. It is not likely, however, that drought conditions would be so prolonged and severe to cause such damages.

Drought can seriously affect agricultural operations, which make up about a fourth of the county's economy. Farmers in the county that depend upon ground water (wells) and surface water (ponds & small lakes) for crop irrigation and livestock drinking water would be negatively impacted by a severe drought. Also, municipal water supplies in the area provide treated water for users in the cities and throughout the rural areas of the county. Though most of these impoundments can produce an adequate yield throughout a yearlong drought period, water rationing would no doubt be implemented, which would affect all customers, including agricultural and other businesses dependent on water for production. Drought leading to serious water shortages would negatively affect the local economy.

2.5.2.8 Multi-Jurisdictional Risk Assessment

All participating jurisdictions are equally subject to drought, there is no defined geographic hazard boundary. Damages from drought are generally economic. Assets at risk would include open land that could become vulnerable to the wildfire hazard due to extended periods of low rain and high heat. Water supply resources would be affected and the vulnerable populations such as the farmers.

Public Health would be affected through lack of water supply, unsafe water in ponds and creeks, and airborne dust. Those affected most would be the homeless, children, those with health conditions and elderly. Thus the threat is countywide, multi-jurisdictional.

Sebastian County has 931 farms covering 104,459 acres. A majority of these farms, 586, are cattle operations.

Drought would affect the 287,209 acres of forestland Sebastian County; 81,246 acres being privately owned and 205,963 belonging to the federal government. Drought condition leaves the forest land vulnerable to wildfire due to extended periods of low rain and high heat, and increases the infestation of insects.

Drought would affect the main agriculture crop in Sebastian County, which is hay, and accounts for 435 farms and 21,644 acres.

Public Safety would be affected across the county, cities and school districts, from the threat of fire, and contaminated water.

2.5.3 Extreme Heat

2.5.3.1 Description of Extreme Heat

Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks are defined as extreme heat. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground.

2.5.3.2 Locations Affected by Extreme Heat

There is no defined geographic hazard boundary for extreme heat. Extreme heat generally affects people rather than property. All participating jurisdictions within the entire planning area are equally likely to experience an extreme heat event.

2.5.3.3 Extent, Magnitude or Severity of Extreme Heat Events

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Heat Index Charts

To use the heat index charts, find the appropriate temperature at the top of the chart. There are two charts on this page. Read down until you are opposite the humidity/dew point. The number which appears at the intersection of the temperature and humidity/dew point is the heat index.

Heat Index Chart (Temperature & Dewpoint)

Dewpoint (° F)	Temperature (° F)															
	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
65	94	95	96	97	98	100	101	102	103	104	106	107	108	109	110	112
66	94	95	97	98	99	100	101	103	104	105	106	108	109	110	111	112
67	95	96	97	98	100	101	102	103	105	106	107	108	110	111	112	113
68	95	97	98	99	100	102	103	104	105	107	108	109	110	112	113	114
69	96	97	99	100	101	103	104	105	106	108	109	110	111	113	114	115
70	97	98	99	101	102	103	105	106	107	109	110	111	112	114	115	116
71	98	99	100	102	103	104	106	107	108	109	111	112	113	115	116	117
72	98	100	101	103	104	105	107	108	109	111	112	113	114	116	117	118
73	99	101	102	103	105	106	108	109	110	112	113	114	116	117	118	119
74	100	102	103	104	106	107	109	110	111	113	114	115	117	118	119	121
75	101	103	104	106	107	108	110	111	113	114	115	117	118	119	121	122
76	102	104	105	107	108	110	111	112	114	115	117	118	119	121	122	123
77	103	105	106	108	109	111	112	114	115	117	118	119	121	122	124	125
78	105	106	108	109	111	112	114	115	117	118	119	121	122	124	125	126
79	106	107	109	111	112	114	115	117	118	120	121	122	124	125	127	128
80	107	109	110	112	114	115	117	118	120	121	123	124	126	127	128	130
81	109	110	112	114	115	117	118	120	121	123	124	126	127	129	130	132
82	110	112	114	115	117	118	120	122	123	125	126	128	129	131	132	133

Note: *Exposure to full sunshine can increase HI values by up to 15° F*

Heat Index Chart (Temperature & Relative Humidity)

RH (%)	Temperature (° F)															
	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
90	119	123	128	132	137	141	146	152	157	163	168	174	180	186	193	199
85	115	119	123	127	132	136	141	145	150	155	161	166	172	178	184	190
80	112	115	119	123	127	131	135	140	144	149	154	159	164	169	175	180
75	109	112	115	119	122	126	130	134	138	143	147	152	156	161	166	171
70	106	109	112	115	118	122	125	129	133	137	141	145	149	154	158	163
65	103	106	108	111	114	117	121	124	127	131	135	139	143	147	151	155
60	100	103	105	108	111	114	116	120	123	126	129	133	136	140	144	148
55	98	100	103	105	107	110	113	115	118	121	124	127	131	134	137	141
50	96	98	100	102	104	107	109	112	114	117	119	122	125	128	131	135
45	94	96	98	100	102	104	106	108	110	113	115	118	120	123	126	129
40	92	94	96	97	99	101	103	105	107	109	111	113	116	118	121	123
35	91	92	94	95	97	98	100	102	104	106	107	109	112	114	116	118
30	89	90	92	93	95	96	98	99	101	102	104	106	108	110	112	114

Note: *Exposure to full sunshine can increase HI values by up to 15° F*

Source: *Meteorology for Scientists and Engineers, 2nd edition* by Roland B. Stull

According to the third U.S. National Climate Assessment released in 2014, for Arkansas, there have been increasing numbers of days above 95 degrees F and nights above 75 degrees F, and decreasing number of extremely cold days since 1970. (NCA, Ch. 17: Southeast)

Across the entire planning area, June, July, and August are the months most likely to experience Extreme Heat. The planning area experiences an average of 12 days above 90 degrees each June, 23 days above 90 degrees each July, and 22 days above 90 degrees each August.

2.5.3.4 Previous Occurrences

There have been 20 events reported between January 1, 2010 and December 31, 2015. Extreme Heat events occurred in 2010, 2011, 2012, 2013, and 2015; all during the months of June, July, and August.

2.5.3.5 Probability of Future Extreme Heat Events

Location (All participating jurisdictions within the entire planning area.)
***Extensive*:** 75 to 100 percent of planning area or consistent single-point of occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)
Weak: Limited classification on scientific scale, slow speed of onset or short duration of event resulting in little to no damage. Of the 20 extreme heat events occurring since 2010, zero have resulted in property or crop damage, there was one injury reported in August 2010.

Probability of Future Events
Likely: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.

Overall Significance
Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometime used for hazards with a high extent rating but very low probability rating.

2.5.3.6 Impact of Extreme Heat

Heat is the number one weather-related killer in the United States, resulting in hundreds of fatalities each year. In fact, on average, excessive heat claims more lives each year than floods, lightning, tornadoes and hurricanes combined.

Extreme heat, though not a serious threat to structures, can negatively affect agri-businesses, particularly poultry grow-out operations, thus affecting the local economy. Sebastian County has 133 poultry operations. Heat stress also adversely affects dairy and livestock production. Optimal temperatures for milk production are between 40 degrees F and 75 degrees F. Sebastian County has 7 dairy farms.

Extreme heat can also be a hazard to critical facilities that must be temperature controlled, such as hospitals, nursing homes and communications facilities (due to the heat sensitive electronic equipment). A total power outage or brown-out during a time of extreme heat would create a very serious situation for those facilities that do not have a backup power supply, such as a generator, to power air conditioning systems.

2.5.3.7 Vulnerability and Estimating Potential Loss by Jurisdiction to Extreme Heat

An extreme heat event will extend throughout all participating jurisdictions within the entire planning area.

It affects people of all ages, primarily the elderly, children and homeless. All agriculture crops, livestock, water supply and forestlands are vulnerable to extreme heat. No area can be said to be immune from, or any more or less vulnerable to extreme heat.

Heat exhaustion usually affects people who are working or exercising in a hot environment. Those at risk for heat exhaustion include: Infants and young children are at risk because their temperature regulation mechanisms are not fully developed. They also are dependent upon others for water and appropriate clothing. In Sebastian County 7.2% of the county's population is under the age of 5 years.

The elderly are similarly at risk because of underlying medical conditions that limit the ability to sweat including poor circulation, skin changes, and chronic medication usage. In Sebastian County 13.1% of the county's populations is over the age of 65 years.

Socioeconomic issues increase the risk of heat exhaustion if access to air conditioning is limited. During heat waves, large cities often open cooling centers to help minimize the risk of large numbers of people succumbing to heat-related illness.

Certain medications may impair the ability of the body to sweat.

2.5.3.8 Multi-Jurisdictional Risk Assessment

Based on historical records for Sebastian County, the region's location is within one of the country's highest exposures to an extreme heat index. All participating jurisdictions within the entire planning area will sometime in the near future face extreme heat. Extreme heat is equally dangerous to all jurisdictions, and school districts throughout the county. Extreme heat will not affect one area of Sebastian County more than another.

2.5.4 Flooding

2.5.4.1 Description of Flooding

A flood is the partial or complete inundation of normally dry land. The various types of flooding include riverine flooding and flash flooding in Sebastian County.

A **riverine flood** is a flood caused by precipitation, runoff or snowmelt over a relatively large watershed causing flooding over wide areas and cresting in over 8 hours. A **flash flood** is a flood caused by heavy precipitation or snowmelt over a limited watershed (typically less than 50 square miles), crests in eight hours or less, and generally occurs in hilly terrain. Riverine floods have relatively low velocity, cover a large area of land, and take longer to recede, whereas flash floods have a higher velocity and may recede quickly. A flash flood can also occur when extreme amounts of precipitation fall on any terrain if the precipitation accumulates more rapidly than the terrain can allow runoff.

Common impacts of flooding include damage to personal property, buildings, and infrastructure; bridge and road closures; service disruptions; and injuries or even fatalities.

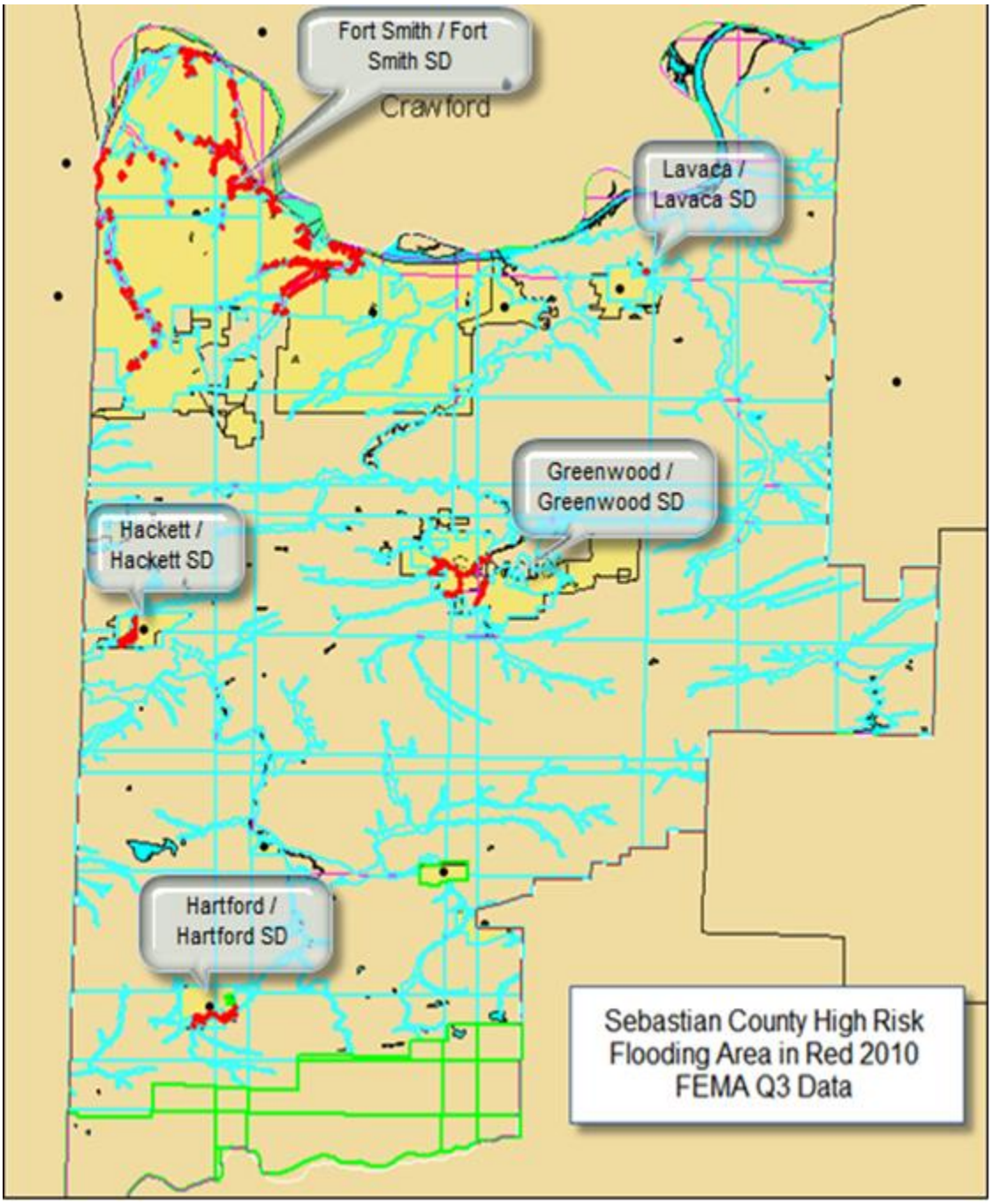
Sebastian County is subject to both riverine and flash flooding, with flash flood events occurring most frequently. Urban development in this part of the state exacerbates the flash flooding problem. Intense rainfall events, often accompanying the large thunderstorms that occur in the County several times a year, may result in water accumulating rapidly.

2.5.4.2 Location of Flooding Events

Sebastian County is subject to flash flooding. The Hazard Mitigation Planning Team has reviewed Sebastian County's Flood Insurance Rate Maps (FIRMs). Research on flooding history in the county included newspaper accounts of floods, data collected by the National Climatic Data Center and the National Flood Insurance Program, and interviews with individual county residents.

Floods are common along the Arkansas River corridor, which forms the northern boundary of the county. However, this flooding is typically not caused by river overflows but by upstream discharges to the river through the flat terrain in the northern portions of the county, where these discharges are sometimes inhibited by high river waters. These areas exhibit low relief and typically have flat, broad floodplains. The areas adjoining and near the Arkansas River in the county can be typically characterized as having wide, flat floodplains, large amounts of wetlands, and, outside of Fort Smith and Barling (cities near the river), mainly farmland and sparsely populated

Following is a County map with an overlay of FEMA floodplain locations. Though this scale does not show the individual structures locations, this overlay revealed that most flood-prone areas in the county are located within urban areas. This map supports the fact that flood damage to structures that has occurred over recent years in the county has mainly been associated with urban buildup and drainage systems that have begun to prove that the flooding occurring is associated with urban buildup and inadequate drainage systems does indicate inadequate local planning, land-use controls and subdivision development requirements.



Flood zones are geographic areas that FEMA has defined in terms of varying levels of flood risk. These zones are illustrated by a community's Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map. Each zone reflects the severity or type of flooding in the area. Following are explanations of the FEMA flood zone designations, followed by the Flood Hazard Boundary Map for Sebastian County.

Zone	Description
A	Areas of 100-year Flood; Base flood elevations and flood hazard factors not determined
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundations are shown, but no flood hazard factors are determined.
AE	Base flood elevations determined.
AH	Areas of 100 year shallow flooding where depths are between one (1) and three (3) feet; Base Flood Elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100 year flood; Base Flood Elevations and Flood Hazard Factors determined.
A-99	Areas of 100 year flood to be protected by flood protection system under construction; Base Flood Elevations and Flood Hazard Factors not determined.
AR	The base floodplain that results from the de-certification of a previously accredited flood protection system that is in the process of being restored to provide a 100 year or greater level of flood protection.
V	The coastal area subject to a velocity hazard (wave action) where BFE's are not determined on the FIRM.
VE	The coastal area subject to a velocity hazard (wave action) where BFE's are provided on the FIRM.
B & X Shaded	Areas of moderate flood hazard, usually the area between the limits of the 100 year and 500 year floods. B zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from the 100 year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.
C &X Unshaded	Areas of minimal flood hazard, usually depicted on FIRMs as exceeding in 500 year flood level. Zone C may have ponding and local drainage problems that do not warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500 year flood.
D	Ares of undetermined but possible flood hazards.

Moderate to Low Risk Areas

In communities that participate in the NFIP, flood insurance is available to all property owners and renters with moderate to low risk.

Zones B, C, and X

Areas outside the 1-percent annual chance floodplain, areas of 1% annual chance sheet flow flooding where average depths are less than 1 foot, areas of 1% annual chance stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 1% annual chance flood by levees. No Base Flood Elevations or depths are shown within this zone. Insurance purchase is not required in these zones.

High Risk Areas

In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all A zones.

Zone A

Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.

Zone AE and A1-A30

Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In most instances, base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Zone AH

Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Zone AO

River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.

Zone AR

Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.

Zone A99

Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.

High Risk - Coastal Areas

In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all V zones.

Zone V

Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones.

Zone VE and V1 - 30

Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Undetermined Risk Areas

Zone D

Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

Sebastian County joined the NFIP in 1988.

Vulnerability and Impact

Areas with previous flooding events in unincorporated Sebastian County include: Centerpoint Road near Hartford, Highway 96 between Lavaca and Greenwood, Highway 255 between Central City and Lavaca, Highway 252 near Lavaca, Highway 45 and the James Fork Bridge between Hackett and Midland, Slaytonville Road south of Hackett, and Highway 10 between Hackett and Highway 71.

From the State of Arkansas All-Hazards Mitigation Plan (September 2013) the following table provides the estimated losses for the 1-percent annual chance flood event for Sebastian County.

HAZUS Estimated Losses, 1-Percent Annual Chance Flood Event

County	Residential Building Losses	Residential Contents Losses	Commercial Building Losses	Commercial Contents Losses	Other Building Losses	Other Contents Losses	Total Contents Losses	Total Building Losses	Business Disruption Losses	Total Losses
Sebastian County	$15,530,000	$11,250,000	$2,550,000	$6,386,000	$1,023,000	$18,169,000	35,805,000	$19,103,000	$3,487,000	$58,395,000

Source: FEMA AAL Study, 2010

National Flood Insurance Program (NFIP)
Sebastian County oversees the floodplain program for Sebastian County Arkansas. The Sebastian County Certified Floodplain Manager (CFM) assists citizens of Sebastian County with filling out documents for the NFIP and educating the citizens about the NFIP program. If a person wishes to build in a floodplain, there is a permit that must be completed for Sebastian County then the CFM will monitor the construction process to insure compliance. The vast majority of work done by CFM is assisting citizens in completing letters of map amendments and continuing education for the director of Sebastian County's flood insurance program.

Insurance Summary- Sebastian County is a member of the National Flood Insurance Program, Community Identification Number 050462

Staff Resources- Sebastian County has a Certified NFIP Coordinator. The floodplain management is an auxiliary function. Sebastian County has not had any barriers running an effective NFIP program.

Compliance History- Sebastian County is in good standing with the NFIP, and there are no outstanding compliance issues.

Sebastian County has zero repetitive loss structures.

Central City: Central City does not participate in NFIP and does not have a current FIRM.

Vulnerability and Impact
Flood waters from Vache Grasse Creek and the Arkansas River have previously impacted Highway 255 north east of Central City including Hickman Bluff.

The National Climatic Data Center Storm Events Database reports no damages from flooding between 2010 and 2015.

Huntington: Huntington does not participate in NFIP and does not have a current FIRM.

Vulnerability and Impact
Because of the topography of the city, Huntington experiences very little flooding. Areas most likely to flood would be those located along Cherokee Creek. The City Park is adjacent to Cherokee Creek and there's a bridge that cross Cherokee Creek on Highway 252 heading west out of Huntington.

The National Climatic Data Center Storm Events Database reports no damages from flooding between 2010 and 2015.

Barling: Barling joined the NFIP in 2007.

Vulnerability and Impact
According to residents, areas of flooding include the intersection of Strozier Lane and Highway 22 resulting from an issue with highway department culverts, the bridges on H Street and 5th Terrace, and 22nd Street off of Highway 22 due to houses being built on an old creek bed that has been rerouted, but naturally wants to follow its old path and also Highway 255. The Fort Smith School District operates Barling Elementary within the Barling city limits. There are no critical facilities located within the floodplain. The area around the Vache Grasse Creek floodplain though Barling is mostly undeveloped.

The National Climatic Data Center Storm Events Database reports no damages from flooding between 2010 and 2015.

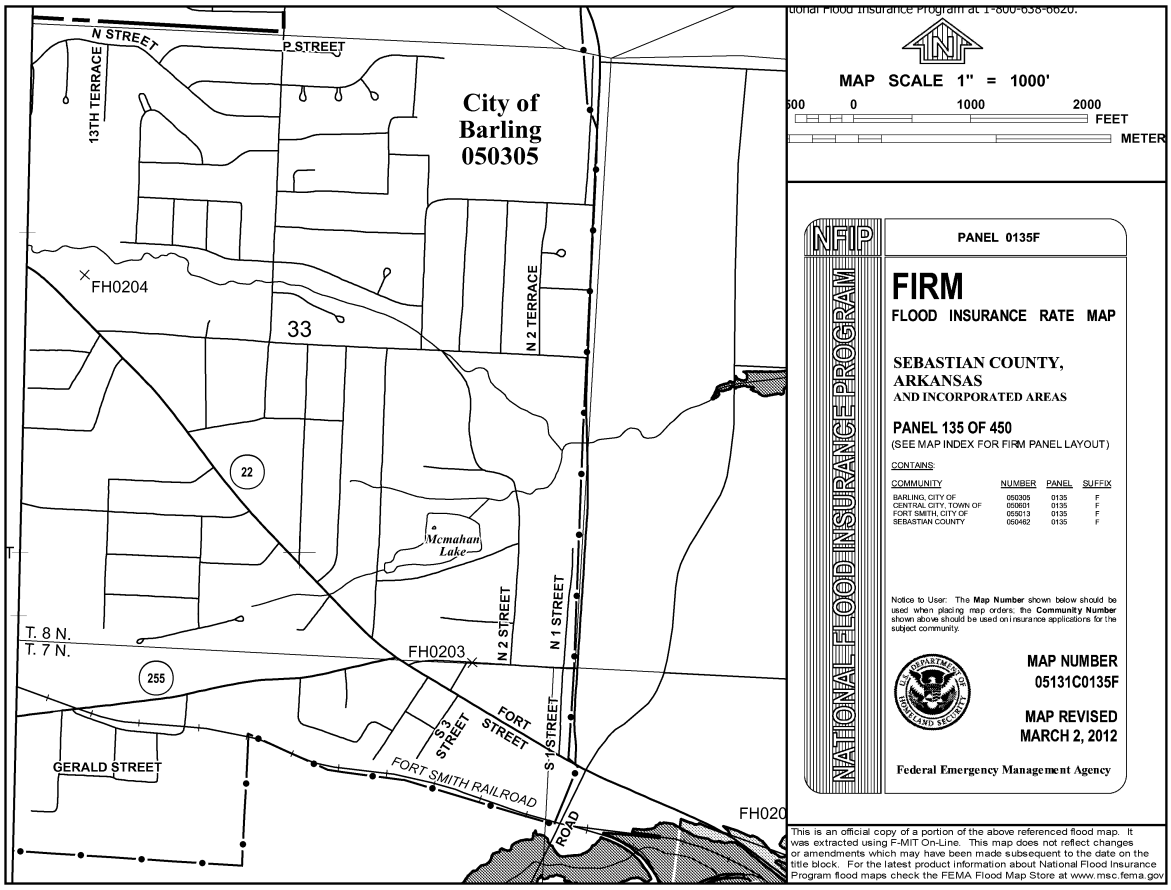
City of Barling oversees the floodplain program for City of Barling Arkansas. The City of Barling Certified Floodplain Manager (CFM) assists citizens of City of Barling with filling out documents for the NFIP and educating the citizens about the NFIP program. If a person wishes to build in a floodplain, there is a permit that must be completed for City of Barling then the CFM will monitor the construction process to insure compliance. The vast majority of work done by CFM is assisting citizens in completing letters of map amendments and continuing education for the director of City of Barling's flood insurance program.

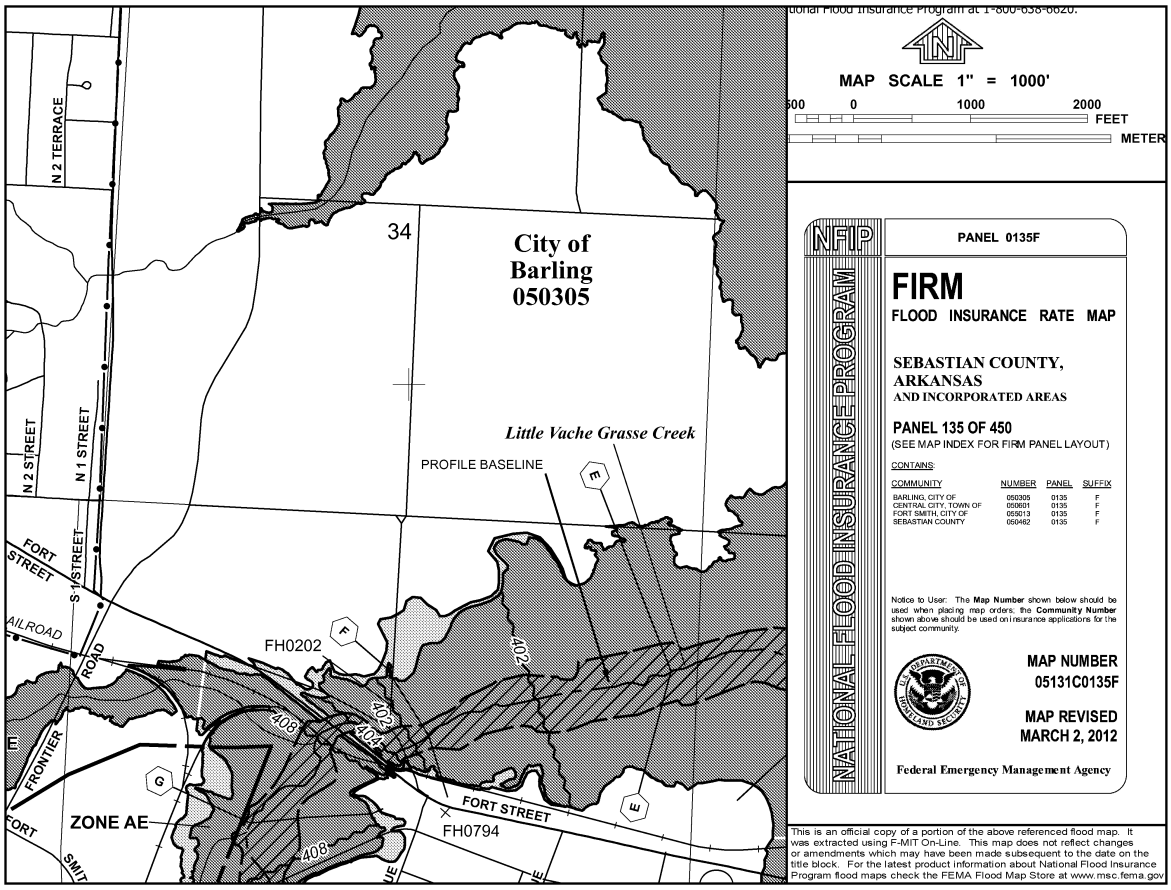
Insurance Summary- City of Barling is a member of the National Flood Insurance Program, Community Identification Number 050305

Staff Resources- City of Barling has a Certified NFIP Coordinator. The floodplain management is an auxiliary function. City of Barling has not had any barriers running an effective NFIP program.

Compliance History- City of Barling is in good standing with the NFIP, and there are no outstanding compliance issues.

Barling has 0 repetitive loss structures.


N STREET
P STREET
13TH TERRACE
City of
Barling
050305
FH0204
33
N 2 TERRACE
22
Memahan
Lake
T. 8 N.
T. 7 N.
FH0203
N 2 STREET
N 1 STREET
255
FORT
STREET
S 3
STREET
S 1 STREET
GERALD STREET
FORT SMITH RAILROAD
ROAD
FH020
MAP SCALE 1" = 1000'
500 0 1000 2000
FEET
METER
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0135F
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY,
ARKANSAS
AND INCORPORATED AREAS
PANEL 135 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
BARLING, CITY OF 050305 0135 F
CENTRAL CITY, TOWN OF 050601 0135 F
FORT SMITH, CITY OF 055013 0135 F
SEBASTIAN COUNTY 050462 0135 F
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
05131C0135F
MAP REVISED
MARCH 2, 2012
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


tional Flood Insurance Program at 1-800-638-6620.
MAP SCALE 1" = 1000'
500 0 1000 2000
FEET
METER
NFIP
PANEL 0135F
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY, ARKANSAS
AND INCORPORATED AREAS
PANEL 135 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
BARLING, CITY OF 050305 0135 F
CENTRAL CITY, TOWN OF 050601 0135 F
FORT SMITH, CITY OF 055013 0135 F
SEBASTIAN COUNTY 050462 0135 F
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
05131C0135F
MAP REVISED
MARCH 2, 2012
Federal Emergency Management Agency
NATIONAL FLOOD INSURANCE PROGRAM
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34
City of Barling 050305
Little Vache Grasse Creek
PROFILE BASELINE
N 2 TERRACE
N 2 STREET
N 1 STREET
S 1 STREET
FORT STREET
AILROAD
ROAD
FRONTIER
FH0202
FH0794
ZONE AE
402
404
408
FORT STREET
E
F
G
M

Bonanza: Bonanza joined the NFIP in 2012.

Vulnerability and Impact
Areas of flooding identified by residents include those along Wells Creek. Oak Street and First Street have also previously experienced flooding which resulted in the need for extensive road repairs.

The National Climatic Data Center Storm Events Database reports no damages from flooding between 2010 and 2015.

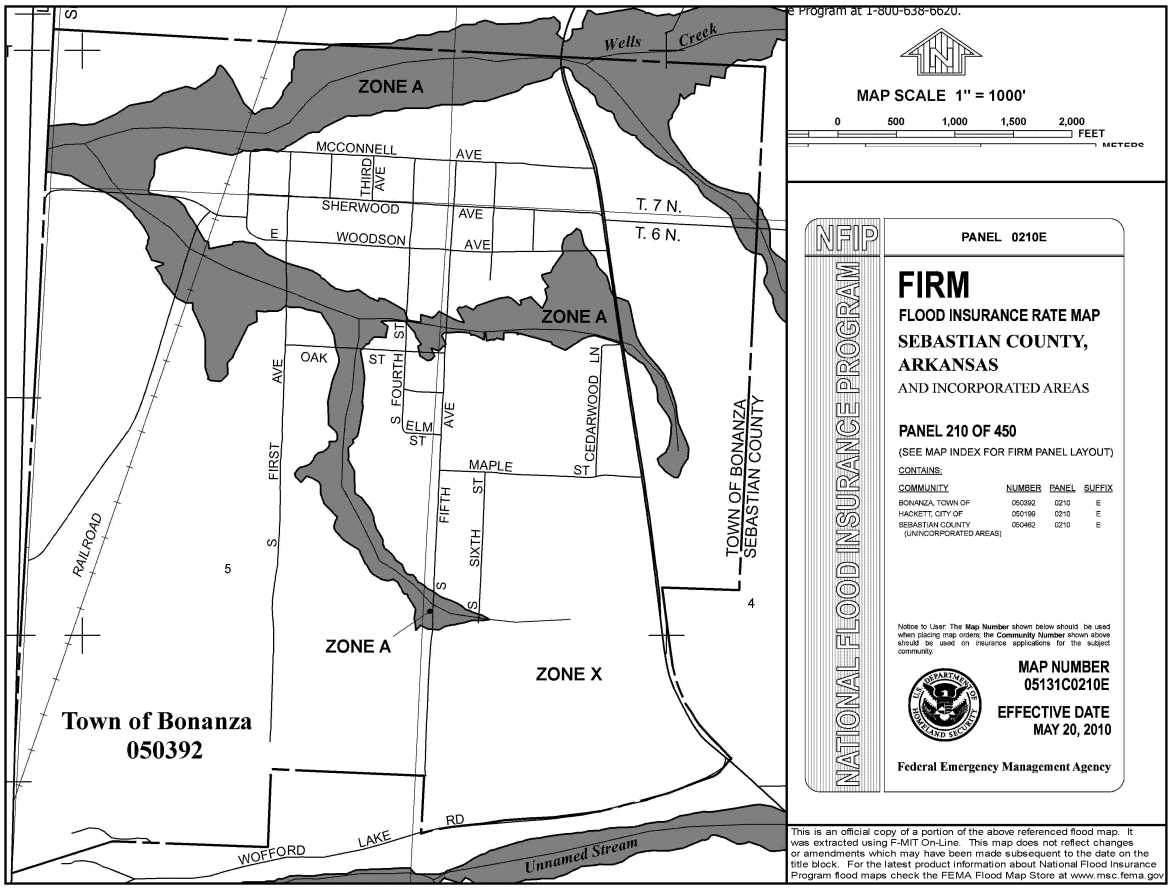
City of Bonanza oversees the floodplain program for City of Bonanza Arkansas. The City of Bonanza Certified Floodplain Manager (CFM) assists citizens of City of Bonanza with filling out documents for the NFIP and educating the citizens about the NFIP program. If a person wishes to build in a floodplain, there is a permit that must be completed for City of Bonanza then the CFM will monitor the construction process to insure compliance. The vast majority of work done by CFM is assisting citizens in completing letters of map amendments and continuing education for the director of City of Bonanza's flood insurance program.

Insurance Summary- City of Bonanza is a member of the National Flood Insurance Program, Community Identification Number 050392

Staff Resources- City of Bonanza has a Certified NFIP Coordinator. The floodplain management is an auxiliary function. City of Bonanza has not had any barriers running an effective NFIP program.

Compliance History- City of Bonanza is in good standing with the NFIP, and there are no outstanding compliance issues.

Bonanza has 0 repetitive loss structures.


Wells Creek
ZONE A
MCCONNELL AVE
THIRD AVE
SHERWOOD AVE
WOODSON AVE
T. 7 N.
T. 6 N.
ZONE A
OAK ST
FOURTH ST
ELM ST
CEDARWOOD LN
MAPLE ST
FIRST AVE
FIFTH ST
SIXTH ST
RAILROAD
TOWN OF BONANZA
SEBASTIAN COUNTY
ZONE A
ZONE X
Town of Bonanza
050392
WOFFORD LAKE RD
Unnamed Stream
MAP SCALE 1" = 1000'
0 500 1,000 1,500 2,000
FEET
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0210E
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY, ARKANSAS
AND INCORPORATED AREAS
PANEL 210 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
BONANZA, TOWN OF 050392 0210 E
HACKETT, CITY OF 050196 0210 E
SEBASTIAN COUNTY (UNINCORPORATED AREAS) 050462 0210 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
05131C0210E
EFFECTIVE DATE
MAY 20, 2010
Federal Emergency Management Agency
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Fort Smith: Fort Smith joined the NFIP in 1971.

Vulnerability and Impact
Areas prone to flooding include downtown Fort Smith on the west side of the city and Rogers Avenue/Highway 22 on the east side. Residential areas prone to flooding include South O Street, Riverlyn Drive, and Oak Park. Commercial areas that have previously experienced flooding include Rogers Avenue, 74th Street, and 79th Street on the east side of the city. Howard Elementary (Fort Smith School District) is located just on the edge of the floodplain on North 8th Street. The Future School of Fort Smith is located just outside the floodplain on North 7th Street.

The National Climatic Data Center Storm Events Database reports $270K in damages from flooding between 2010 and 2015.

City of Fort Smith oversees the floodplain program for City of Fort Smith Arkansas. The City of Fort Smith Certified Floodplain Manager (CFM) assists citizens of City of Fort Smith with filling out documents for the NFIP and educating the citizens about the NFIP program. If a person wishes to build in a floodplain, there is a permit that must be completed for City of Fort Smith then the CFM will monitor the construction process to insure compliance. The vast majority of work done by CFM is assisting citizens in completing letters of map amendments and continuing education for the director of City of Fort Smith's flood insurance program.

Insurance Summary- City of Fort Smith is a member of the National Flood Insurance Program, Community Identification Number 055013

Staff Resources- City of Fort Smith has a Certified NFIP Coordinator. The floodplain management is an auxiliary function. City of Fort Smith has not had any barriers running an effective NFIP program.

Compliance History- City of Fort Smith is in good standing with the NFIP, and there are no outstanding compliance issues.

Fort Smith has 25 repetitive loss structures.

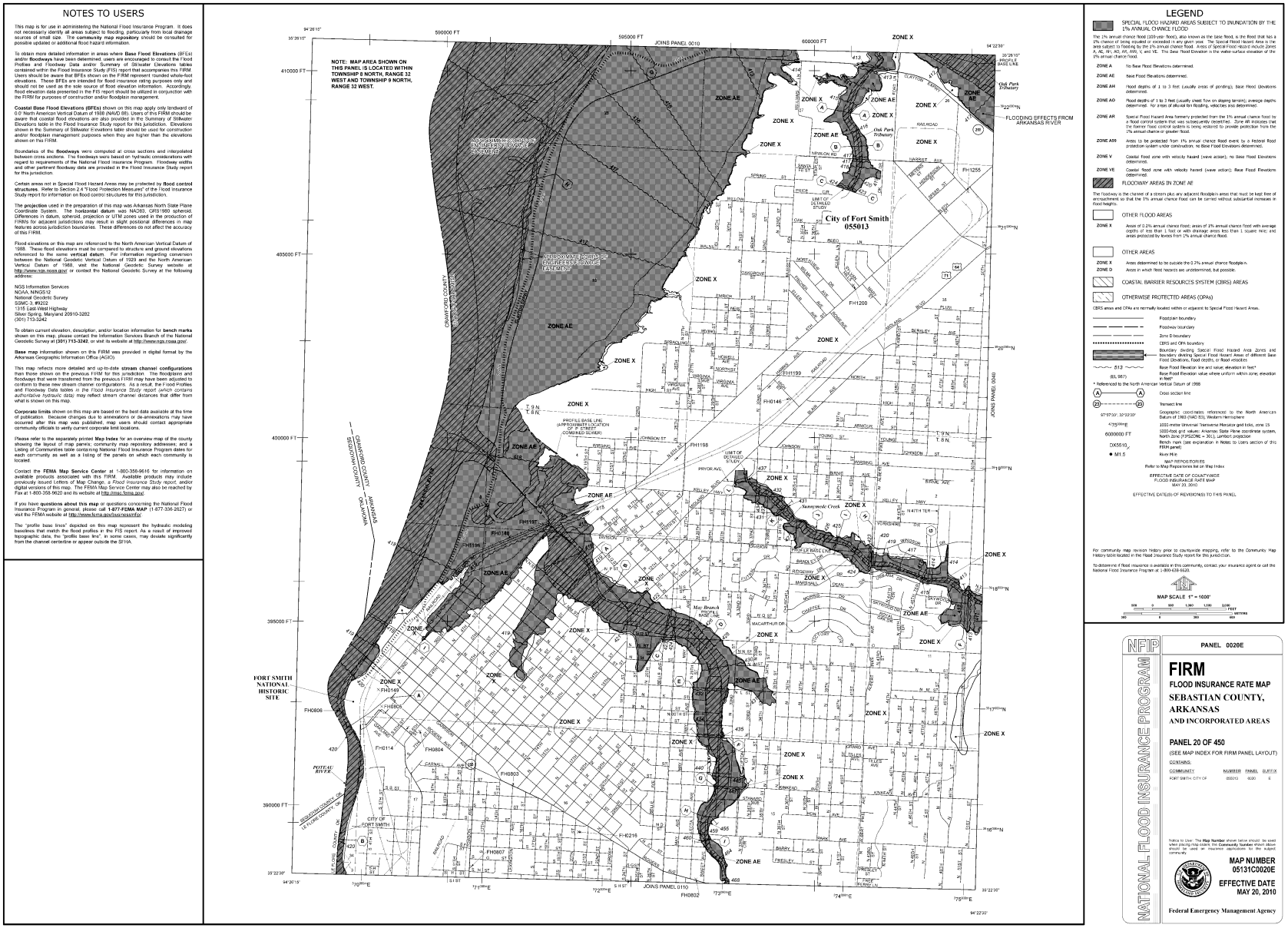
Fort Smith School District: The School District has no jurisdiction over floodplain areas, as it is the responsibility of the County and/or municipalities to regulate them. The School District has facilities in Fort Smith and Barling.

Future School of Fort Smith: The School District has no jurisdiction over floodplain areas, as it is the responsibility of the County and/or municipalities to regulate them. The School District has facilities in Fort Smith.

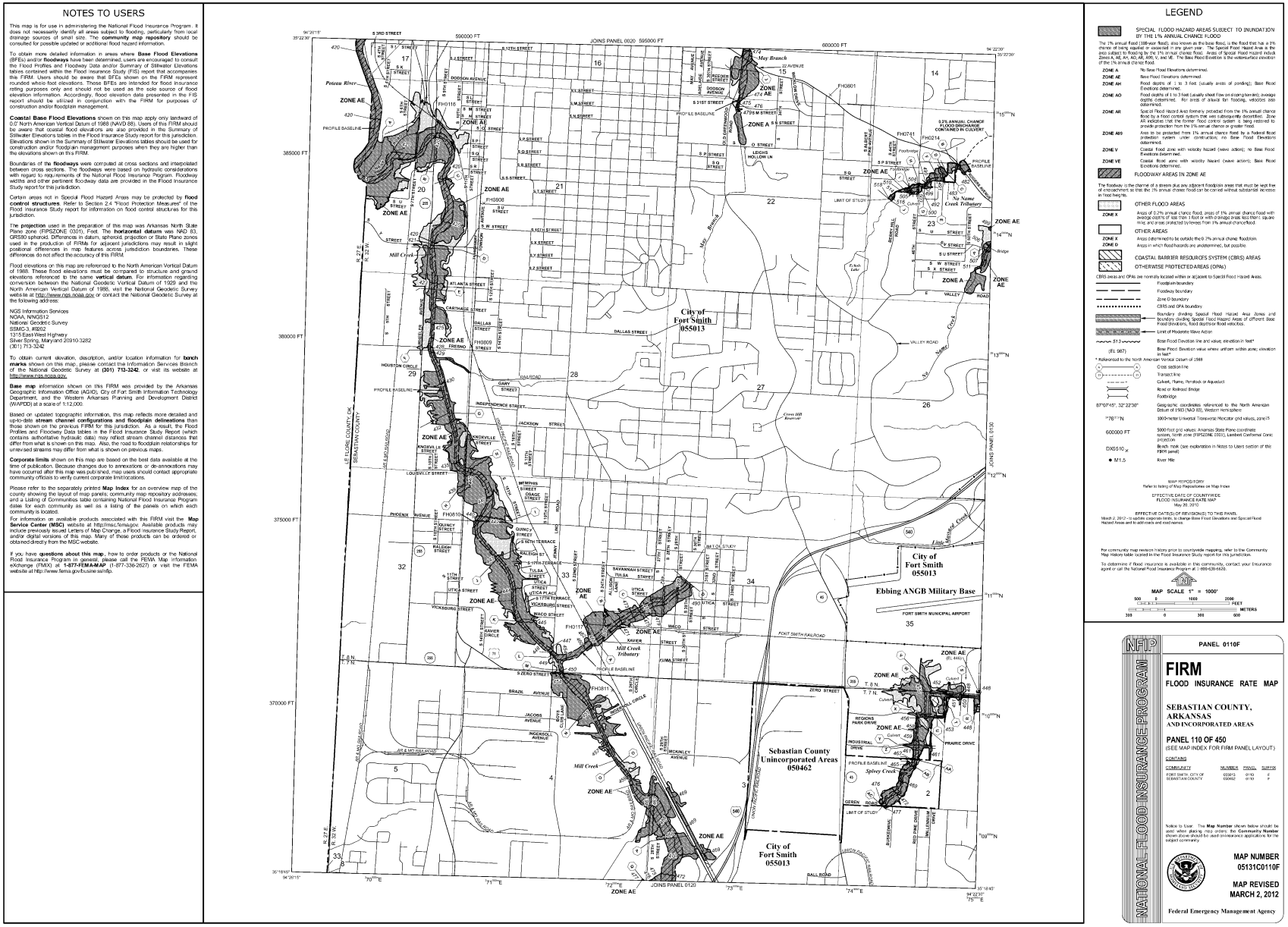
University of Arkansas-Fort Smith: The University has no jurisdiction over floodplain areas, as it is the responsibility of the County and/or municipalities to regulate them. The University has facilities in Fort Smith.

Arkansas College of Osteopathic Medicine: The College has no jurisdiction over floodplain areas, as it is the responsibility of the County and/or municipalities to regulate them. The College has facilities in Fort Smith.

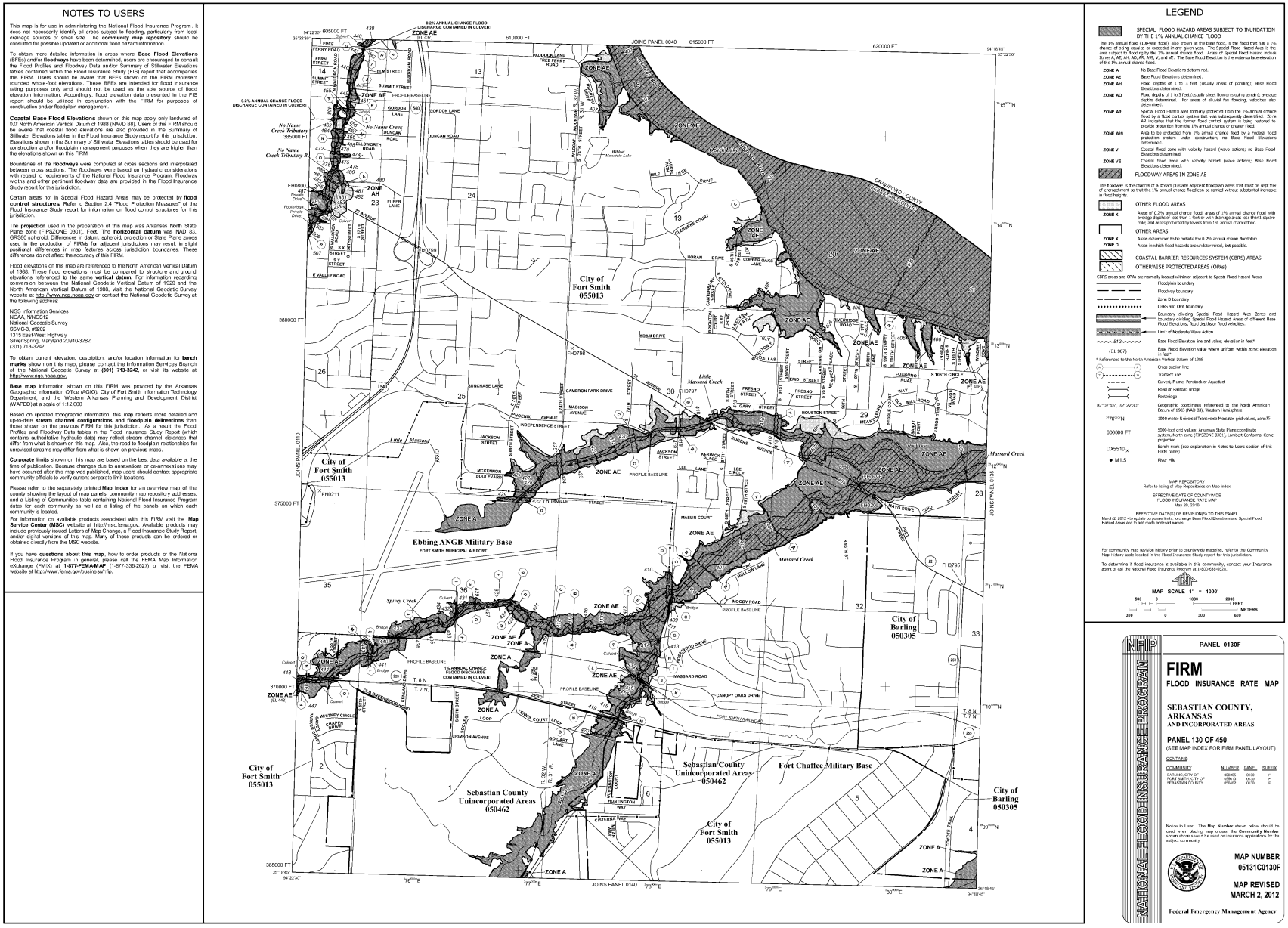
The following map is of north Fort Smith where the Arkansas River creates the border between Sebastian and Crawford Counties which can experience major flooidng during extended period of rainfall. Additional areas within the floodplain are located along May Branch and Sunnymede Creek. Howard Elementary (Fort Smith School District) is located just on the edge of the floodplain on North 8th Street. The Future School of Fort Smith is located just outside the floodplain on North 7th Street.



The following map is of west central Fort Smith where the Poteau River flows near the Arkansas/Oklahoma Border. Additional areas within the floodplain are located along Mill Creek.



The following map is of east central Fort Smith where Little Massard Creek, Massard Creek, and Spivey Creek are areas where flooding occurs. This area is near the Fort Smith/Barling city limits.



Greenwood: Greenwood joined the NFIP in 1981.

Vulnerability and Impact
Residents identified the following areas as being prone to flooding those along Hartsill Creek, Vache Grasse Creek, and Highway 96. Hartsill Creek intersects with Highway 10, Old Hackett Road, W. Denver Street, N. Ulmer Street, W. Center Street, Westwood Avenue, and Liberty Drive. Flooding along this creek could impact Westwood Elementary School, and residences along Crooked Creek Road and Creekside Drive. Vache Grasse Creek intersects with E. Center Street and could impact the Greenwood water and wastewater treatment facilities.

The National Climatic Data Center Storm Events Database reports no damages from flooding between 2010 and 2015.

City of Greenwood oversees the floodplain program for City of Greenwood Arkansas. The City of Greenwood Certified Floodplain Manager (CFM) assists citizens of City of Greenwood with filling out documents for the NFIP and educating the citizens about the NFIP program. If a person wishes to build in a floodplain, there is a permit that must be completed for City of Greenwood then the CFM will monitor the construction process to insure compliance. The vast majority of work done by CFM is assisting citizens in completing letters of map amendments and continuing education for the director of City of Greenwood's flood insurance program.

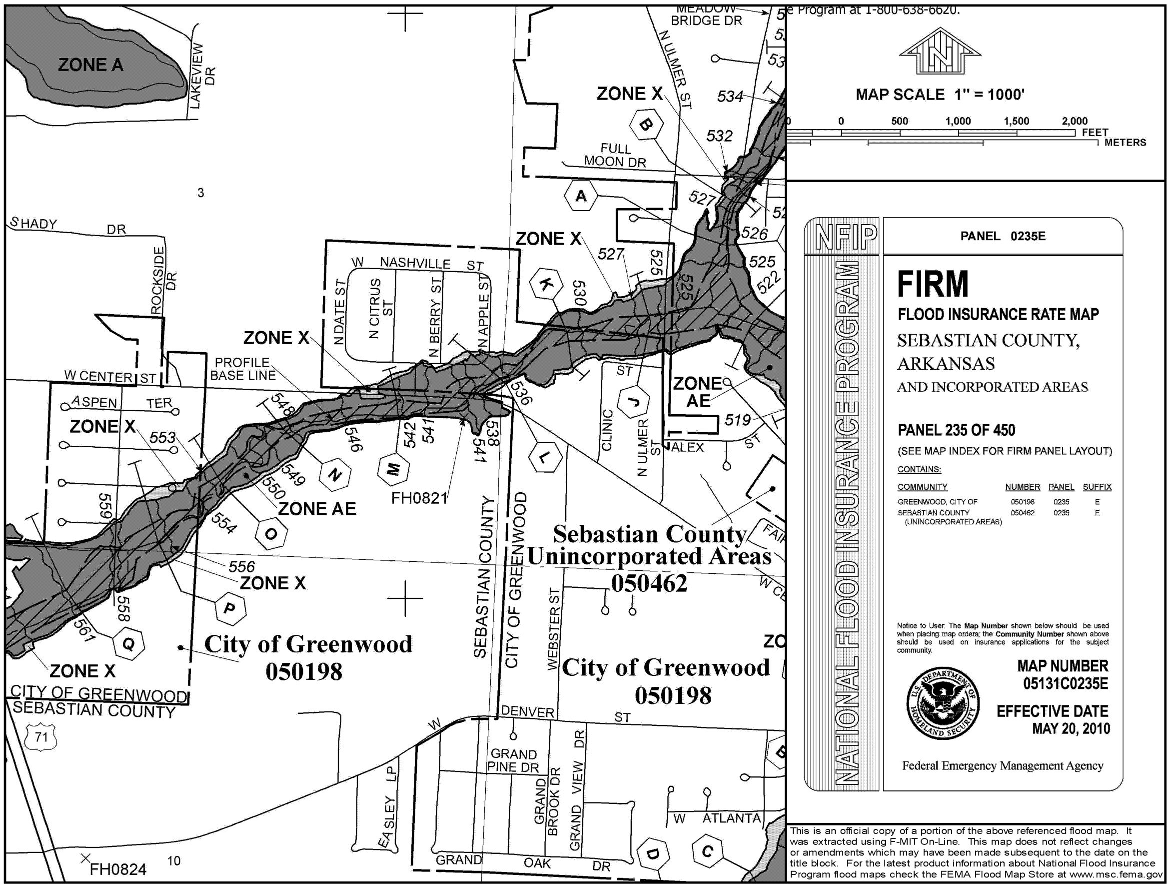
Insurance Summary- City of Greenwood is a member of the National Flood Insurance Program, Community Identification Number 050198

Staff Resources- City of Greenwood has a Certified NFIP Coordinator. The floodplain management is an auxiliary function. City of Greenwood has not had any barriers running an effective NFIP program.

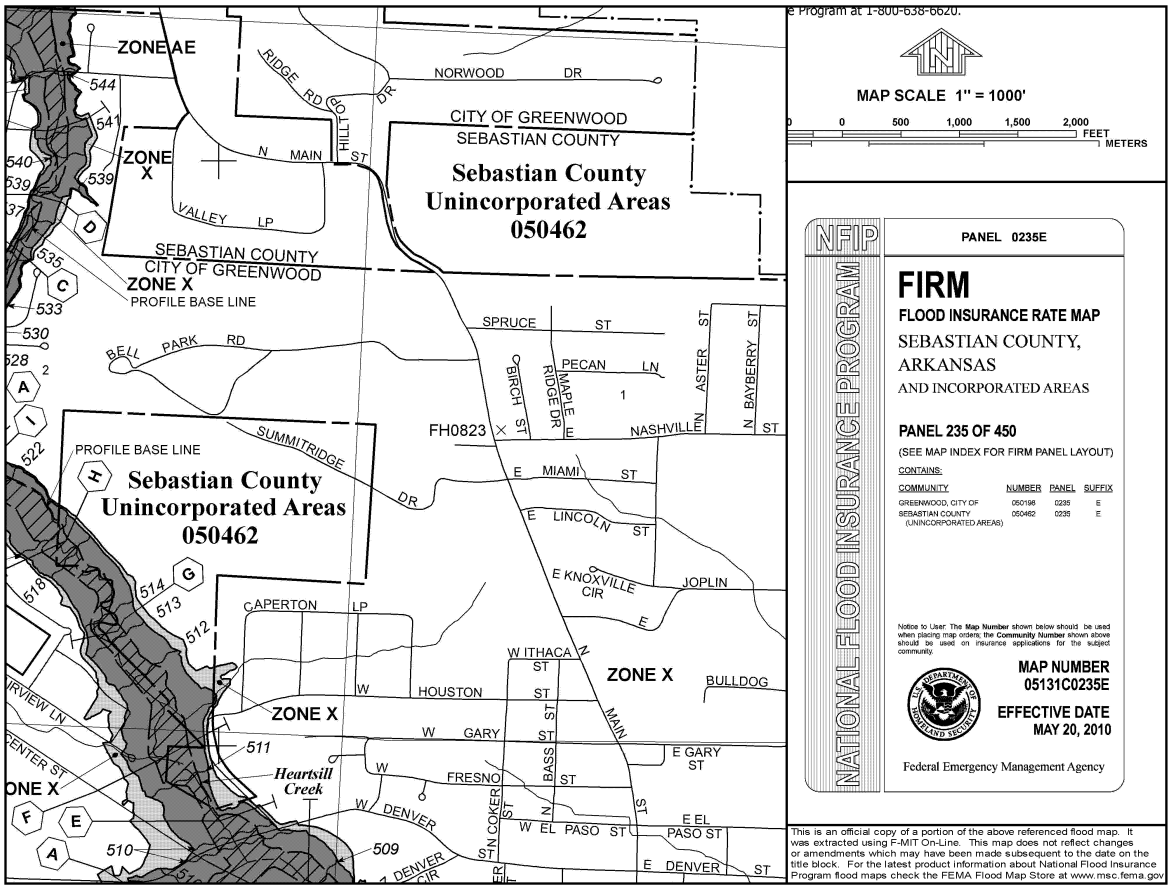
Compliance History- City of Greenwood is in good standing with the NFIP, and there are no outstanding compliance issues.

Greenwood has 3 repetitive loss structures.

Greenwood School District: The School District has no jurisdiction over floodplain areas, as it is the responsibility of the County and/or municipalities to regulate them. All schools are within Greenwood.



ZONE A
ZONE X
ZONE AE
PROFILE BASE LINE
Sebastian County Unincorporated Areas 050462
City of Greenwood 050198
City of Greenwood 050198
CITY OF GREENWOOD
SEBASTIAN COUNTY
FH0821
FH0824
MAP SCALE 1" = 1000'
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0235E
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY, ARKANSAS
AND INCORPORATED AREAS
PANEL 235 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
GREENWOOD, CITY OF 050198 0235 E
SEBASTIAN COUNTY (UNINCORPORATED AREAS) 050462 0235 E
MAP NUMBER 05131C0235E
EFFECTIVE DATE MAY 20, 2010
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


ZONE AE
ZONE X
CITY OF GREENWOOD
SEBASTIAN COUNTY
Sebastian County
Unincorporated Areas
050462
SEBASTIAN COUNTY
CITY OF GREENWOOD
ZONE X
PROFILE BASE LINE
Sebastian County
Unincorporated Areas
050462
PROFILE BASE LINE
ZONE X
ZONE X
ZONE X
Heartsill
Creek
FH0823
NORWOOD DR
RIDGE RD
HILLTOP DR
N MAIN ST
VALLEY LP
BELL PARK RD
SPRUCE ST
PECAN LN
BIRCH ST
MAPLE RIDGE DR
ASTER ST
N BAYBERRY ST
NASHVILLE ST
SUMMITRIDGE DR
E MIAMI ST
E LINCOLN ST
E KNOXVILLE CIR
JOPLIN E
APERTON LP
W ITHACA ST
W HOUSTON ST
W GARY ST
MAIN ST
E GARY ST
BULLDOG
W FRESNO ST
BASS ST
N COKER ST
W DENVER ST
W EL PASO ST
E EL PASO ST
E DENVER ST
DENVER CIR
544
541
540
539
537
535
533
530
528
522
518
514
513
512
511
510
509
MAP SCALE 1" = 1000'
0 500 1,000 1,500 2,000 FEET
METERS
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0235E
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY, ARKANSAS
AND INCORPORATED AREAS
PANEL 235 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
GREENWOOD, CITY OF 050198 0235 E
SEBASTIAN COUNTY (UNINCORPORATED AREAS) 050462 0235 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
05131C0235E
EFFECTIVE DATE
MAY 20, 2010
Federal Emergency Management Agency
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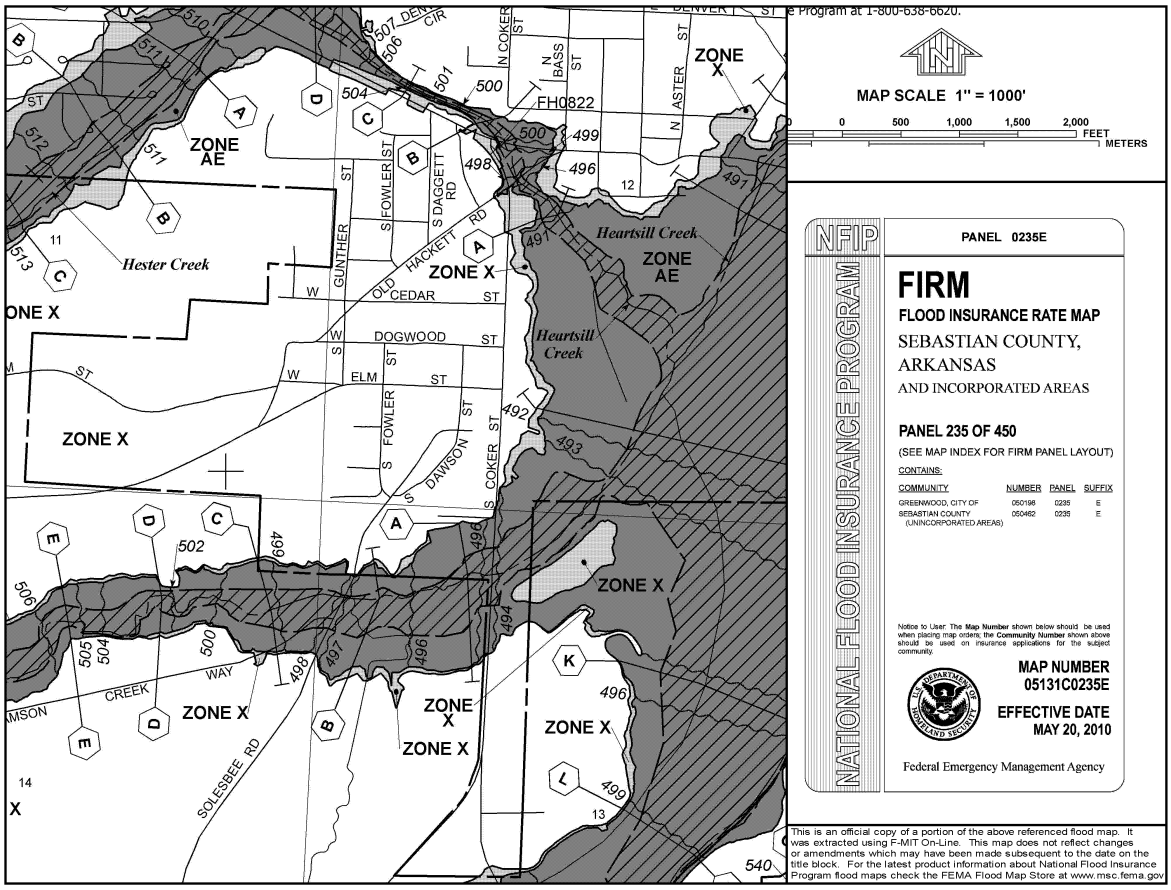
MAP SCALE 1" = 1000'
0 500 1,000 1,500 2,000 FEET
METERS
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0235E
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY, ARKANSAS
AND INCORPORATED AREAS
PANEL 235 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
GREENWOOD, CITY OF 050198 0235 E
SEBASTIAN COUNTY (UNINCORPORATED AREAS) 050462 0235 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
05131C0235E
EFFECTIVE DATE
MAY 20, 2010
Federal Emergency Management Agency
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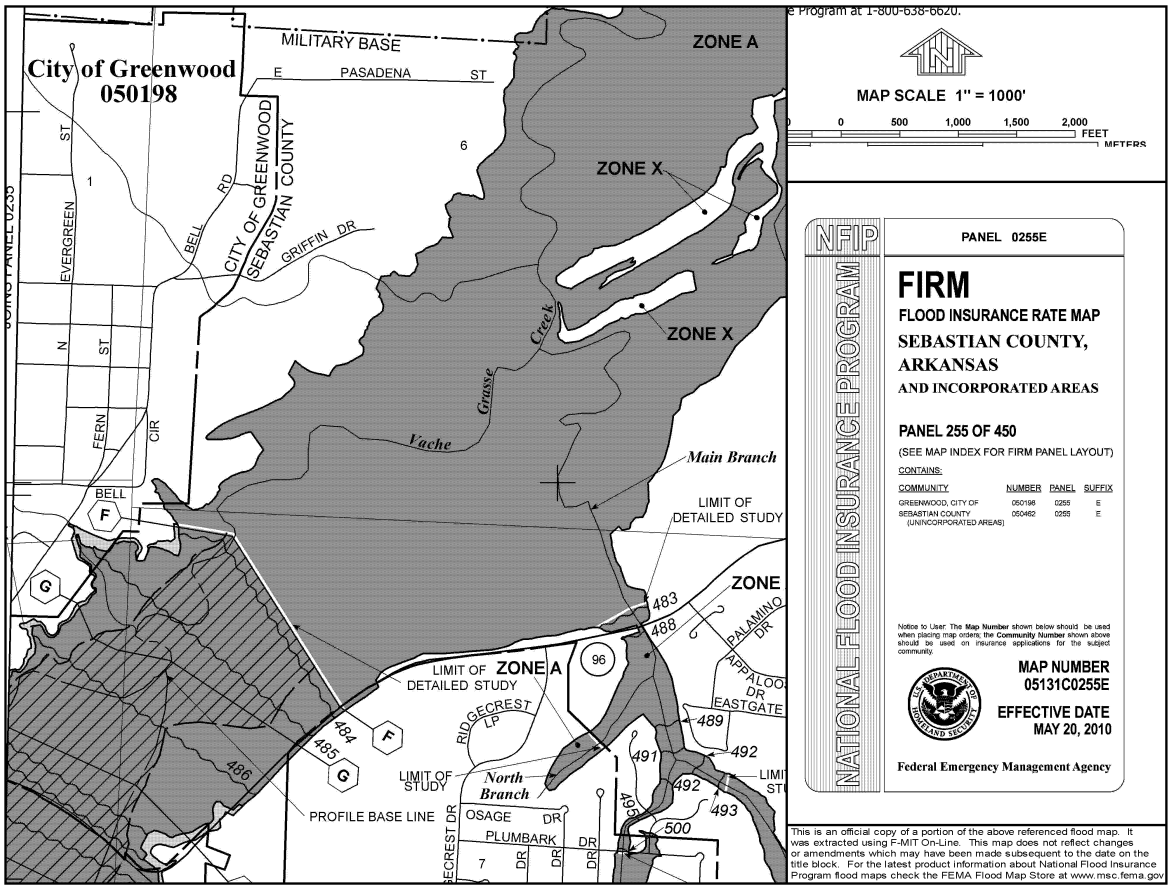
ZONE AE
ZONE X
Hester Creek
Heartsill Creek
FH0822
CREEK WAY
SOLESBEE RD
S FOWLER ST
S DAGGETT RD
HACKETT RD
OLD CEDAR ST
DOGWOOD ST
ELM ST
S DAWSON ST
S COKER ST
N COKER ST
N BASS ST
N ASTER ST
GUNTHER ST


City of Greenwood
050198
MILITARY BASE
E PASADENA ST
ZONE A
ZONE X
ZONE X
CITY OF GREENWOOD
SEBASTIAN COUNTY
GRIFFIN DR
EVERGREEN
BELL RD
FERN CIR
N ST
Creek
Grasse
Vache
Main Branch
LIMIT OF DETAILED STUDY
ZONE
LIMIT OF DETAILED STUDY
ZONE A
RIDGECREST LP
PALAMINO DR
APPALOOSA DR
EASTGATE
LIMIT OF STUDY
North Branch
PROFILE BASE LINE
OSAGE DR
PLUMBARK DR
483
488
489
491
492
493
494
495
486
500
96
MAP SCALE 1" = 1000'
0 500 1,000 1,500 2,000
FEET
METERS
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0255E
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY, ARKANSAS
AND INCORPORATED AREAS
PANEL 255 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
GREENWOOD, CITY OF 050198 0255 E
SEBASTIAN COUNTY (UNINCORPORATED AREAS) 050462 0255 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
05131C0255E
EFFECTIVE DATE
MAY 20, 2010
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Hackett: Hackett joined the NFIP in 1982.

Vulnerability and Impact
Areas prone to flooding identified by officials were Highway 10 the Henderson Street bridge that crosses Hackett Creek. There are 6 houses on Henderson Street as well as the Hackett City Park.

The National Climatic Data Center Storm Events Database reports no damages from flooding between 2010 and 2015.

City of Hackett oversees the floodplain program for City of Hackett Arkansas. The City of Hackett Certified Floodplain Manager (CFM) assists citizens of City of Hackett with filling out documents for the NFIP and educating the citizens about the NFIP program. If a person wishes to build in a floodplain, there is a permit that must be completed for City of Hackett then the CFM will monitor the construction process to insure compliance. The vast majority of work done by CFM is assisting citizens in completing letters of map amendments and continuing education for the director of City of Hackett's flood insurance program.

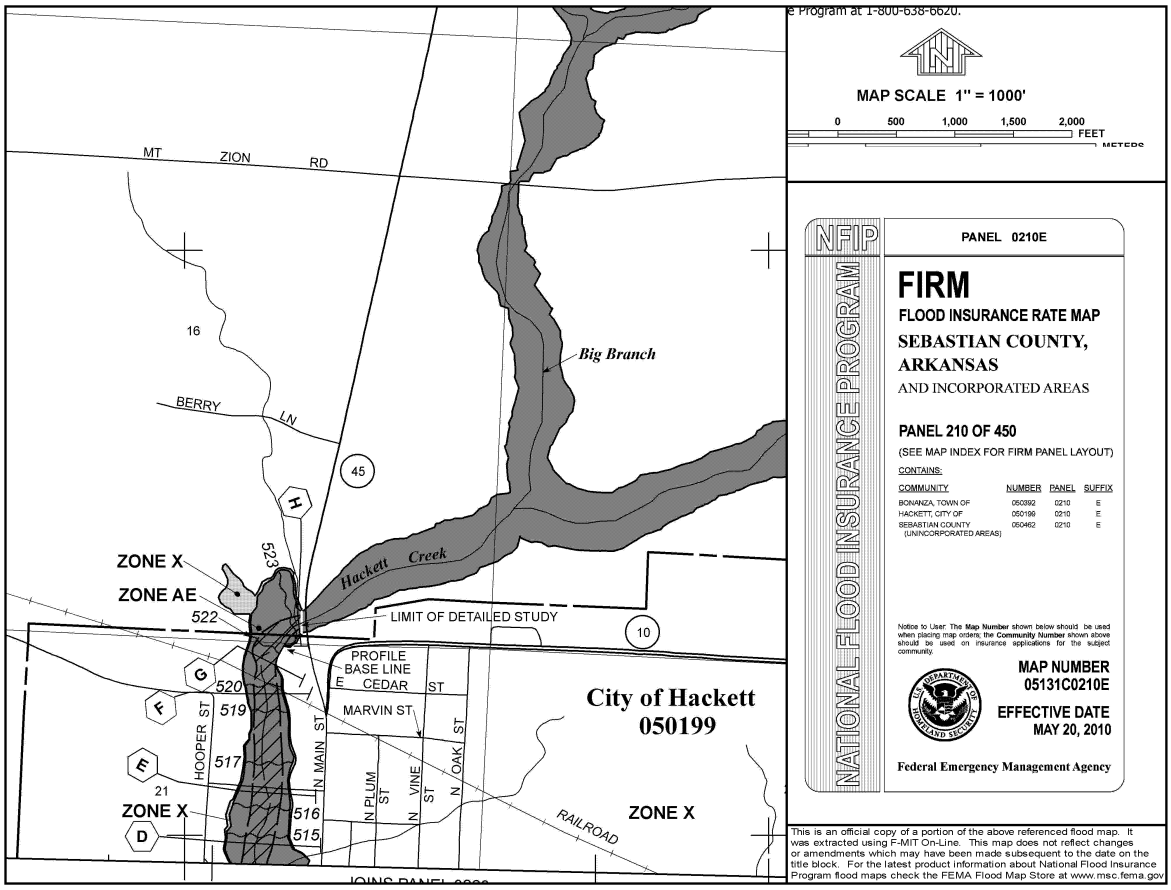
Insurance Summary- City of Hackett is a member of the National Flood Insurance Program, Community Identification Number 050199

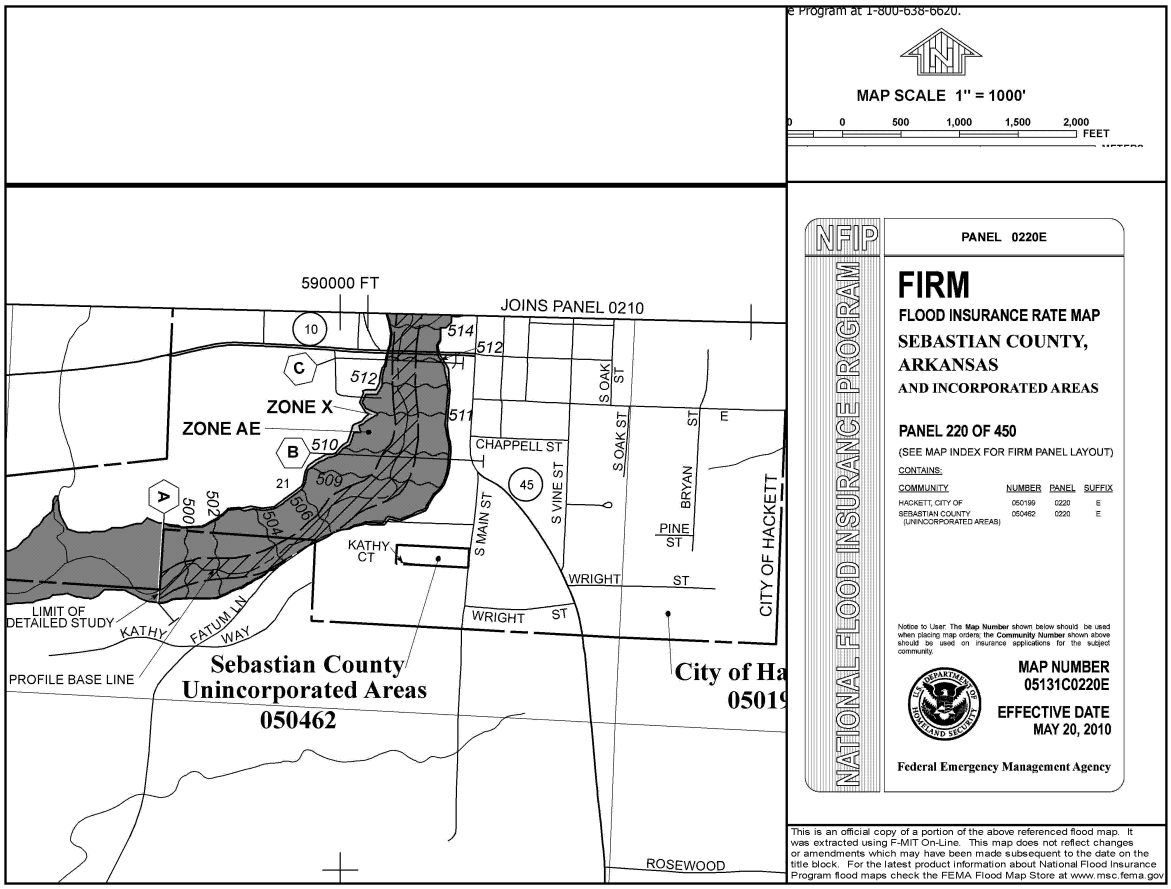
Staff Resources- City of Hackett has a Certified NFIP Coordinator. The floodplain management is an auxiliary function. City of Hackett has not had any barriers running an effective NFIP program.

Compliance History- City of Hackett is in good standing with the NFIP, and there are no outstanding compliance issues.

Hackett has 0 repetitive loss structures.

Hackett School District: The School District has no jurisdiction over floodplain areas, as it is the responsibility of the County and/or municipalities to regulate them. The School District has facilities in Hackett and Hartford.


e Program at 1-800-638-6620.
MAP SCALE 1" = 1000'
0 500 1,000 1,500 2,000
FEET
MT ZION RD
16
BERRY LN
45
Big Branch
Hackett Creek
ZONE X
ZONE AE
522
523
LIMIT OF DETAILED STUDY
10
PROFILE BASE LINE
E CEDAR ST
MARVIN ST
City of Hackett
050199
520
519
517
516
515
HOOPER ST
N MAIN ST
N PLUM ST
N VINE ST
N OAK ST
21
ZONE X
ZONE X
RAILROAD
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0210E
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY, ARKANSAS
AND INCORPORATED AREAS
PANEL 210 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
BONANZA, TOWN OF 050392 0210 E
HACKETT, CITY OF 050199 0210 E
SEBASTIAN COUNTY (UNINCORPORATED AREAS) 050462 0210 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
05131C0210E
EFFECTIVE DATE
MAY 20, 2010
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


e Program at 1-800-638-6620.
MAP SCALE 1" = 1000'
0 0 500 1,000 1,500 2,000
FEET
590000 FT
JOINS PANEL 0210
ZONE X
ZONE AE
CHAPPELL ST
S OAK ST
S VINE ST
S MAIN ST
BRYAN ST E
PINE ST
WRIGHT ST
KATHY CT
LIMIT OF DETAILED STUDY
KATHY
FATUM LN
WAY
PROFILE BASE LINE
Sebastian County
Unincorporated Areas
050462
CITY OF HACKETT
ROSEWOOD
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0220E
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY, ARKANSAS
AND INCORPORATED AREAS
PANEL 220 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
HACKETT, CITY OF 050199 0220 E
SEBASTIAN COUNTY (UNINCORPORATED AREAS) 050462 0220 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
05131C0220E
EFFECTIVE DATE
MAY 20, 2010
Federal Emergency Management Agency
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Hartford: Hartford joined the NFIP in 1982.

Vulnerability and Impact
Areas identified as being prone to flooding include those along West Creek. West Creek intersects with S. Pine Street, a residential area, and W. Hartford Road, mostly agriculture land.

Hackett School District operates facilities in Hartford.

The National Climatic Data Center Storm Events Database reports no damages from flooding between 2010 and 2015.

City of Hartford oversees the floodplain program for City of Hartford Arkansas. The City of Hartford Certified Floodplain Manager (CFM) assists citizens of City of Hartford with filling out documents for the NFIP and educating the citizens about the NFIP program. If a person wishes to build in a floodplain, there is a permit that must be completed for City of Hartford then the CFM will monitor the construction process to insure compliance. The vast majority of work done by CFM is assisting citizens in completing letters of map amendments and continuing education for the director of City of Hartford's flood insurance program.

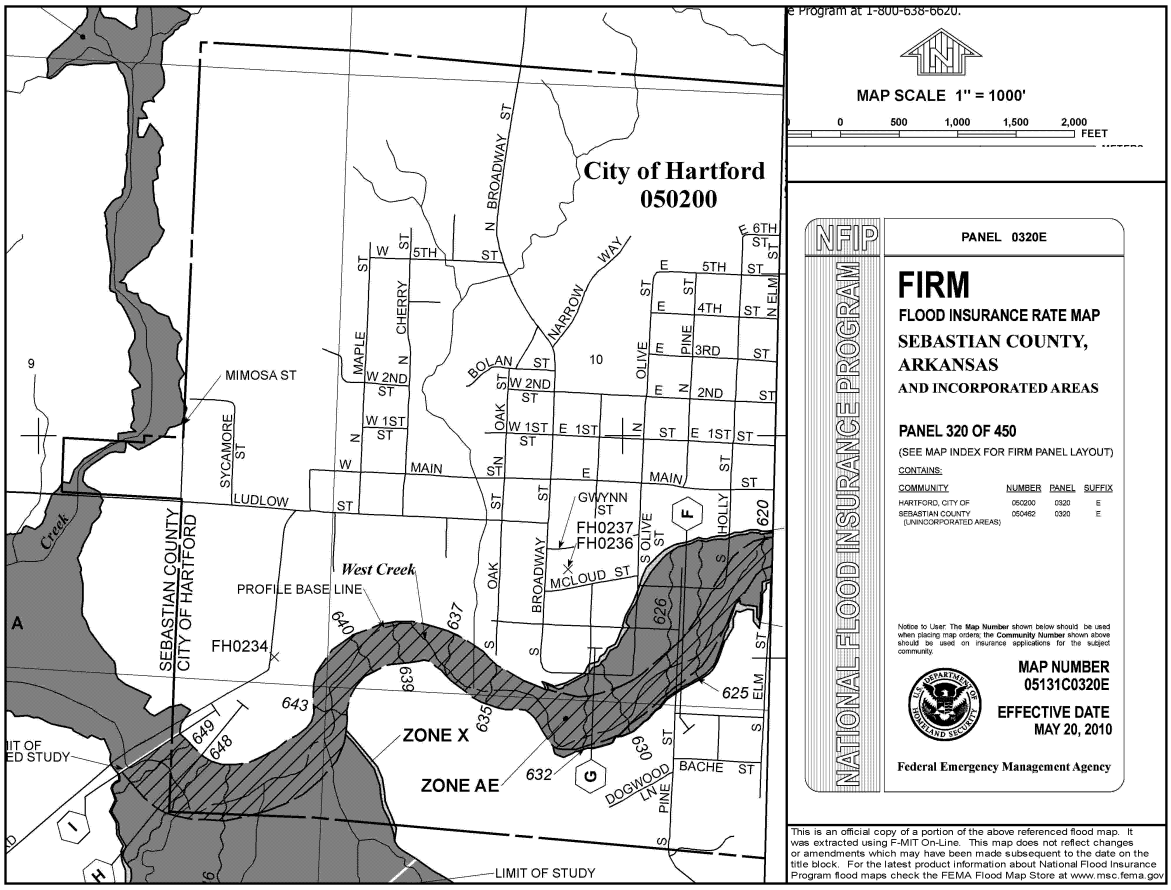
Insurance Summary- City of Hartford is a member of the National Flood Insurance Program, Community Identification Number 050200

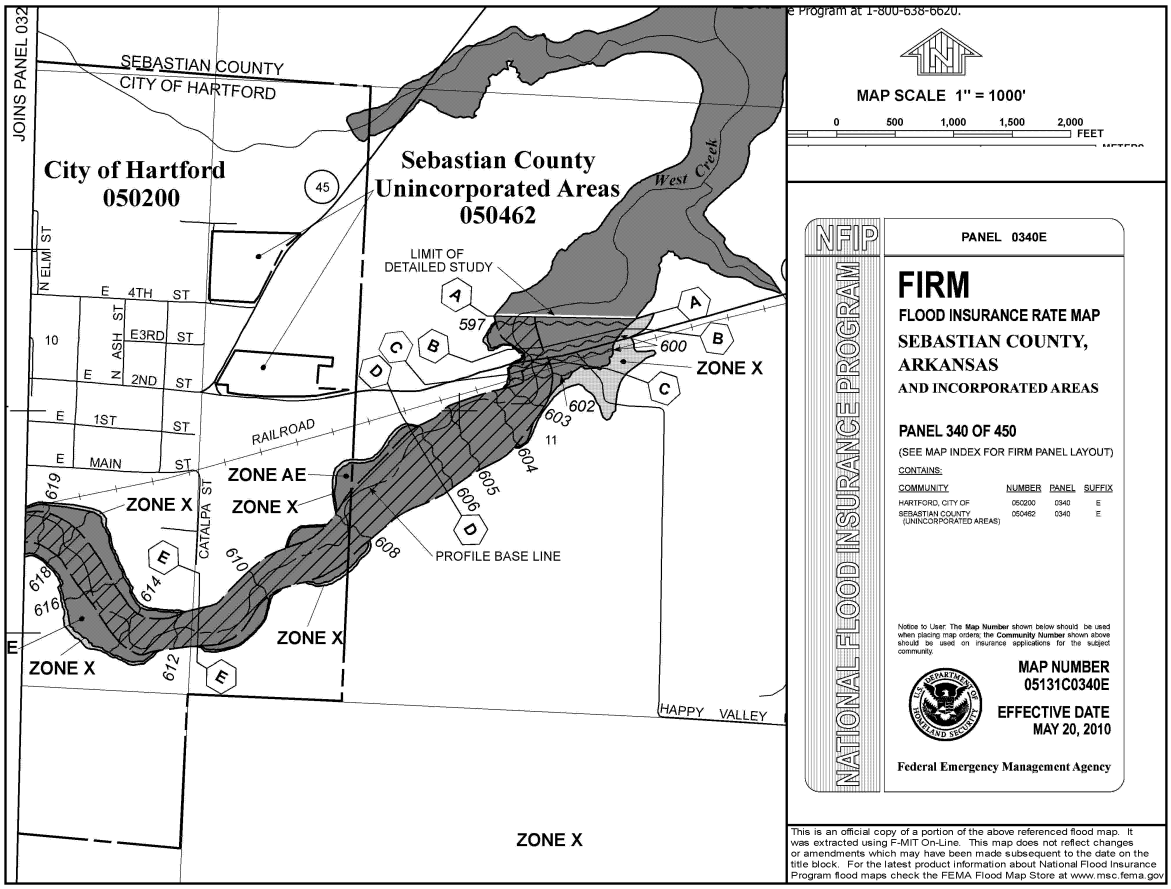
Staff Resources- City of Hartford has a Certified NFIP Coordinator. The floodplain management is an auxiliary function. City of Hartford has not had any barriers running an effective NFIP program.

Compliance History- City of Hartford is in good standing with the NFIP, and there are no outstanding compliance issues.

Hartford has 0 repetitive loss structures.

Hackett School District: The School District has no jurisdiction over floodplain areas, as it is the responsibility of the County and/or municipalities to regulate them. The School District has facilities in Hackett and Hartford.


City of Hartford
050200
SEBASTIAN COUNTY
CITY OF HARTFORD
West Creek
PROFILE BASE LINE
FH0234
FH0237
FH0236
ZONE X
ZONE AE
LIMIT OF STUDY
MAP SCALE 1" = 1000'
0 500 1,000 1,500 2,000 FEET
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0320E
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY, ARKANSAS
AND INCORPORATED AREAS
PANEL 320 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
HARTFORD, CITY OF 050200 0320 E
SEBASTIAN COUNTY (UNINCORPORATED AREAS) 050462 0320 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
05131C0320E
EFFECTIVE DATE
MAY 20, 2010
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


JOINS PANEL 032
SEBASTIAN COUNTY
CITY OF HARTFORD
City of Hartford
050200
Sebastian County
Unincorporated Areas
050462
West Creek
45
LIMIT OF
DETAILED STUDY
N ELM ST
E 4TH ST
N ASH ST
E3RD ST
E 2ND ST
E 1ST ST
E MAIN ST
RAILROAD
CATALPA ST
10
11
597
600
602
603
604
605
606
608
610
612
614
616
618
619
ZONE X
ZONE AE
ZONE X
ZONE X
ZONE X
ZONE X
PROFILE BASE LINE
HAPPY VALLEY
MAP SCALE 1" = 1000'
0 500 1,000 1,500 2,000
FEET
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0340E
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY,
ARKANSAS
AND INCORPORATED AREAS
PANEL 340 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
HARTFORD, CITY OF 050200 0340 E
SEBASTIAN COUNTY (UNINCORPORATED AREAS) 050462 0340 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
05131C0340E
EFFECTIVE DATE
MAY 20, 2010
Federal Emergency Management Agency
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Lavaca: Lavaca joined the NFIP in 1982.

Vulnerability and Impact
Residents identified the following areas as being prone to flooding: Harding Street by City Hall, the car wash, and El Paso Street at the bridge, Adams Street and the City Park. Other than that, most of the flooding problems occur outside the city limits on Highway 255 in the bottoms and sometimes on 96 Highway around the bridge at Nixon Road and on Utah Ranch Road at the low water bridge and Crowe Road.

The National Climatic Data Center Storm Events Database reports $100K in damages from flooding between 2010 and 2015.

City of Lavaca oversees the floodplain program for City of Lavaca Arkansas. The City of Lavaca Certified Floodplain Manager (CFM) assists citizens of City of Lavaca with filling out documents for the NFIP and educating the citizens about the NFIP program. If a person wishes to build in a floodplain, there is a permit that must be completed for City of Lavaca then the CFM will monitor the construction process to insure compliance. The vast majority of work done by CFM is assisting citizens in completing letters of map amendments and continuing education for the director of City of Lavaca's flood insurance program.

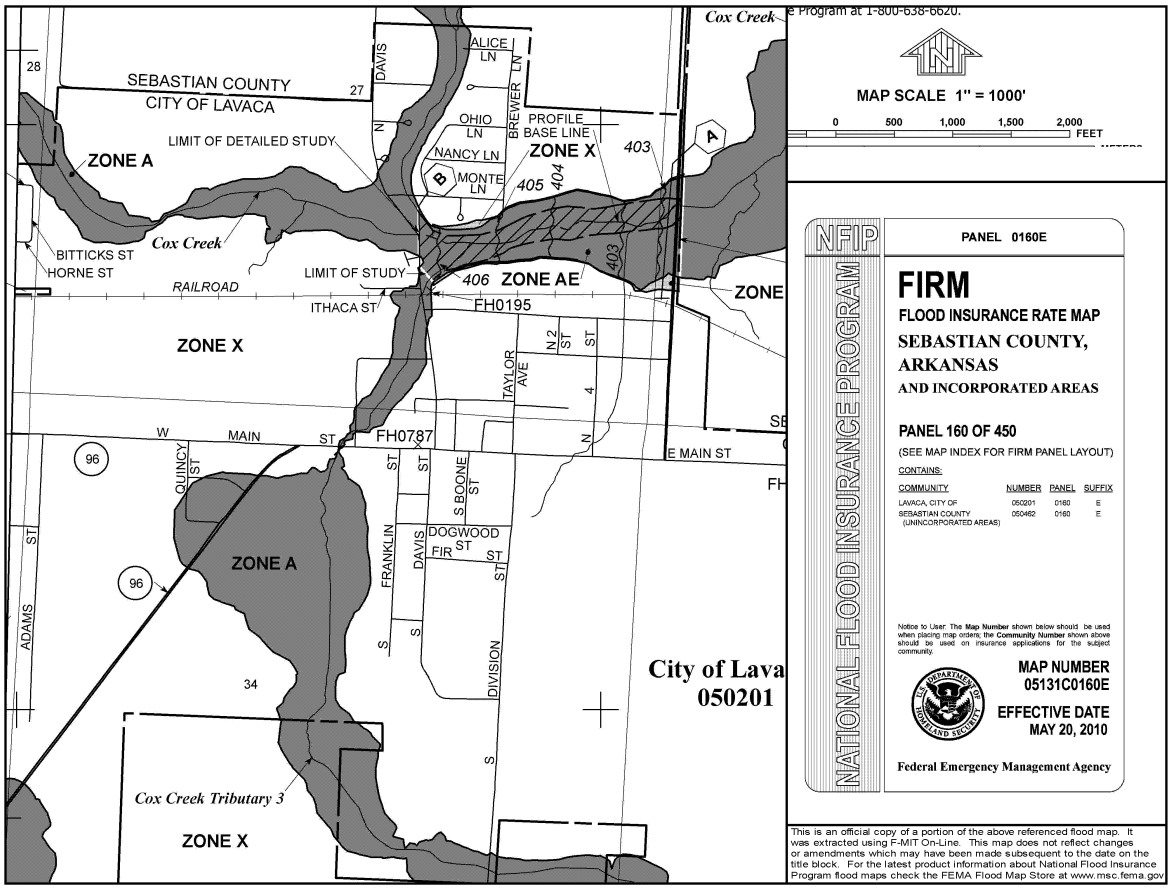
Insurance Summary- City of Lavaca is a member of the National Flood Insurance Program, Community Identification Number 050201

Staff Resources- City of Lavaca has a Certified NFIP Coordinator. The floodplain management is an auxiliary function. City of Lavaca has not had any barriers running an effective NFIP program.

Compliance History- City of Lavaca is in good standing with the NFIP, and there are no outstanding compliance issues.

Lavaca has 0 repetitive loss structures.

Lavaca School District: The School District has no jurisdiction over floodplain areas, as it is the responsibility of the County and/or municipalities to regulate them. All schools are within Lavaca.


Cox Creek
e Program at 1-800-638-6620.
MAP SCALE 1" = 1000'
0 500 1,000 1,500 2,000
FEET
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0160E
FIRM
FLOOD INSURANCE RATE MAP
SEBASTIAN COUNTY, ARKANSAS
AND INCORPORATED AREAS
PANEL 160 OF 450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
LAVACA, CITY OF 050201 0160 E
SEBASTIAN COUNTY (UNINCORPORATED AREAS) 050462 0160 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
05131C0160E
EFFECTIVE DATE
MAY 20, 2010
Federal Emergency Management Agency
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SEBASTIAN COUNTY
CITY OF LAVACA
LIMIT OF DETAILED STUDY
ZONE A
ZONE X
ZONE AE
406
403
404
405
PROFILE BASE LINE
LIMIT OF STUDY
RAILROAD
ITHACA ST
BITTICKS ST
HORNE ST
FH0195
FH0787
W MAIN ST
E MAIN ST
ALICE LN
OHIO LN
NANCY LN
MONTE LN
BREWER LN
DAVIS
QUINCY ST
ADAMS ST
FRANKLIN
S BOONE ST
DOGWOOD ST
FIR ST
DIVISION
TAYLOR AVE
N 2 ST
4 ST
96
City of Lava
050201
Cox Creek Tributary 3
ZONE X

Mansfield: Mansfield joined the NFIP in 1987.

Vulnerability and Impact
Residents identified the following areas as being prone to flooding: West Howard Street, Huntington Avenue, Caldwell Avenue, and Walnut Avenue. Flooding along Coop Creek impacts the Mansfield City Park and the mobile home park on Huntington Avenue, the Mansfield Elementary School and bus lot between Caldwell Avenue and Walnut Avenue, and the Mansfield Middle School on Walnut Avenue. Flooding along Cherokee Creek impacts West Howard Street and the mobile home park and the Mansfield Wastewater Treatment Plant both on N. Division Street.

The National Climatic Data Center Storm Events Database reports $50K in damages from flooding between 2010 and 2015.

City of Mansfield oversees the floodplain program for City of Mansfield Arkansas. The City of Mansfield Certified Floodplain Manager (CFM) assists citizens of City of Mansfield with filling out documents for the NFIP and educating the citizens about the NFIP program. If a person wishes to build in a floodplain, there is a permit that must be completed for City of Mansfield then the CFM will monitor the construction process to insure compliance. The vast majority of work done by CFM is assisting citizens in completing letters of map amendments and continuing education for the director of City of Mansfield's flood insurance program.

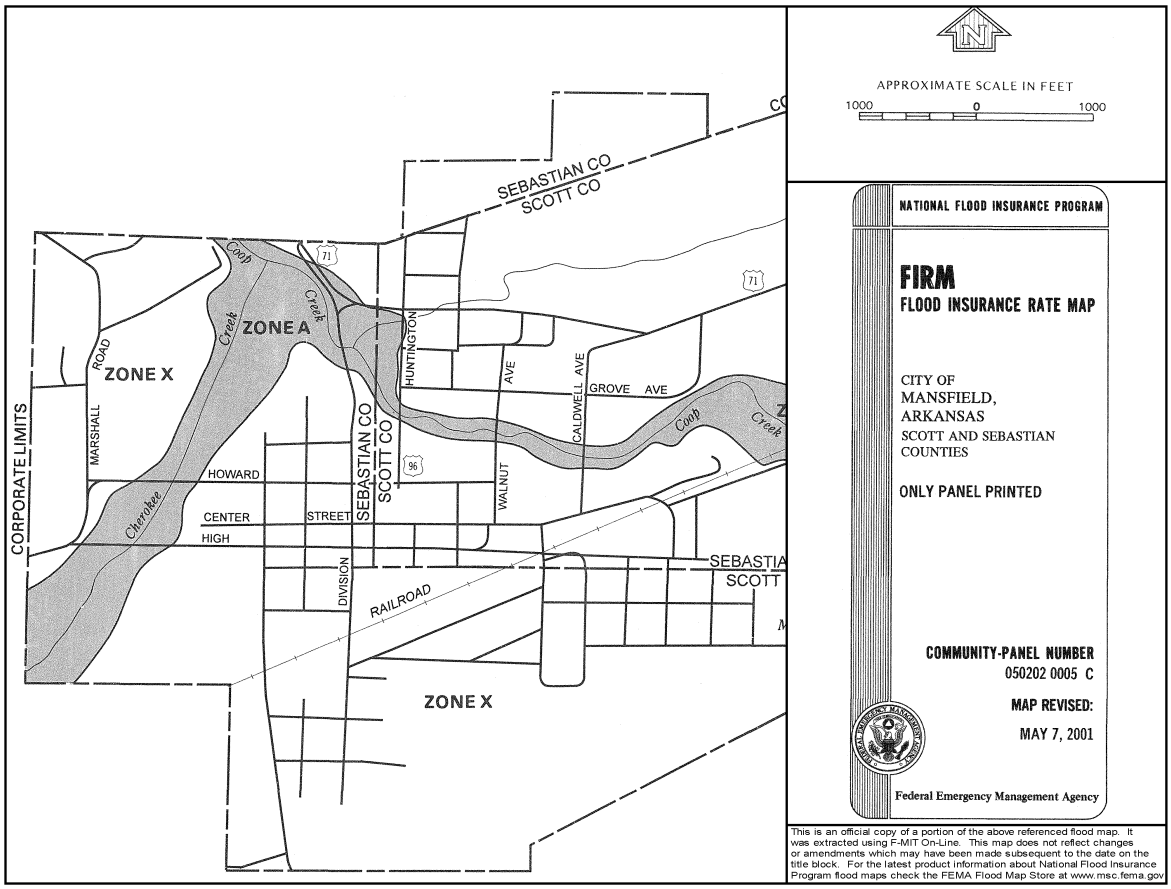
Insurance Summary- City of Mansfield is a member of the National Flood Insurance Program, Community Identification Number 050202

Staff Resources- City of Mansfield has a Certified NFIP Coordinator. The floodplain management is an auxiliary function. City of Mansfield has not had any barriers running an effective NFIP program.

Compliance History- City of Mansfield is in good standing with the NFIP, and there are no outstanding compliance issues.

Mansfield has 0 repetitive loss structures.

Mansfield School District: The School District has no jurisdiction over floodplain areas, as it is the responsibility of the County and/or municipalities to regulate them. All schools are within Mansfield.


APPROXIMATE SCALE IN FEET
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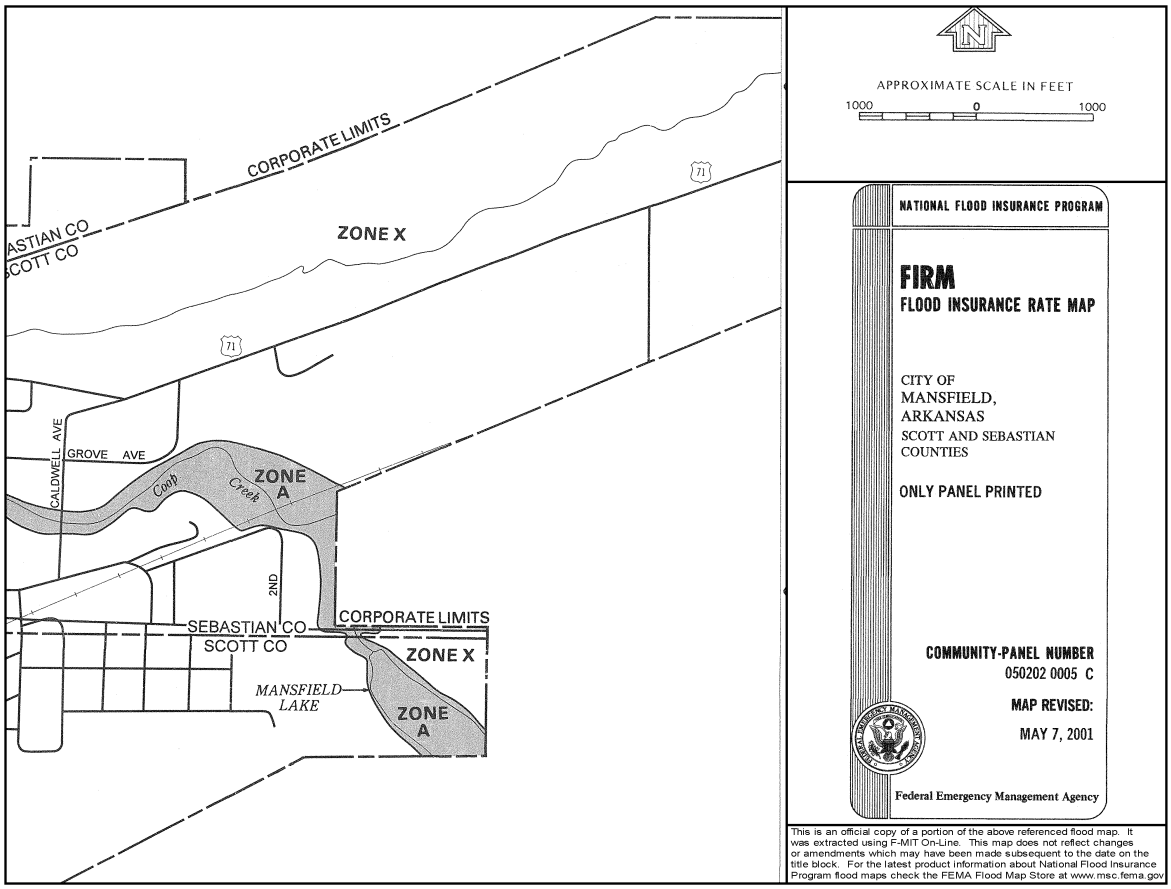
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
CITY OF
MANSFIELD,
ARKANSAS
SCOTT AND SEBASTIAN
COUNTIES
ONLY PANEL PRINTED
COMMUNITY-PANEL NUMBER
050202 0005 C
MAP REVISED:
MAY 7, 2001
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov
SEBASTIAN CO
SCOTT CO
ZONE A
ZONE X
ZONE X
CORPORATE LIMITS
MARSHALL ROAD
HOWARD
CENTER STREET
HIGH
HUNTINGTON AVE
GROVE AVE
CALDWELL AVE
WALNUT
DIVISION
RAILROAD
Coon Creek
Cherokee
71
96


CORPORATE LIMITS
ASTIAN CO
SCOTT CO
ZONE X
71
GROVE AVE
CALDWELL AVE
Coop
Creek
ZONE A
2ND
SEBASTIAN CO
SCOTT CO
CORPORATE LIMITS
ZONE X
MANSFIELD LAKE
ZONE A
APPROXIMATE SCALE IN FEET
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NATIONAL FLOOD INSURANCE PROGRAM
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FLOOD INSURANCE RATE MAP
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Midland: Midland joined the NFIP in 1987.

Vulnerability and Impact
Residents identified the area along James Fork as being prone to flooding. This is a mostly wooded area. The James Fork Bridge on Highway 253 is just northeast of the Midland city limits.

The National Climatic Data Center Storm Events Database reports no damages from flooding between 2010 and 2015.

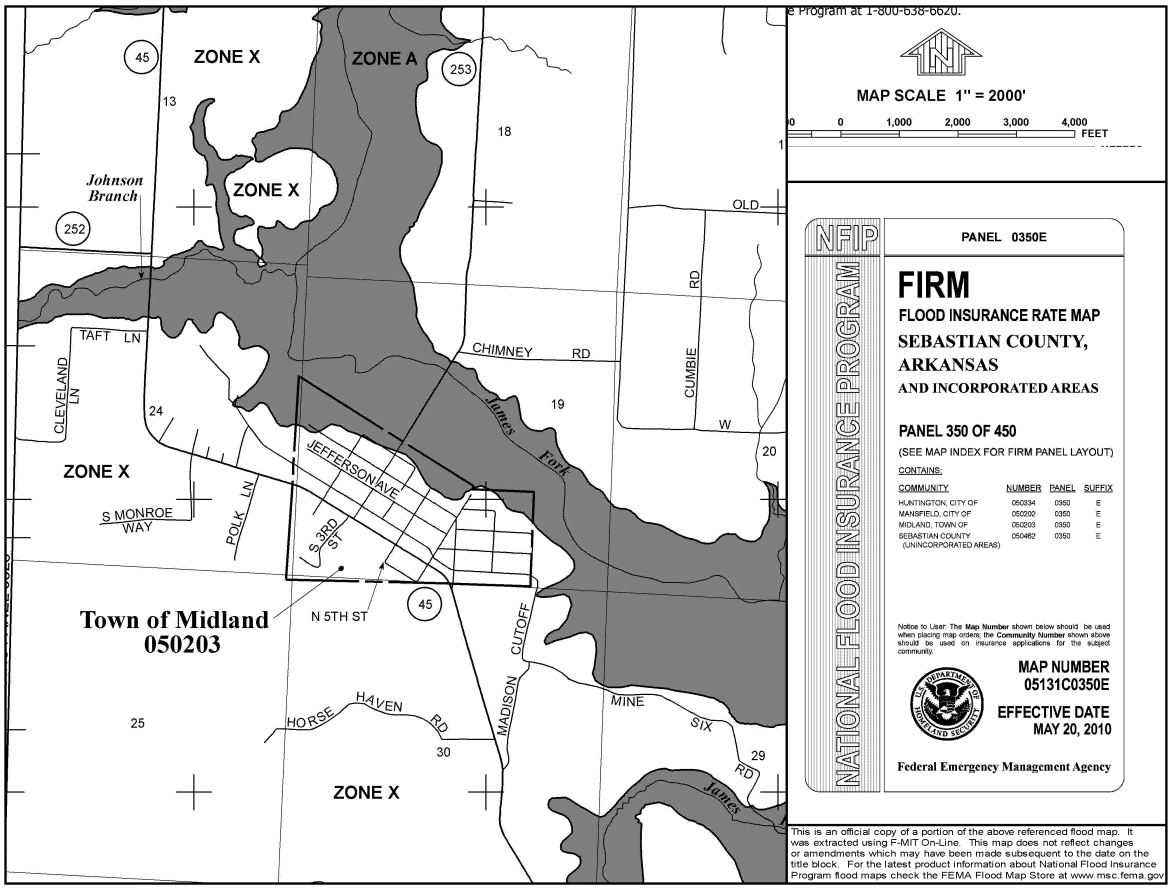
City of Midland oversees the floodplain program for City of Midland Arkansas. The City of Midland Certified Floodplain Manager (CFM) assists citizens of City of Midland with filling out documents for the NFIP and educating the citizens about the NFIP program. If a person wishes to build in a floodplain, there is a permit that must be completed for City of Midland then the CFM will monitor the construction process to insure compliance. The vast majority of work done by CFM is assisting citizens in completing letters of map amendments and continuing education for the director of City of Midland's flood insurance program.

Insurance Summary- City of Midland is a member of the National Flood Insurance Program, Community Identification Number 050203

Staff Resources- City of Midland has a Certified NFIP Coordinator. The floodplain management is an auxiliary function. City of Midland has not had any barriers running an effective NFIP program.

Compliance History- City of Midland is in good standing with the NFIP, and there are no outstanding compliance issues.

Midland has 0 repetitive loss structures.



2.5.4.3 Extent, Magnitude or Severity of Flooding

Flood severity categories used by the NWS include minor flooding, moderate flooding, and major flooding. Each category has a definition based on property damage and public threat.

Minor Flooding - minimal or no property damage, but possibly some public threat or inconvenience

Moderate Flooding - some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.

Major Flooding - extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.

Sebastian County considers three to four inches of heavy rainfall in a short period of time a severe event. During this amount of rainfall, flash flooding will start to occur and the storm water drainage system will not accommodate the excess rainfall. Generally, the only flooding that occurs is in low-lying areas and the 100-year flood plain.

A variety of factors affect the type and severity of flooding within the County, including topography, geology, urban development and infrastructure. Flash floods are common across the county. Urban development in the County exacerbates the flash flooding problem. Intense rainfall events, often accompanying the large thunderstorms that occur in the County several times a year, may result in water accumulating rapidly.

Flood is generally measured by the 100-year (base flood) level and is considered to be a flood with a 1% chance of occurring annually in areas with "Special Flood Hazard Areas" identified on FEMA Flood Insurance Rate Maps. Bridges, roads, and structures have been destroyed by this hazard.

Local storm events typically average between one to six inches of rain falling within a short period of time, resulting in flash floods.

Flash flooding is the bigger risk as it can occur across the entire planning area. Flash floods result from heavy or excessive rainfall in a short period of time, generally less than 6 hours and can occur within minutes or a few hours of excessive rainfall. Flowing at just 6 mph, water exerts the same force per unit area as air blowing at EF5 tornado wind speeds. Water moving at 25 mph has the pressure equivalent of wind blowing at 790 mph, faster than the speed of sound.

Barling flood maps indicate areas of Zone AE with levels of flooding at 390 to 408 feet above sea level along the Little Vache Grasse Creek.

Bonanza flood maps indicate limited areas of Zone X and Zone A for which base flood elevations are not determined.

Central City does not participate in NFIP, therefore flood maps and data regarding flood extent are not available.

Fort Smith flood maps indicate areas of Zone AE with levels of flooding at 408 to 480 feet above sea level along the Little Vache Grasse Creek, 405 to 476 feet above sea level along Massard Creek, and 405 to 474 feet above sea level along the Arkansas River.

Greenwood flood maps indicate areas of Zone AE and levels of flooding at 484 to 573 feet above sea level along Heartsill Creek, Hester Creek, and Adamson Creek.

Hackett flood maps indicate areas of Zone AE and levels of flooding at 499 to 523 feet above sea level along Hackett Creek.

Hartford flood maps indicate areas of Zone AE and levels of flooding at 608 to 649 feet above sea level along West Creek.

Huntington does not participate in NFIP, therefore flood maps and data regarding flood extent are not available.

Lavaca flood maps indicate areas of Zone AE and levels of flooding at 403 to 406 feet above sea level along Cox Creek.

Mansfield flood maps indicate limited areas of Zone A along Cherokee Creek for which base flood elevations are not determined.

Midland flood maps indicate mostly Zone X with a minimal area of Zone A for which base flood elevations are not determined.

2.5.4.4 Previous Flood and Flash Flooding Occurrences

There were 40 flood/flash flood event(s) were reported between 1/1/2010 and 12/31/2015.

Eleven of those were in unincorporated Sebastian County.

Fort Smith experienced the most flooding of the incorporated jurisdictions with 9 events totaling $170,000 in damages.

The 40 flood/flash flood events resulted in $420K in damage.

2.5.4.5 Probability of Future Flooding

Location (All participating jurisdictions within the entire planning area)
***Extensive*:** 75 to 100 percent of planning area or consistent single-point of occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)
Moderate: Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of service for days

Probability of Future Events
Highly Likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of 1 year.

Overall Significance
High: The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a signification to extensive portion of the planning area.

2.5.4.6 Impact of Flooding

This hazard can directly impact building inventory, people, infrastructure (roads, bridges), agriculture, and livestock that are in the inundation areas, as well as having indirect economic impacts. Water velocity is increased when severe flooding occurs, which can flood or completely wash away buildings of all construction types (masonry, wood, concrete, or metal), automobiles, and farm equipment; topple trees, destroy crops, erode bridges, and damage roads.

The events between 2010 and 2015 resulted in $420K in property damage. Bridges have been washed out, homes have been flooded, roads have been flooded by with as much as 3 feet of water, and people have been evacuated.

Businesses can suffer economic losses when buildings are damaged or roads are closed, as well as during times of forced closure to protect public health and safety if fresh water is unavailable or if fire safety poses a risk.

Sebastian County has experienced 40 flooding events over the last 6 years. There are 25 repetitive flood loss structures in Fort Smith and 3 in Greenwood. listed on FEMA's Repetitive Flood Loss List. Damages to structures caused by flooding in recent years have not been widespread but specific to particular locations in the county.

Listed are other areas in which flooding can affect Sebastian County:

Environmental **-**Flat areas that do not have trees or rocks to prevent erosion are often swept away. Farm fields, which typically are located in flat areas, become washed out and crops are lost. Contaminants from sewer back-ups and other waste may be washed into the water supply, resulting in water that is unsafe for residents to use. The shelters of animals in the area are also washed out, resulting in many homeless animals that can cause problems for their owners.

Economic**-** Residential loss or repair. Businesses also suffer, not only from the loss of property, but the lack of customers during the flood and for a while after during recovery. Farmers also suffer from the loss of their crops.

Financial**-** Some residents who do not carry flood insurance suffer a great financial hardship. Those who do have insurance get help with the clean-up, but some costs may still come out of pocket. Towns and cities that are impacted by a flood carry the financial burden of fixing the public buildings, roads and other structures damaged by the flood waters. People who are impacted by the flood may also lose wages because the business they work for suffered damages or they are unable to get to work.

Health**-** Flood waters can also damage the health of those living and working in the area. Because flood waters can wash dangerous waste into water supplies, tap water may become unsafe to use if the local authorities do not issue a boil

advisory warning everyone to boil water before ingesting it. Mold is also likely to grow in homes and other buildings that were engulfed by the flood waters. It is important to search all homes for mold and remove it completely before moving back in. Breathing the mold spores is dangerous for your health. A flood can also contribute to other health problems from human waste that contaminates the ground.

Safety Once flooding begins, strong currents can pull a grown man beneath the water to drown. Once the flood waters have settled, it is still unsafe to wander through the water by car or on foot. Deep spots may be undetectable and there may be electric currents running through the water as well.

Timber Plantations Flooding can severely stress or even kill trees, depending on how deeply or how long they remain submerged. Floods kill trees that are completely covered by water and seedlings pushed over by the force of the water or buried under silt. Prolonged flooding can cause root rot, leading to tree death. Prior tree health plays a role in whether the trees survive after flooding.

Soil Flooding results in poor soil aeration, leading to poor plant growth. Soil becomes more acidic following flooding. In addition, flooding can lead to soil erosion or soil contamination from such man-made pollutants as oils (on roadways), fertilizers (in yards and farms) and paints.

Rural Impact Floods damage farmland by burying crops in silt, uprooting crops by the force of the water or drowning crops. Flood waters can drown livestock as well. Flooding devastates wetlands and other wildlife habitats by depositing massive amounts of silt or leaving behind toxic substances such as petroleum products, fertilizers and pesticides and other man-made chemicals. This can kill animals and lead to water and land pollution.

Disease Flooding increases human exposure to dysentery and other diseases. Flooded sewage treatment plants contaminate drinking water supplies. Contaminated drinking water is a greater problem in developing countries.

2.5.4.7 Addressing Repetitive Loss Properties

Community Name	Community Number	County Name	# of Properties	Type of Property
Sebastian County	050462	Sebastian County	0	N/A
Barling (City)	050305	Sebastian County	0	N/A
Bonanza (Town)	050392	Sebastian County	0	N/A
Fort Smith (City)	055013	Sebastian County	25	10 Residential 15 Non-residential
Greenwood (City)	050198	Sebastian County	3	3 Residential
Hackett (City)	050199	Sebastian County	0	N/A
Hartford (City)	050200	Sebastian County	0	N/A
Lavaca (City)	050201	Sebastian County	0	N/A
Mansfield (City)	050202	Sebastian County	0	N/A
Midland (Town)	050203	Sebastian County	0	N/A

*Huntington and Central City do not participate in National Flood Program.

The above records indicate that Fort Smith and Greenwood each have multiple repetitive loss properties in their jurisdiction.

According to the FEMA website:
"The primary objective of the Repetitive Loss Properties Strategy is to eliminate or reduce the damage to property and the disruption of life caused by repeated flooding of the same properties. A specific target group of repetitive loss properties is identified and serviced separately from other NFIP policies by the Special Direct Facility (SDF). The target group includes every NFIP-insured property that, since 1978 and regardless of any change(s) of ownership during that period, has experienced:
a) Four or more paid flood losses of more than $1,000 each; or

b) Two paid flood losses within a 10-year period that, in the aggregate, equal or exceed the current value of the insured property; or
c) Three or more paid losses that, in the aggregate, equal or exceed the current value of the insured property."

"Severe Repetitive Loss Property Definition: The definition of severe repetitive loss as applied to this program was established in section 1361A of the National Flood Insurance Act, as amended (NFIA), 42 U.S.C. 4102a. An SRL property is defined as a **residential property** that is covered under an NFIP flood insurance policy and:
(a) That has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or
(b) For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.
For both (a) and (b) above, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart."

2.5.4.8 Vulnerability and Estimating Potential Loss

All participating jurisdictions within the entire planning area are vulnerable to flooding. Loss of life and injuries are possible, damage to residential and business structures, transportation systems, disruption of utility services, and major environmental damage.

Based on historical data, the average estimated losses per flood event is approximately $10,500 and averages $70,000 per year..

	Events	Deaths	Injuries	Property Damage	Crop Damage	Total Damages
Total 2010-2015	40	0	0	$420K	0	$420K

2.5.4.9 Multi-Jurisdictional Risk Assessment

Sebastian County has experienced 40 countywide flooding events (2010-2015) affecting the county as a whole. Property damages total $420K.

Oak Park/Fort Smith	5-12-11	$100K	Roads flooded
Fort Smith	4-3-12	$10K	Cars stalled in water on roadway
Fort Smith	4-3-12	$10K	
Mansfield	6-1-13	$50K	Bridge damaged
Lavaca	5-20-15	$100K	Apartment complex evacuated
Fort Smith	5-20-15	$150K	3 businesses flooded

Though flooding, specifically flash floods, is a problem affecting all jurisdictions in the county at one time or another to varying degrees of seriousness, mitigation solutions are typically site specific and generally the responsibility of the specific jurisdictions within which the problems exist.

2.5.5 Thunderstorms

2.5.5.1 Description of Thunderstorm/Strong Wind, Lightning, and Hail Events

A **thunderstorm**, also known as an **electrical storm**, a **lightning storm**, **thundershower** or simply a **storm**, is a form of turbulent weather characterized by the presence of lightning and its acoustic effect on the Earth's atmosphere known as thunder. The meteorologically assigned cloud type associated with the thunderstorm is the cumulonimbus. Thunderstorms are usually accompanied by **strong winds**, heavy rain and sometimes snow, sleet, hail, or no precipitation at all. Those that cause hail to fall are called **hailstorms**. Thunderstorms may line up in a series or rain band, known as a squall line. Strong or severe thunderstorms may rotate, known as supercells. While most thunderstorms move with the

mean wind flow through the layer of the troposphere that they occupy, vertical wind shear causes a deviation in their course at a right angle to the wind shear direction.

Strong Winds- Damaging winds are often called "straight-line" winds to differentiate the damage they cause from tornado damage. Strong thunderstorm winds can come from a number of different processes. Most thunderstorm winds that cause damage at the ground are a result of outflow generated by a thunderstorm downdraft. Damaging winds are classified as those exceeding 50-60 mph.

Damage from severe thunderstorm winds account for half of all severe reports in the lower 48 states and is more common than damage from tornadoes. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles.

Lightning- Lightning is a channel of electrical charge called a stepped leader that zigzags downward in roughly 50-yard segments in a forked pattern. This step leader is invisible to the human eye, and shoots to the ground in less time than it takes to blink. As it nears the ground, the charged step leader is attracted to a channel of opposite charge reaching up, a streamer, normally through something tall, such as a tree, house, or telephone pole. When the oppositely-charged leader and streamer connect, a powerful electrical current begins flowing. A bright return stroke travels about 60,000 miles per second back towards the cloud. A flash consists of one or perhaps as many as 20 return strokes. We see lightning flicker when the process rapidly repeats itself several times along the same path. The actual diameter of a lightning channel is one-to-two inches.

Hail- Hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into balls of ice. Hail can damage aircraft, homes and cars, and can be deadly to livestock and people.

According to data from the FEMA 1997 publication "Multi-Hazard - Identification and Risk Assessment," Arkansas is within a part of the country that averages two to three hailstorms annually.

2.5.5.2 Location of Thunderstorm/Strong Wind, Lightning, and Hail Events

All participating jurisdictions of the entire planning area have experienced thunderstorms, lightning, strong winds and hail events and are equally at risk.

2.5.5.3 Extent, Magnitude or Severity of Thunderstorm/Strong Wind, Lightning, and Hail Events

Based on historical data, the entire planning area could experience thunderstorm winds from 52 knots to 70 knots as well as hail from .75 to 2.50 inches.

Extreme Weather Madness
Thunderstorm Criteria

THUNDERSTORM TYPES	Rainfall Rate/hr	MAX WIND GUST	HAIL SIZE	PEAK TORNADO Possibility	LIGHTNING FREQUENCY (5 min Intervals)	Darkness Factor	STORM IMPACT
T-1 – Weak thunderstorms or Thundershowers	.03-.10	< 25 MPH	None	None	Only a few strikes during the storm.	Slightly Dark. Sunlight may be seen under the storm.	1. No damage. 2. Gusty winds at times.
T-2 – Moderate Thunderstorms.	.10"-.25"	25-40 MPH	None	None	Occasional 1-10	Moderately Dark. Heavy downpours may cause the need for car lights.	1. Heavy downpours. 2. Occasional lightning. 3. Gusty winds. 4. Very little damage. 5. Small tree branches may break. 6. Lawn furniture moved around
T-3 – Heavy Thunderstorms 1. Singular or lines of storms.	.25"-.55"	40-57 MPH	1/4 " to ¾"	EF0	Occasional to Frequent 10-20	Dark. Car lights used. Visibility low in heavy rains. Cars may pull off the road.	1. Minor Damage. 2. Downpours that produce some flooding on streets. 3. Frequent lightning could cause house fires. 4. Hail occurs within the downpours. 5. Small branches are broken. 6. Shingles are blown off roofs.
T-4 – Intense Thunderstorms 1. Weaker supercells 2. Bow Echos or lines of Storms	.55" – 1.25"	58 to 70 MPH	1" to 1.5"	EF0 to EF2	Frequent 20-30	Very Dark. Car lights used. Some street lights come on.	1. Moderate Damage. 2. Heavy rains can cause flooding to streams and creeks. Roadway flooding. 3. Hail can cause dents on cars and cause crop damage. 3. Wind damage to trees and buildings. 4. Tornado damage. 5. Power outages
T-5 – Extreme Thunderstorms 1. Supercells with familty of tornadoes. 2. Derecho Windstorms	1.25" – 4"	Over 70 Mph	Over 1.5" to 4"	EF3 to EF5	Frequent to Continuous. > 30	Pitch Black. Street Lights come on. House lights maybe used	1. Severe Damage to Trees and Property. Damage is widespread. 2. Flooding rains. 3. Damaging hail. 4. Damaging wind gusts to trees and buildings. 5. Tornadoes F3-F5 or family of tornadoes can occur. Tornadoes can cause total devastation. 6. Widespread power outages.

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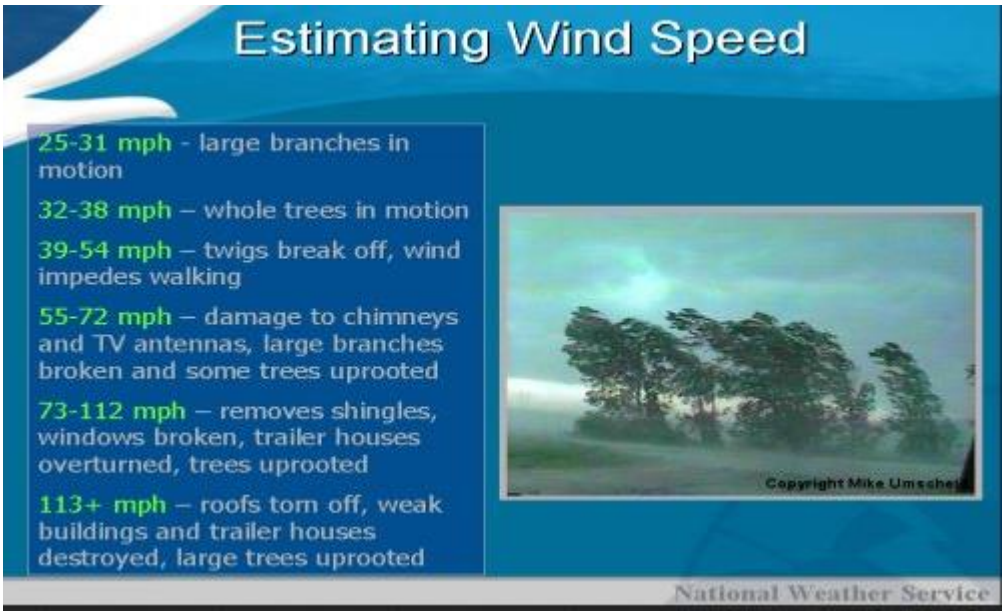
Modified NOAA/TORRO Hailstorm Intensity Scale

Size Code	Intensity Category	Typical Hail Diameter (inches)	Approximate Size	Typical Damage Impacts
H0	Hard Hail	Up to 0.33	Pea	No damage
H1	Potentially Damaging	0.33-0.60	Marble or Mothball	Slight damage to plants, crops
H2	Potentially Damaging	0.60-0.80	Dime or Grape	Significant damage to fruit, crops, vegetation
H3	Severe	0.80-1.20	Nickel to Quarter	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	1.2-1.6	Half Dollar to Ping Pong Ball	Widespread glass damage, vehicle bodywork dented, brick walls pitted
H5	Destructive	1.6-2.0	Silver Dollar to Golf Ball	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	2.0-2.4	Egg	Aircraft bodywork dented, brick walls pitted
H7	Very Destructive	2.4-3.0	Tennis Ball	Severe damage to aircraft bodywork
H8	Very Destructive	3.0-3.5	Baseball to Orange	Severe damage to aircraft bodywork
H9	Super Hailstorms	3.5-4.0	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

H10	Super Hailstorms	4+	Softball and up	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open.

Severe Thunderstorm Winds



2.5.5.4 Previous Thunderstorm/Strong Wind, Lightning, and Hail Events

There have been 69 ***Thunderstorm/Strong Wind*** events reported between 2010 and 2015 ranging from 52 kts.EG to 70 kts.EG resulting in $445K in property damages, with zero deaths and 1 injury.

Unusually gusty winds occur in Arkansas due to the pressure difference between low pressure to the northeast of the state and high pressure to the west. The difference in pressure between low pressure to the northeast of Arkansas and high pressure to the southwest of the state caused very windy conditions

Lightning Events-There have been 2 lightning events reported between 2010 and 2015, resulting in $200K in damages and 1 injury.

Hail Events-There have been 31 hail events reported between 2010 and 2015 ranging from .75 to 2.50 inches resulting in $170K in property damages, but zero deaths and zero injuries.

2.5.5.5 Probability of Future Thunderstorm/Strong Wind, Lightning, and Hail Events

Location (All participating jurisdictions within the entire planning area)
Extensive**:** 75 to 100 percent of planning area or consistent single-point of occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)
Moderate: Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, results in some damage and loss of services for days. There have been 102 Thunderstorm/Strong Wind, Lightning, and Hail events between 2010 and 2015 resulting in $815K in property damages.

Probability of Future Events
Highly Likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of 1 year.

Overall Significance
High: The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

2.5.5.6 Impact of Thunderstorm/Strong Wind, Lightning, and Hailstorm Events

Thunderstorm hazard can contribute to property damage and in some cases, injuries or fatalities.

Stages of **thunderstorm** development;

- Developing- A tower cumulus close develops as air rises. Usually there is little if any rain, but occasionally ***lightening*** occurs during this stage, which lasts about 10 minutes.
- Mature- During this stage, the storm builds to heights of 40,000 feet or more. This is the most likely time for ***hail,*** heavy rain, frequent ***lightning, strong winds***, and tornadoes. The mature stage lasts an average of 10 to 20 minutes by may last much longer.
- Dissipating-Downdrafts begin to choke off the supply of air that feeds the storm; the storm stops building, loses height, and dissipates. Rainfall decreases in intensity, but some thunderstorms produce a burst of ***strong winds*** in this stage, and ***lightning*** remains a danger.

Category	Wind Speed	Precipitation/Hail
Ordinary	< 40 mph (35 knots)	Variable
Approaching Severe	>40 mph (35 knots)	Hail >1/2 inch
Severe	58 mph (50 knots)	Hail> 1 inch

Non-tornadic, damaging **winds** from thunderstorms include four types;

- Straightline winds- Winds having little or no curvature or rotation, complete of affecting a larger geographic area than a tornado
- Downbursts- Localized downward gust of air from a thunderstorm. These winds can be very damaging on and near the ground and tend to cover areas of just a few miles.
- Microbursts-Minimized downbursts affecting areas less than 2.5 miles (4km) in diameter. Microbursts induce a strong wind shear and can produce winders over 150 mph(130kt).
- Gus fronts- Cool, gusty are that flows out of the base of a thunderstorm and spreads along the ground ahead of the thunderstorm cell.

Severe Wind Threat Level	Threat Level Descriptions
Extreme	**"An Extreme Threat to Life and Property from Severe Wind Gusts Associated with Thunderstorms."** Within 12 miles of a location, an extreme likelihood (36% or greater) of severe wind, with storms capable of damaging wind gusts (greater than or equal to 58 mph) causing minor damage to major damage in the worst situations.
High	**"A High Threat to Life and Property from Severe Wind Gusts Associated with Thunderstorms."** Within 12 miles of a location, a high likelihood (26% to 35% probability) of severe wind, with storms capable of damaging wind gusts (greater than or equal to 58 mph) causing minor damage to major damage in the worst situations.

Moderate	**"A Moderate Threat to Life and Property from Severe Wind Gusts Associated with Thunderstorms."** Within 12 miles of a location, a moderate likelihood (16% to 25% probability) of severe wind, with storms capable of damaging wind gusts (greater than or equal to 58 mph) causing minor damage to major damage in the worst situations.
Low	**"A Low Threat to Life and Property from Severe Wind Gusts Associated with Thunderstorms."** Within 12 miles of a location, a low likelihood (6% to 15% probability) of severe wind, with storms capable of damaging wind gusts (greater than or equal to 58 mph) causing minor damage to major damage in the worst situations.
Very Low	**"A Very Low Threat to Life and Property from Severe Wind Gusts Associated with Thunderstorms."** Within 12 miles of a location, a very low likelihood (2% to 5%) of strong wind gusts (greater than or equal to 58 mph) causing minor damage to major damage in the worst situations.
Non-Threatening	**"No Discernable Threat to Life and Property from Severe Wind Gusts Associated with Thunderstorms."** Within 12 miles of a location, environmental conditions do not support the occurrence of severe wind gusts from thunderstorms.
Note: To be considered severe, associated wind gusts must be 58 mph or greater (50 knots or greater). **Damaging Wind Gusts -** Severe thunderstorm wind gusts between 58 mph and 74 mph (between 50 knots and 64 knots) causing minor damage, to severe damage with wind gusts of 90 to 150 mph (78 to 130 knots).	

2.5.5.7 Vulnerability and Estimating Potential Loss

All participating jurisdictions within the entire planning area are equally likely to experience a severe thunderstorm, lightning, high winds and hailstorm events.

All structures in the county and their contents are vulnerable to damage by thunderstorms winds. High winds can down trees onto power lines, damage mobile homes that are not anchored, and rip off roofing. Winds can cause death and injuries by lifting unanchored objects creating flying missiles.

Lightning strikes have the power to fell trees many times disrupting service, and structural fires. Lightning can possibly cause death and injuries. Zero injuries due to lightning have been reported in Sebastian County. Wind and lightning can damage communication towers located throughout the county.

Hailstorms event are frequent in the county and can cause damage to all structures, namely roof shingles which can lead to roof leaks and further damage to the structure interiors. All types of real and personal property are vulnerable to hailstorms, cars, trailers, boats, and crops. Hailstorms can cause bodily injury if caught outside without protection.

Event	Events	Fatalities X $8M	Injuries X $1M	Total Fatalities, Injuries, Personal and Crop Damages	Average loss per event
Thunderstorm/ Strong Winds	69/$445K	$0	1/$1M	$1,445,000	$20.942
Lightning	2/$200K	$0	1/$1M	$1,200,000	$600,000
Hail Events	31/$170K	$0	$0	$170K	$5484

The entire county is subject to thunderstorm events where usually high winds, lightning and hail are involved.

2.5.5.8 Multi-Jurisdictional Risk Assessment of Thunderstorms/Strong Wind, Lightning and Hailstorms

Severe thunderstorms do not seem to be unique to particular areas of the county. The threat is countywide and with no significant variation at the county or jurisdiction levels. However, certain facilities under county government control that are critical to the entire county are particularly at risk to thunderstorms. Specifically, this is the county's emergency operations center in Harrisburg and also the E-911 dispatch center in Fort Smith. Communications equipment and antenna towers, which are prone to damage by lighting, are integral components of these facilities. Protection of these facilities is a high priority.

2.5.6 Tornado

2.5.6.1 Description of a Tornado

A Tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings and particularly manufactured homes. Tornadoes are more likely to occur during the months of March through May and tend to form in the late afternoon and early evening.

2.5.6.2. Locations of Tornado Events

Because there is no defined geographic hazard boundary, all people and property within all participating jurisdictions within the entire planning area are exposed to the risk of damage from Tornadoes. Based on the short 65-year dataset, no clear areas of high tornado occurrence occur at any particular county scale. Thus, although tornado risk appears to vary at a statewide scale, variable tornado risk at the county scale cannot be demonstrated. Thus, mapping variations in tornado risk at a local or county scale is not currently possible. For the purpose of this plan, all parts of this plan are considered equally likely to experience a tornado event.

2.5.6.3. Extent, Magnitude or Severity of Tornado

While the entire planning area is susceptible to tornados, since 2010 Sebastian County has experienced three tornados, with 1 classified as EF0 and 2 classified as EF1 on the Enhanced Fujita Scale. Due to the extreme unpredictability of tornados, it is not outside the realm of possibilities for any of the participating jurisdictions within the planning area to experience a EF5 tornado.

The Enhanced Fujita (EF) Scale was devised by a panel of meteorologists and engineers convened by the Wind Science and Engineering Research Center at Texas Tech University. The Weather Channel's severe weather expert Dr. Greg Forbes was on the team of experts who determined the revised wind speed ranges. Since 2007, the EF Scale has been used to rate tornadoes.

Enhanced Fujita Scale		
Category	Wind Speed	Potential Damage
EF0	105–137 km/h 65–85 mph	Light damage. Peels surface off roofs; some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; mobile homes pushed off foundations or overturned; sign boards damaged.
EF1	138–179 km/h 86–110 mph	Moderate damage. Roofs torn off frame houses; windows and glass doors broken; moving autos blown off roads; mobile homes demolished; boxcars overturned.
EF2	180–217 km/h 111–135 mph	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	218–266 km/h 136–165 mph	Severe damage. Some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	267–324 km/h 166–200 mph	Devastating damage. Well-constructed houses and whole frame houses completely leveled; structures with weak foundations blown away some distance; trees debarked; cars thrown and small missiles generated.
EF5	>324 km/h >200 mph	Incredible damage. Strong frame houses leveled off foundations and swept away; with strongest winds, brick houses completely wiped off foundations; automobile-sized missiles fly through the air in excess of 100 m (109 yd); cars thrown and large missiles generated; incredible phenomena will occur.

2.5.6.4. Previous occurrences

There were only 3 tornados reported between 01/01/2010 and 12/31/2015, 1 EF0 and 2 EF1s, causing $500K in damages with no deaths or injuries reported.

2.5.6.5. Probability of Future Tornadoes

Location (All participating jurisdictions within the entire planning area)
***Extensive*:** 75 to 100 percent of planning area

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)
Extreme: onset or extended duration of tornado event, resulting in catastrophic damage and uninhabitable conditions.

Probability of Future Events
Likely: 10 to 90 percent probability of tornado occurrence in the next year or a recurrence interval of 1 to 10 years.

Overall Significance
High: A tornado event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

2.5.6.6 Impact of Tornado

RESIDENTAL HOME DAMAGE CLASSES		
Degree of Damage (DOD)		Expected Wind Speed Value (mph)
1	Threshold of visible damage	65
2	Loss of roof covering material (<20%), gutters, and/or Awning; loss of vinyl or metal siding	79
3	Broken glass in doors and windows	90
4	Uplift of roof deck and loss of significant roof covering material (>20%); collapse of chimney, garage doors; collapse inward, failure of porch or carport.	97
5	Entire house shifts off foundation	121
6	Large sections of roof structure removed; most walls remain standing	122
7	Exterior walls collapsed	132
8	Most walls collapsed, except small interior rooms	152
9	All walls collapsed	170

10	Destruction of engineered and/or well-constructed residence; slab swept clean.	200

Source: FEMA

Tornadoes can cause significant damage to trees, building, and power infrastructure. They can cause fatalities, particularly when people are unable to get to a protective shelter. Associated hazards include:

- Wind- Tornadoes consist of strong, often destructive winds that can uproot trees and damage buildings and cars
- Rain/Hail-Tornadoes are associated with thunderstorms and may be preceded or followed by heavy rainfall or hail. Depending on the hydrological conditions, flash flooding may occur.
- Obstacles to Response- Damage or destruction of public facilities, including hospitals, can complicate emergency response efforts. Additionally, debris may block roadways, there may be extensive damage to electric and telephone lines, utility lines may be broken, and communication may be cut off because of damaged or destroyed cell, radio and television towers.

Sebastian County has recorded 3 tornados since 2010, one EF0 and two EF1s. These numbers indicate that Sebastian County will experience at least 1 tornado every few years. There was $500K in property damages from the 3 tornados.

2.5.6.7. Vulnerability and Estimating Potential Loss

The National Climatic Data Center provides historical details about past hazard events in the county. The chart shows a breakdown of the magnitudes of the tornadoes which have occurred in Sebastian County from 2010-2015.

Magnitude of Tornadoes	NDCD Total Events- (-)
EF-0	1 (2010)
EF-1	2 (2011, 2012)
EF-2	0
EF-3	0
EF-4	0
EF-5	0
Total	**3**

Based on historical data, the average estimated losses per tornado is $58,333.

	Events	Deaths	Injuries	Property Damage	Crop Damage	Total Damages
Total 2010-2015	3	0	0	$500K	$0	$167K

2.5.6.8 Multi-Jurisdictional Risk Assessment

Because there is no defined geographic hazard boundary, all people and property in Sebastian County are exposed to the risk of damage from tornadoes. All structures in Sebastian County are vulnerable to tornadoes. The most vulnerable to tornadoes are wood frame structures and manufactured homes. Damage to residential structures could cause hundreds to be without shelter, or try to live in unsafe conditions.

Utilities most vulnerable to tornado winds are electrical power (e.g. power generation facility, above ground transmission lines and sub-stations) and communication structures (radio towers, cell phone towers). Most transportation systems such as highways, railways are not highly vulnerable to tornadoes, but downed power lines and trees and limbs can delay travel until roads are cleared. This would not only affect the day to day traffic but also critical services such as emergency police, fire, and ambulance.

Vulnerable populations (retirement homes, schools and child care centers), are primarily located in the incorporated cities and towns within Sebastian County.

All participating jurisdictions within the entire planning area would be affected due to the lost power, water, sewer, gas, and communications. Power and water outages would cause food spoilage and sanitation problems for communities. Hospitals, grocery stores and other critical need and economically important facilities are damaged and closed for extended periods.

Businesses and local government infrastructure often suffer extensive damage in tornados as well as the death of people, wildlife and livestock. Employment is often affected because of businesses that close due to the tornado damage and loss of business. Even with the advances in meteorology, warning times may be short.

The school districts within Sebastian County could be closed for extended periods due to power and water outages, or possible damage to building structures on school campuses. The school buses are also disrupted due to damaged or destroyed roads and bridges. Employment would be affected from school closings.

2.5.7 Wildfire Profile

2.5.7.1 Description of Wildfire

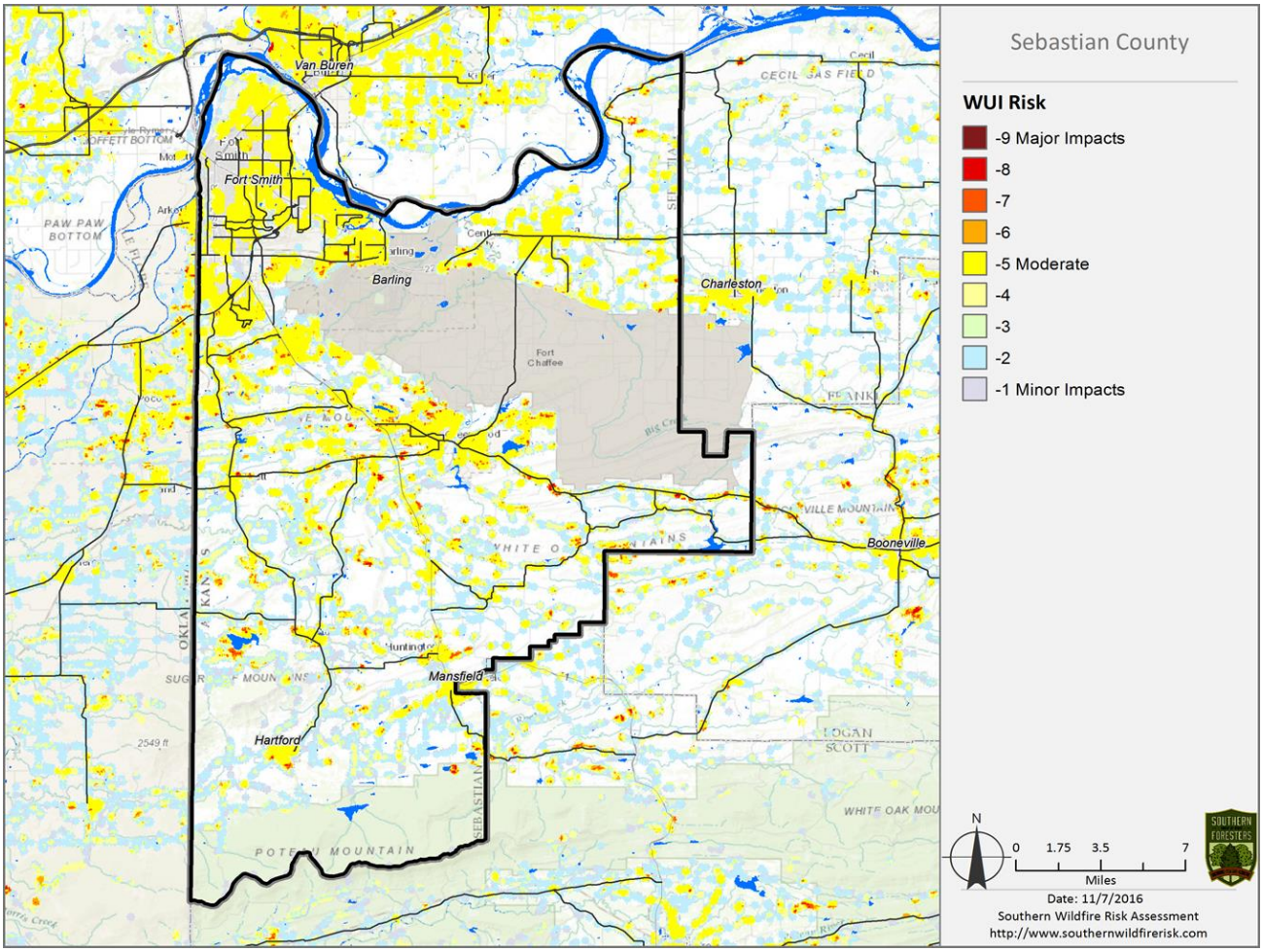
A wildfire is any outdoor fire that is not controlled, supervised, or arranged that spreads through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the area for miles around. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires. A wildland fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines and similar facilities. A Wildland-Urban Interface (WUI) fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels. Areas with a large amount of wooded, brush and grassy areas are at highest risk of wildfires. Additionally, areas anywhere that have experienced prolonged droughts or are excessively dry are also at risk of wildfires.

2.5.7.2 Location of Wildfire

The area most affected by wildfire would be wooded areas such as forestland. The entire county possesses some type of fuel, whether grass, agriculture, forestry, shrubs, structures, or other vegetation types. Sebastian County includes 287,209 acres of forestland, 81.7% of the land area in Sebastian County.

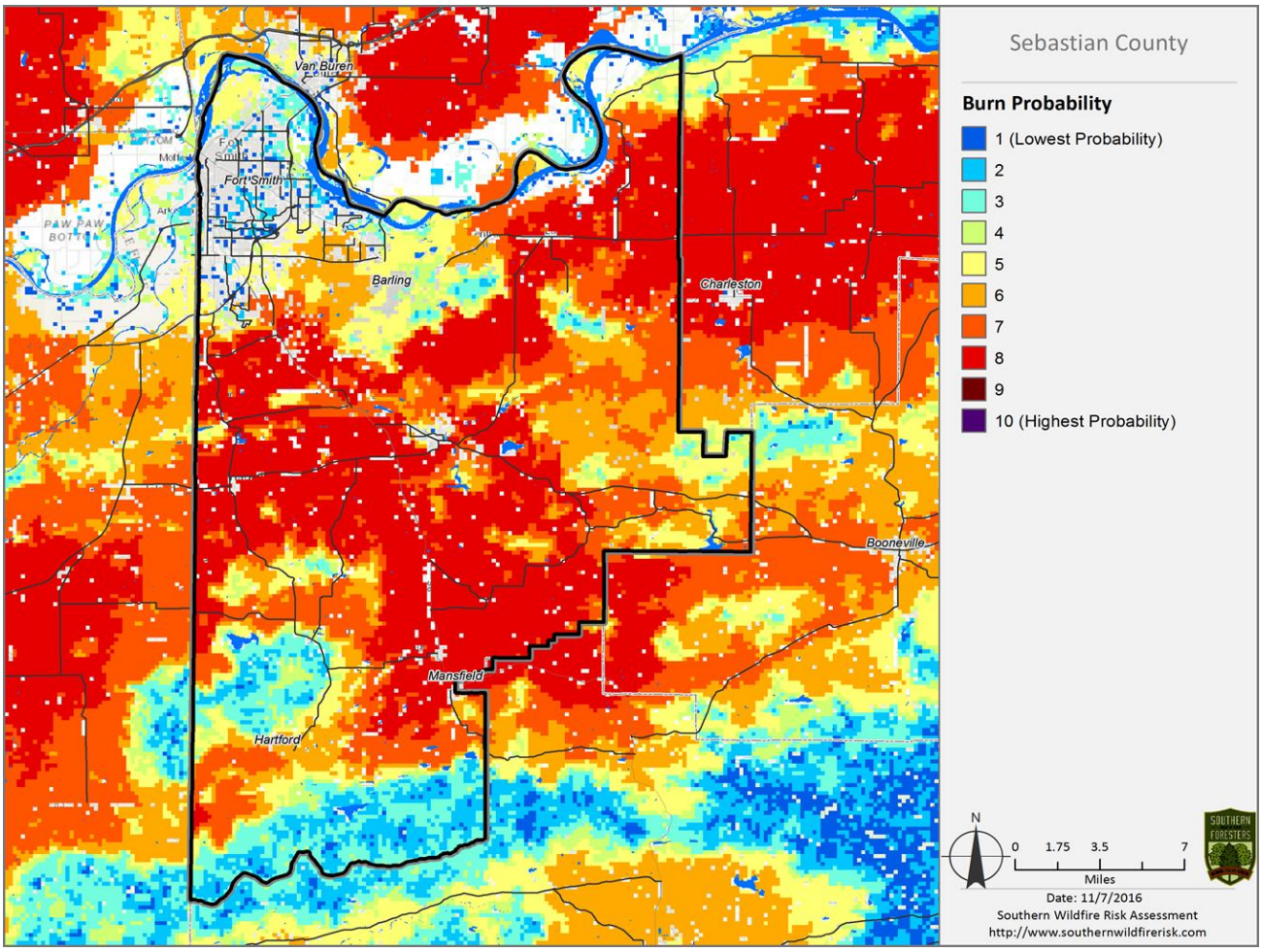
Records documenting the locations and resulting damages of wildfires have not been well kept by the fire districts, making it difficult to statistically quantify the threats and effects of wildfires. Because local record-keeping and reporting is lacking, the NCDC database has no record of wildfire events in the county. But the county does experience wildfire events. According to the county emergency management coordinator and chiefs of the county's rural fire districts, wildfires occur often at various locations in rural areas of the county. Most at risk are structures in the rural and urban fringe areas of the county where vegetation fuels and development interface. Unlike some areas in western United States, such as California, rarely are there any threats to areas in the county with high concentrations of population. Generally speaking, the areas of the county most affected and threatened by wildfire are those outside the incorporated cities and typically related to open-field grass and brush fires.

The Wildland Urban Interface (WUI) Risk Index layer is a rating of the potential impact of a wildfire on people and their homes. The key input, WUI, reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the Wildland Urban Interface and rural areas is key information for defining potential wildfire impacts to people and homes.



Class	Acres	Percent
-9 Major Impacts	9	0.0%
-8	256	0.2%
-7	1,655	1.2%
-6	1,840	1.4%
-5 Moderate	47,284	35.4%
-4	21,201	15.9%
-3	9,926	7.4%
-2	41,535	31.1%
-1 Minor Impacts	9,890	7.4%
Total	**133,595**	**100.0%**

The Burn Probability (BP) layer depicts the probability of an area burning given current landscape conditions, percentile weather, historical ignition patterns and historical fire prevention and suppression efforts.



Class	Acres	Percent
1	3,072	1.0%
2	15,643	5.1%
3	22,894	7.5%
4	12,020	3.9%
5	35,562	11.6%
6	44,920	14.7%
7	59,934	19.6%
8	111,668	36.5%
9	0	0.0%
10	0	0.0%
Total	**305,712**	**100.0%**

2.5.7.3 Extent, Magnitude or Severity of Wildfire

Based on historical data, the planning area experiences an average of 25 wildfires per year burning an average of 9 acres per fire and 218 acres per year.

Burn Severity
From a landscape perspective, burn severity is defined as the degree of environmental change caused by fire. Heterogeneity in burn severity is a result of the spatial variation of factors such as fire intensity, topography and vegetation type. Burn severity can be broken down into several categories, useful in gauging post burn ecological responses:

Rank	Burn Severity	Description	Characteristics
0	Unburned	Fire extinguished before reaching microsite	• Leaf litter from previous years intact and uncharred • No evidence of char around base of trees and shrubs • Pre-burn seedlings and herbaceous vegetation present.
1	Low Severity Burn	Surface fire which consumes litter yet has little effect on trees and understory vegetation.	• Burned with partially consumed litter present • Evidence of low flame heights around base of trees and shrubs (<0.5 m) • No significant decreases in overstory & understory basal area, diversity or species richness from pre-burn assessments • Usually burning below 80 ° C
2	Medium-Low Severity Burn	No significant differences in overstory density and basal area, & no significant differences in species richness. However, understory density, basal area, and species richness declined.	· No litter present and 100% of the area covered by duff · Flame lengths < 2 m · Understory mortality present, little or no overstory mortality
3	Medium-High Severity Burn	Flames that were slightly taller than those of Medium-low intensity fires, but these fires had occasional hot spots that killed large trees, With significant reduction in the understory	· Soil exposure on l-50% of the area · Flame lengths <6m · High understory mortality with some overstory trees affected
4	High Severity Burn	Crown fires, usually a stand replacing burn with relatively high overstory mortality	· Soil exposure >50% · Flame lengths >6m · Higher overstory mortality >20% · Usually burning above 800 ° C

2.5.7.4 Previous Occurrences

Sebastian County Fires and Acres by Cause

Year	Incendiary		Debris		Smokers		Railroad		Campfire		Equip. Use		Children		Lightning		Misc.		Total	
	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres
2010	4	56	12	57	3	3	0	0	1	2	3	28	0	0	0	0	27	89	50	235
2011	10	34	11	61	4	40	0	0	0	0	6	89	1	1	2	16	9	421	43	662
2012	5	20	4	22	2	43	0	0	1	2	2	4	0	0	1	1	8	63	23	155
2013	1	6	3	11	0	0	0	0	0	0	0	0	0	0	0	0	2	4	6	21
2014	0	0	9	63	0	0	0	0	0	0	1	2	1	6	0	0	4	111	15	182
2015	1	2	10	49	0	0	0	0	0	0	1	1	0	0	1	1	0	0	13	53

2.5.7.5 Probability of Future Wildfire Occurrences

Location (Forest land accounts for 287,209 acres, or 81.7 percent of Sebastian County.)
Extensive: 75 to 100 percent of planning area or consistent single-point occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)
Weak: Limited classification on scientific scale, slow speed on onset or short duration of even resulting in little to no damage.

Probability of Future Events
Highly Likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of 1 year.

Overall Significance
Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating.

It is likely that Sebastian County will continue to experience wildfire hazards due to the three primary factors wildfires are based on: fuel, topography, and weather. Though most wildfires typically affect only grass and wood-lands with no damage to property or loss of lives, the threat of wildfires to homes and other structures is often high during certain times of the year and under certain conditions. As residential growth increases in the rural areas of the county, the likelihood of wildfires causing property damage and possibly injuries grows. Good fire protection coverage is provided throughout the county by rural fire departments, which do an excellent job of responding to and minimizing the damage of wildfires. The county is also planning to expand the State Forestry's Firewise program, which is intended to educate residents on the dangers of wildfires and on mitigating measures to take. Participation in the Firewise program will also help the county quantify the number of structures in the county that are vulnerable to wildfire.

2.5.7.6 Impact of Wildfire

Wildland fires not only consume forest and rangeland vegetation, but impact wildlife habitat, recreation and tourism, water quality and supply and property values. Wildfires can cause extensive damage, both to property and human life.

In Sebastian County, most rural residents depend on their local volunteer fire departments to protect their property from loss.

In drought conditions, wildfires can be easily started and are extremely dangerous. Protecting structures in the wildland from fires poses special problems, and put additional burdens on local firefighting resources. Weather conditions leading to wildfires can change rapidly. Thus, there are few measures, other than rapid-response, that can contain wildfires and limit their threat to property. Local economic impacts from catastrophic wildfires include disruptions to both consumption and production of local goods and services. Immediate effects may include decreased recreation / tourism and timber harvest in the fire region, as well as disruptions from evacuations and transportation delays. Increased use of local goods and services for fire protection also impacts local economies. Other effects include direct property losses (in the form of buildings, timber, livestock, and other capital), damage to human health, and possible changes in the long-term structure of the local economy. There are many secondary effects to wildfire. All vegetation may be destroyed as well as the organic material in the soil may be burned away or may decompose into water repellent substances that prevent water from

absorbing into the soil. In effect, normal rainfall after a wildfire may result in unusual erosion or flooding from burned areas; depending on the topography of the burned area, heavy rain can produce destructive debris flows. Wildfires also have an effect on water supplies. The loss of ground-surface cover, such as pine needles and small branches, and the chemical transformation of burned soils make watersheds more susceptible to erosion from rainstorms.

In 2011, Sebastian County experienced one particularly large wildfire with extensive damages. A wildfire, initially started by children in Greenwood spread to Fort Chaffee destroying 120 former military barracks causing over $6 million in damages over 7 days. Wildfires in neighboring counties have caused between $25,000 and $250,000 per year.

2.5.7.7 Vulnerability and Estimating Potential Loss

Sebastian County is approximately 351,358 acres. Forest land accounts for 287,209 acres, or 81.7 percent of Sebastian County. Sebastian County also has 931 farms covering 104,459 acres.

For the Sebastian County project area, it is estimated that 98,353 people or 78 percent of the total project area population (125,659) live within the WUI.

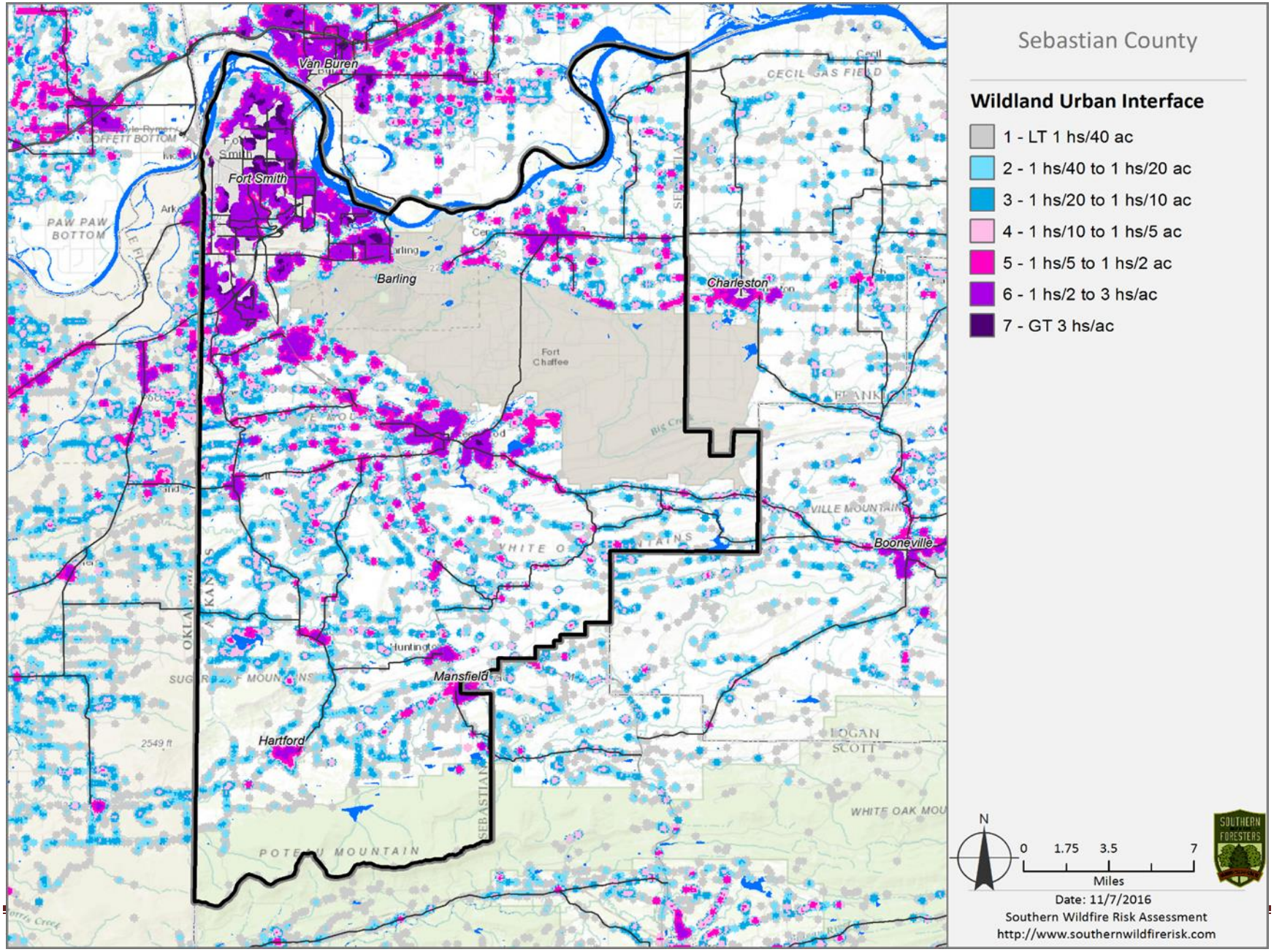
WUI –

Housing Density	WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
LT 1hs/40ac	601	0.6%	35,555	26.3%
1hs/40ac to 1hs/20ac	1,299	1.3%	21,553	15.9%
1hs/20ac to 1hs/10ac	3,345	3.4%	24,607	18.2%
1hs/10ac to 1hs/5ac	5,041	5.1%	17,337	12.8%
1hs/5ac to 1hs/2ac	9,514	9.7%	14,768	10.9%
1hs/2ac to 3hs/1ac	61,033	62.1%	19,661	14.5%
GT 3hs/1ac	17,520	17.8%	1,712	1.3%
Total	**98,353**	**100.0%**	**135,193**	**100.0%**

Population and Acres from the Southern Wildfire Risk Assessment Summary Report for Sebastian County

The majority of the planning area's population (61,033) is in a density area of 1 house/2 acres to 3 houses/1 acre, meaning the majority of the planning area's population is vulnerable to wildfire.

The following maps shows the high density areas in Sebastian County.


Sebastian County
Wildland Urban Interface
1 - LT 1 hs/40 ac
2 - 1 hs/40 to 1 hs/20 ac
3 - 1 hs/20 to 1 hs/10 ac
4 - 1 hs/10 to 1 hs/5 ac
5 - 1 hs/5 to 1 hs/2 ac
6 - 1 hs/2 to 3 hs/ac
7 - GT 3 hs/ac
Van Buren
Fort Smith
Barling
Charleston
Fort Chaffee
Booneville
Mansfield
Hartford
PAW PAW BOTTOM
POTEAU MOUNTAIN
N
0
1.75
3.5
7
Miles
Date: 11/7/2016
Southern Wildfire Risk Assessment
http://www.southernwildfirerisk.com

Structure location is the primary control on vulnerability to wildfire. Structures most vulnerable to wildfire are those located within the rural areas of the county where wildfire events typically occur and, to a less extent, in the rural-urban interface areas of the county. These are areas where structures and other human development meet or intermix with undeveloped or open rural land. These interfaces create an environment in which fire can move readily between structural and vegetation fuels. Its expansion over the past several years has increased the likelihood that wildfires will threaten structures and people. Although all building construction types within the interface are vulnerable, the most vulnerable construction type is wood frame, which comprises about three-fourths of the structures in the county. These wood frame structures are found at locations throughout the county.

Most vulnerable are wood frame structures and mobile homes in the rural and urban interface areas that are adjacent to land that is subject to wildfire, due namely to natural fuel characteristics in the vicinity. As a predominately rural county with small cities and numerous scattered home-sites and businesses, interface settings are found throughout the county and affect all jurisdictions. Accordingly, all fire departments are mindful of fire conditions and threats in their service areas.

Lack of written records and documentation relating to wildfire events limited quantifying the actual and potential effects of wildfires on structures. This data deficiency was recognized by the Planning Team as something that needed to be addressed in the future.

Fire fighters are the most vulnerable populations during wildfires. Fire fighters can face mortality due to heat exhaustion. Other vulnerable populations are those that live in a high intensity area, the population in the dense housing area referenced on the previous pages, and those that reside in wood frame structures or manufactured homes, especially the elderly and children.

The following table shows the percentage of those over the age of 65 and under the age of 18 in planning area according the 2010 Census.

Jurisdiction	Persons 65 years and over	Persons under 18 years
Barling	16%	22.3%
Bonanza	18.6%	21.7%
Central City	17.3%	19.7%
Fort Smith	12.7%	25.5%
Greenwood	10.7%	30%
Hackett	13.5%	28.3%
Hartford	16.4%	24.6%
Huntington	13.4%	24.3%
Lavaca	10.9%	29.4%
Mansfield	14.3%	27.6%
Midland	16.6%	29.8%
Sebastian County	13.1%	25.4%

2.5.7.8 Multi-Jurisdictional Risk Assessment

Wildfires are more prevalent in the rural, unincorporated areas of the county and pose a greater threat to property and lives where structures interface with wildfire-prone conditions (such as high fuel grass lands and shrubbery). Though records on wildfires in the county have not always been well maintained, rural fire departments and the County Emergency Coordinator state that the risk of wildfire exists throughout the county and is not associated with any particular sector.

Throughout the country, associated with the risk of wildfire is the expansion of the wildfire/urban interface (WUI) in recent decades, which has significant implications for wildfire management and impact. The WUI creates an environment in which fire can move readily between structural and vegetation fuels. Its expansion has increased the likelihood that wildfires will threaten structures and people. For this reason, the areas of greatest concern for wildland fire damages are those rural, urban-interface areas in the growing areas of the county outside the cities. In Sebastian County, the growing areas are generally those in proximity to state highway corridors and main county roads. Crisscrossing the county, these corridors traverse much of the county and are not specific to one sector or another.

The risk for wildfire is thus much greater within jurisdictional areas of county government and less likely within areas under jurisdictional purview of the incorporated cities. For this reason, rural fire departments throughout the county, which are to some extent under the auspices of county government, play a central role in terms of mitigating against and responding to wildfire events.

2.5.8 Winter Storm

2.5.8.1 Description of Winter Storm

Severe winter storms, which may include heavy snowfall, sleet, freezing rain, or a mix of these wintry forms of precipitation. Severe winter weather can down trees, cause widespread power outages, damage property, and cause fatalities and injuries. Areas where such weather is uncommon, such as Arkansas, are typically disrupted more severely by severe winter storms than are regions that experience this weather more frequently.

The National Weather Service defines snow as a steady fall of snow for several hours or more. Heavy snow is defined as either a snowfall accumulating to 4 inches in depth in 12 hours or less, or snowfall accumulation to 6 inches or more in depth in 24 hours or less. A blizzard means that the following conditions prevail for a period of three hours or longer: 1) sustained wind or frequent gusts to 35 miles an hour or greater; and 2) considerable falling and/or blowing snow. Sleet is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Heavy sleet is a relatively rare event defined as the accumulation of ice pellets covering the ground to a depth of 0.5 inch or more. Freezing rain or freezing drizzle occurs when rain or drizzle freezes on surfaces such as the ground, trees, power lines, vehicles, streets, highways, etc. An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant ice accumulations are usually accumulations of 0.25 inches or greater.

2.5.8.2 Location of Winter Storm Events

All participating jurisdictions of the entire planning area are equally susceptible to severe winter storm events. Not all areas of Arkansas are equally affected, Sebastian County is affected less often by severe winter events than the northwestern corner of the state.

2.5.8.3 Extent, Magnitude or Severity of Winter Storms

According to National Climatic Data Center (NCDC) and National Weather Service Data, typical snow accumulations in Sebastian County during heavy snow and winter storm events ranges from 1 inch to 8 inches. Typical ice storm accumulations range from 1/10 of one inch to 1/2 of an inch. Since 2010, 12 severe winter storm events, including one ice storm which resulted in a Presidential Disaster Declarations in Sebastian County, DR-4160 (December 5-6, 2013). When severe winter storm events do occur (the worse typically associated with ice), they are usually wide-spread over the area and impede the movement of vehicles – limiting regular movement of traffic, causing accidents and limiting responsiveness of emergency services – and can down power and communications lines and seriously damage some structures, thus creating potentially critical conditions for the entire area.

2.5.8.4 Previous Occurrences

There have been 12 winter storm events reported between 01/01/2010 and 12/31/2015. Winter Storm events have occurred every year since 2010.

2.5.8.5 Probability of Future Winter Storms

Location (All participating jurisdictions of the entire planning area.)
***Extensive*:** 75 to 100 percent of planning area or consistent single-point of occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)

Moderate: Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days. Since 2010, 12 events have resulted in $600K in damages, resulting from a single ice storm in 2013.

Probability of Future Events
Highly Likely:10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 year. Winter Storm events have occurred every year since 2010.

Overall Significance
High: The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

2.5.8.6 Impact of Winter Storms

Sebastian County experiences a major winter storm nearly every year. However, severe winter storms, such as heavy ice or snowstorms causing anything more than moderate disruptions of people's lives, are infrequent. Severe events – those causing millions of dollars in widespread damage – seem to occur only about every ten years to fifteen years. Also, the county is not located in a region of the country that is prone to frequent severe winter storms. Damage from of winter storms is often not reported to public agencies for recording in databases such as SHELDUS, typically because the damage is not widespread and usually amounts to no more than downed tree limbs and utility-lines and closed schools and businesses caused by icy road conditions.

Based on past experience, an estimated ten to twenty structures might be impacted in any given year by severe winter storm events, resulting typically in only minor damage to the structures, mainly due to limbs breaking and falling on roofs, typically residential.

Winter storms can immobilize an entire county. Six inches of unplowed snow can make roads impassable. Trees can be brought down by the weight of wet snow, snap power lines and damage buildings and houses when they fall. Winter storms can cut off heat, power and communications for several days or weeks. Death can occur from hypothermia.

Winter storms with freezing rain create a coating of ice which snaps tree branches, down power lines, ruin crops, and makes driving hazardous. Rural areas are most at risk of losing power and becoming isolated during a winter storm.

Winter storms can be accompanied by strong winds creating blizzard conditions with blinding wind driven snow, severe drifting, and dangerous wind chill. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines.

Extreme cold often accompanies a winter storm; exposure to the cold can cause frostbite or hypothermia and be life-threatening. Infants and elderly people are most susceptible. Freezing temperatures can cause severe damage to crops and other vegetation. Pipes may freeze and burst in homes or businesses that are poorly insulated or without heat. Structure fires occur more frequently in the winter due to lack of proper safety precautions and present a greater danger because water supplies may freeze, and impede firefighting efforts. People die of hypothermia from prolonged exposure to the cold. Elderly people are most vulnerable to winter storms and account for the largest percentage of hypothermia victims largely due to improperly or unheated homes, but the leading cause of death during winter storms is from automobile or other transportation accidents. Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days while utility companies work to repair the extensive damage. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians. Heavy snow can immobilize an area and paralyze a city, stranding commuters, stopping the flow of supplies, and disrupting emergency services. Large amounts of snow can collapse buildings and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, repairing damages, and loss of business can have large economic impacts on cities and towns.

School officials with each of the school districts in Sebastian County monitor weather updates via television, radio and internet. If weather becomes hazardous, then appropriate actions are taken based on students being in school or getting ready to come to school. If weather due to snow or ice is forecasted to become hazardous, by the determination of the

school officials, school may be cancelled. If weather becomes hazardous after school has started school officials may dismiss school early, if road conditions are safe to do so. Students may be kept inside if there are extreme cold temperatures. Wind chill would be the determining factor in keeping students inside.

The University of Arkansas-Fort Smith and the Arkansas College of Osteopathic Medicine also monitor weather updates via television, radio and internet. If weather due to snow or ice is forecasted to become hazardous, by the determination of the school officials, classes may be cancelled. If weather becomes hazardous after classes have started school officials may dismiss students early, if road conditions are safe to do so.

2.5.8.7 Vulnerability and Estimating Potential Loss

Heavy accumulations of ice or snow commonly result in collapse of structural damage to buildings. The damage may be caused directly by the excessive weight of the ice/snow accumulation, or by ice-laden trees or branches falling on structures. Homes, business, as well as weaker nonresidential structures are most vulnerable to this type of structural damage. The abundant wood structures and manufactured houses in the planning area are much more vulnerable than steel, concrete, or masonry structures. Experiences from past storms indicate that poultry houses are particularly vulnerable. Heavy accumulations of ice from ice storms or heavy snow can also bring down trees, electrical wires, telephone poles and lines, and communication towers.

The National Climatic Data Center provides historical details about past hazard events in the county.

Winter Events 2010-2015	Fatalities	Injuries x $1 M	Combined Fatalities, Injuries Personal Property, and Crop Damage Value	Average Cost per Event
12	0	0	$600K (single ice storm event)	$50K

2.5.8.8 Multi-Jurisdictional Risk Assessment

All participating jurisdictions within the entire planning area are equally affected by winter storms. Winter storms do not seem to be unique to particular areas of the county; the threat is considered to be countywide with no significant variation at the county or jurisdiction levels.

The entire county is usually affected when a winter storm hits Sebastian County. Parts of the county may not be affected as bad as others, but when major roads are affected, it affects the travel flow and the availability of essential services throughout the county.

2.5.9 Earthquake

2.5.9.1 Description of Earthquake

An earthquake is naturally induced shaking of the ground, caused by the fracture and sliding of rock within the Earth's crust. Magnitude is determined by the dimensions of the rupturing fracture (fault) and the amount of displacement that takes place - the larger the fault surface and displacement, the greater the energy. In addition to deforming the rock near the fault, this energy produces the shaking and a variety of seismic waves that radiate throughout the Earth.

2.5.9.2 Location of Earthquake Events

Earthquake activity will follow a fault line. Per the USGS, the New Madrid Fault Line runs through the north-east section of Arkansas. Sebastian County is in the north-west section of Arkansas and does not fall on the fault line.

Earthquake distributions can be misleading because, unlike other hazards, the event does not have to occur in a jurisdiction for that jurisdiction to be affected by it.

2.5.9.3 Extent, Magnitude or Severity of Earthquakes

Sebastian County is in an area with a .05 to .10 peak ground acceleration (pga) coefficient, which means it has some possibility of seismic hazard. Though Sebastian County is vulnerable to the effects of a major earthquake in the region, it is unlikely that an earthquake will affect the area at a significant level.

While Sebastian County has no documented historical record of earthquakes, in 2011 Jasper, Arkansas recorded a 2.5 magnitude earthquake and Greenbrier, Arkansas recorded 3.5 to 3.9 magnitude earthquakes. Neighboring Oklahoma has begun to experience more earthquakes in recent years, but none have occurred in the Oklahoma counties that are adjacent to Sebastian County. In 2011, Prague, Oklahoma experienced a 5.6 magnitude earthquake and in 2016 Pawnee, Oklahoma experienced a 5.8 magnitude earthquake.

Earthquakes are measured by intensity and magnitude. The Richter scale is used for magnitude measurement to describe the energy released while the Modified Mercalli Intensity scale measures intensity to demonstrate the effects of the event. Abbreviated description of the twelve levels of Modified Mercalli intensity follows. The average peak acceleration is given (in parenthesis) for each scale value.

Mercalli Intensity	**Damage Description**
I	Not felt except by a very few under especially favorable conditions. (Negligible)
II	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (Negligible)
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing cars may rock slightly. Vibrations like the passing of a truck. Duration estimated. (Negligible)
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably. (0.015g-0.02g)
V	Felt by nearly everyone; many awakened. Some dishes, windows broken; cracked plaster in a few places; unstable objects overturned. Disturbances of trees, poles, and other objects sometimes noticed. Pendulum clocks may stop. (0.03g-0.04g)
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster and damage chimneys. Damage slight. (0.06g-0.07g)
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving cars. (0.10g-0.15g)
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving cars disturbed. (025g-0.30g)
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (0.50g-0.55g)
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed, slopped over banks. (More than 0.60g)
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
XII	Damage total. Waves seen on ground. Lines of sight and level are distorted. Objects thrown into the air.

Descriptor	Richter magnitudes	Earthquake Effects	Frequency of Occurence
Micro	Less than 2.0	Microearthquakes, not felt.	About 8,000 per day
Very minor	2.0-2.9	Generally not felt, but recorded.	About 1,000 per day
Minor	3.0-3.9	Often felt, but rarely causes damage.	49,000 (estimated) per year
Light	4.0-4.9	Noticeable shaking of indoor items, rattling noises. Significant damage unlikely.	6,200 (estimated) per year
Moderate	5.0-5.9	Can cause major damage to poorly constructed buildings over small regions. At most slight damage to well-designed buildings.	800 per year
Strong	6.0-6.9	Can be destructive in areas up to about 100 miles across in populated areas.	120 per year
Major	7.0-7.9	Can cause serious damage over larger areas.	18 per year
Great	8.0-8.9	Can cause serious damage in areas several hundred miles across.	1 per year
Rare Great	9.0 or greater		1 per 20 years

2.5.9.4 Previous Occurrences

Sebastian County has no documented historical record of earthquakes.

2.5.9.5 Probability of Future Earthquakes

Location (All participating jurisdictions of the entire planning area.)
Negligible: Less than 10 percent of planning area or isolated single-point of occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)
Weak: Limited classification on scientific scale, slow speed of onset or short duration of event resulting in little to no damage.

Probability of Future Events
Unlikely: Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.

Overall Significance
Low: Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

2.5.9.6 Impact of Earthquakes

This hazard can directly impact building inventory (especially Unreinforced Masonry Buildings), people (from being displaced to causing fatalities), infrastructure (damage to bridges, railroads, highways, and runways), livestock, as well as indirect economic impacts.

Businesses can suffer economic losses when roads are closed, buildings are damaged, as well as forced closure to protect public health and safety if fresh water is unavailable or when gas leaks are present.

Per 2010 Census Data, Sebastian County has 54,651 housing units, 62% of which are owner occupied with a median value of $113,800.

2.5.9.7 Vulnerability and Estimating Potential Loss

To date, among the seven States in the New Madrid Seismic Zone (NMSZ), four (Arkansas, Indiana, Kentucky, and Tennessee) have statewide building codes as minimum requirements. In the States where statewide building codes are mandatory, a local jurisdiction still must introduce ordinances to adopt and enforce the State building codes for the jurisdiction.

The State of Arkansas has adopted the 2006 International Codes, including IBC and IRC, into its State code - the *Arkansas Fire Prevention Code*. The State code is mandatory and applicable to all buildings. It is required that local codes must be in accordance with the State code, and only more stringent amendments are allowed by local adoption. The State only oversees code enforcement for state capital investments. Local authorities have jurisdiction over private, district, municipal and county constructions.

This legislation attempts to make public buildings and bridges safer; however, in a major event, inventory will still suffer heavy losses.

Earthquake's Safest & Most Dangerous Buildings

- Small, Wood-frame House - Safest (most widely used in US)
- Steel-Frame (used in US)
- Reinforced Concrete (used in US)
- Unreinforced Masonry (widely used in US)
- Adobe - Most Dangerous (not widely used in US)

In the United States, Unreinforced Masonry (URM) is the most dangerous building structure type where earthquakes are concerned.

All 54,651 housing structures, plus critical facilities, in the planning area are vulnerable to damage by a large magnitude earthquake. In general terms, the building types most vulnerable to ground shaking are those constructed of unreinforced masonry and concrete. Infrastructure most vulnerable to earthquakes includes all utility distribution lines (water, wastewater, natural gas) and facilities. Transportation infrastructure most vulnerable to earthquakes includes highway bridges and railway bridges.

2.5.9.8 Multi-Jurisdictional Risk Assessment

Earthquake is not unique to any area of the county; the threat is countywide with no significant variation at the county or jurisdiction levels. Jurisdictions with the most infrastructures carry the biggest vulnerability to and earthquake event. Three-story buildings and interstate locations can cause vast damage and destruction during an earthquake event.

With no recorded earthquake event in recent history, its potential magnitude and severity are considered negligible.

2.5.10 Landslide

2.5.10.1 Description of Landslide

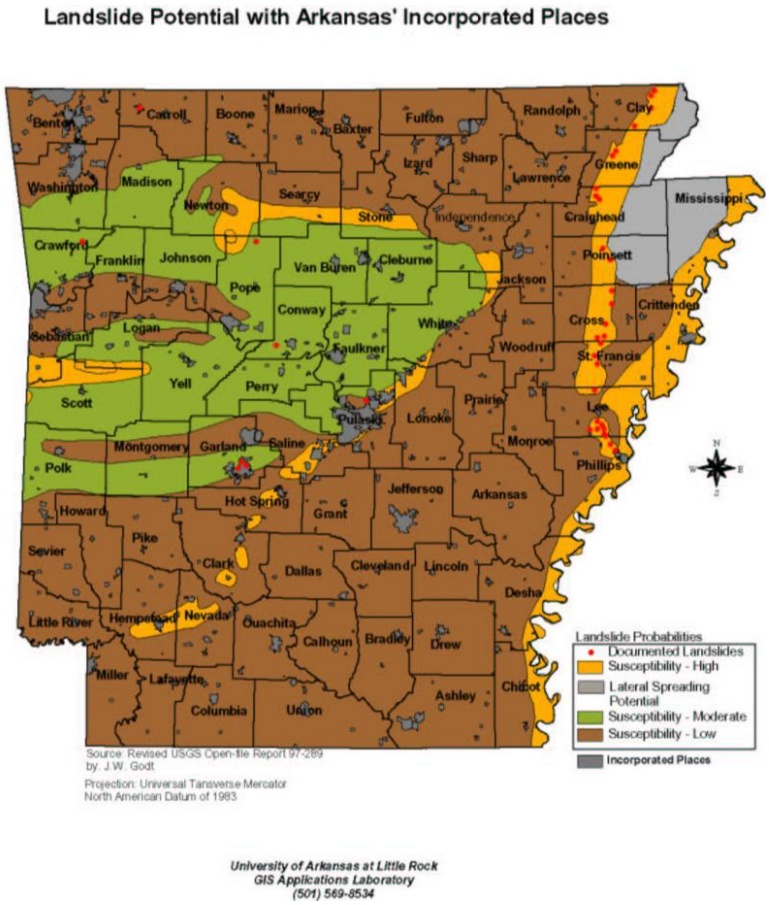
A Landslide is a downward movement of materials under the force of gravity. Landslides include ground movement such as rockfalls, deep failure of slopes, shallow debris flows and mudflows. Landslides are a serious geologic hazard common to almost every state in the United States. It is estimated that nationally they cause up to $2 billion in damages and from 25 to 50 deaths annually. Globally, landslides cause billions of dollars in damage and thousands of deaths and injuries each year. Individuals can take steps to reduce their personal risk. Some landslides move slowly and cause

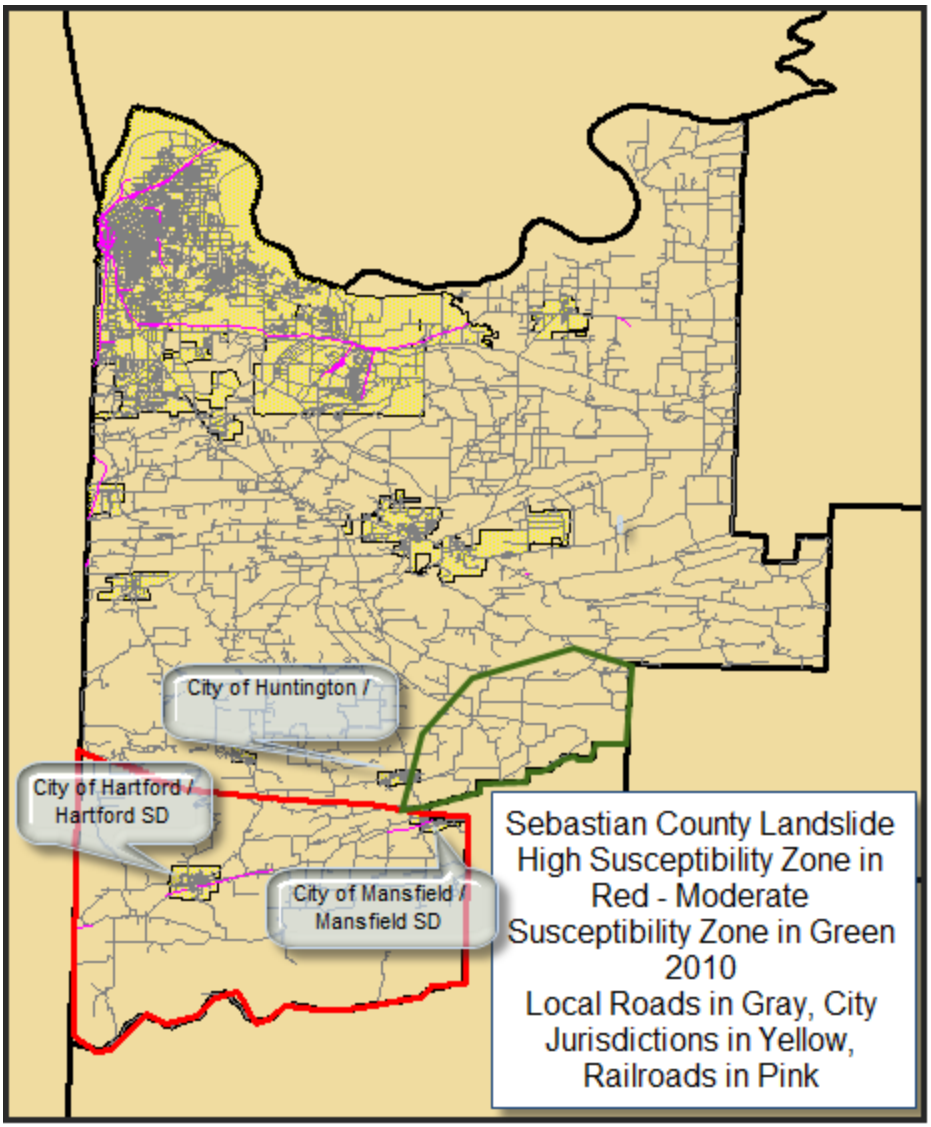
damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly. Gravity is the force driving landslide movement. Factors that allow the force of gravity to overcome the resistance of earth material to landslide movement include: saturation by water, steepening of slopes by erosion or construction, alternating freezing or thawing, earthquake shaking, and volcanic eruptions. Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Although the physical cause of many landslides cannot be removed, geologic investigations, good engineering practices, and effective enforcement of land-use management regulations can reduce landslide hazards. Investing in preventive mitigation steps now such as planting ground cover (low growing plants) on slopes, or installing flexible pipe fitting to avoid gas or water leaks, will help reduce the impact of landslides and mudflows in the future.

2.5.10.2 Location of Landslide Events

Although a landslide may occur almost anywhere, from man-made slopes to natural, pristine ground, most slides often occur in areas that have experienced sliding in the past. Landslides may also be triggered by other natural hazards. For example, the safety of a dam can be severely compromised by upstream landslides or collapse of slopes bordering the reservoir or dam abutments. Landslides and flooding are closely related because both involve precipitation, runoff, and ground saturation. Debris flows usually occur in small, steep channels and are often mistaken for floods. Landslides and lateral spreads often result from seismic activity. The simultaneous or sequential occurrence of interactive hazards may produce cumulative effects that differ significantly from those expected from any one event.

The following map shows areas of the State and its susceptibility to landslide and lateral spread.





2.5.10.3 Extent, Magnitude or Severity of Landslide

Because of the limited significant landslide events that have affected the county, the extent or severity of the landslide hazard in not well known. Because of the low frequency of significant landslides – and the likeliness they would be isolated events if they did occur – this event's potential magnitude is considered negligible and its severity negligible.

The landslides that have been recorded in neighboring Crawford and Franklin Counties have typically been a couple hundred feet across. Franklin County experienced a slide of 700 linear feet that caused 3.2 miles of road closure.

Based on best available data from neighboring Crawford and Franklin County slides, Sebastian County and all participating jurisdictions can expect to experience a landslide up to 700 linear feet, but typically see slides averaging two hundred to three hundred linear feet.

Rapidly moving landslide impact rating definitions as provided by ADEM:

- "Unlikely" ("Low") impact rating indicates that any shallow, rapidly moving landslide initiating within the operation area is unlikely to reach any structure or road.

- "Moderate" ("Possible") impact rating indicates that any shallow, rapidly moving landslide initiating within the operation area is likely to stop prior to the structure or road, or will not directly impact the structure or road. However, a moderate rating also indicates that dangerous impacts cannot be reasonably ruled out.
- "Serious" ("Likely") impact rating indicates that any shallow, rapidly moving landslide initiating within theoperation area is likely to directly impact a structure or road.
- ("Highly Likely") impact rating indicates that any shallow, rapidly moving landslide initiating within the operation area is likely to directly impact a structure or road and, in addition, there are unusual conditions that make dangerous impacts almost certain.

Landslides have occurred in nearly every county in Arkansas. They have destroyed or damaged roads, railroads, bridges, mining facilities, parks and recreational areas, residential and commercial buildings, sewers, dams, reservoirs, forests, fisheries, and farms. Damage caused directly by landslides is largely undocumented or often misreported. The devastating effects of landslides often are attributed to the triggering event such as a flood, earthquake, or storm.

The type of movement that occurs and the type of material involved classify landslides. The types of movement are slides, flows, lateral spreads, falls and topples. The types of material involved in landslides include bedrock and soil (including artificial fill). Soils are described as material that is either predominantly coarse (debris) or predominantly fine (earth). A combination of two or more of the principal types of flows is referred to as a complex movement.

Slides. One of the most common types of movements is sliding, which involves downward displacement along one or more failure surfaces (also referred to as a discontinuity, rupture or slip surface). The material from the slide may be broken into a number of pieces or remain as a single, intact block. Sliding can be translational or rotational. Rotational motion involves movement turning about a specific point, where translational sliding is movement down slope on a path roughly parallel to the slip surface. The most common example of a rotational slide is a slump, which has a strong, backward rotational component and a curved upwardly-concave failure surface. Slides and slumps are common throughout Arkansas, especially along streams and highways. Slides are commonly initiated when the bottom of a slope is removed (by running water or human activity), thereby steepening the overall slope to the point that a landslide will occur.

Flows. Flows consist of a slurry of loose rocks, soil, organic matter, air and water moving down slope in the manner similar to a viscous fluid. They are distinguished from slides by having high water content and are thoroughly deformed internally during movement. While flows can dominate the failure, they are commonly observed as a minor component or extension of the toe (bottom of the landslide) of a slide or fall. Although flows are not as severe a problem in Arkansas as in some of the western states, they are common in all areas of the State, especially along the slopes of Crowley's Ridge (Cronin, 1992; see McFarland, 1992). A type of flow known as soil creep is an extremely slow and steady process that may persist over long periods of time. It is commonly observed in weathered bedrock and soil on steep slopes throughout Arkansas.

Lateral Spreads. The slow-to-rapid lateral extensional movements of rock or soil masses on almost level ground are known as lateral spreads. In fine-grained soils, such as quick clays, lateral spreading occurs if the soils are remolded or disturbed by construction or grading. Loose, granular soils commonly produce lateral spreads through the process of liquefaction. Liquefaction is the transformation of a granular material from a solid state into a liquefied state as a consequence of increasing the water pressure in the spaces between the grains of sand. Liquefaction is caused by vibration of the earth produced by a strong earthquake.

Falls and Topples. Falls occur when masses of rock or other material detach from a steep slope or cliff and descend by free fall, rolling, or bouncing. Topples consist of the forward rotation of rocks or other material about a pivot point on a hill slope. Topples generally develop in rock slopes divided into blocks by vertical fractures or joints oriented parallel to the slope face. Falls and topples can be triggered by an earthquake or erosion at the base of the affected slope. In Arkansas, falls and topples are infrequent in occurrence and are restricted to the rock outcrops of the Ouachita and Ozark Mountains, and the bluff faces of the Arkansas River valley.

TYPE OF MOVEMENT		TYPE OF MATERIAL		
		BEDROCK	ENGINEERING SOILS	
			Predominantly coarse	Predominantly fine
FALLS		Rock fall	Debris fall	Earth fall
TOPPLES		Rock topple	Debris topple	Earth topple
SLIDES	ROTATIONAL	Rock slide	Debris slide	Earth slide
	TRANSLATIONAL			
LATERAL SPREADS		Rock spread	Debris spread	Earth spread
FLOWS		Rock flow (deep creep)	Debris flow (soil creep)	Earth flow
COMPLEX		Combination of two or more principal types of movement		

2.5.10.4 Previous Occurrences

There have been no previous landslide occurrences of any significance recorded for the county.

2.5.10.5 Probability of Future Landslide

According to the Arkansas Highway and Transportation Department, the annual frequency of significant landslide events statewide is three to four per year. However, this number varies considerably (between zero and over 20) depending primarily on precipitation characteristics that year.

Location (All participating jurisdictions of the entire planning area.)
***Limited*:** 10 to 25 percent of planning area or limited single-point of occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)
Weak: Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage.

Probability of Future Events
Occasional:1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.

Overall Significance
Low: Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

2.5.10.6 Impact of Landslide

Based on the best available data, observed conditions, and past occurrences, the probable impact of landslide on the life, safety, and health of the citizens of Sebastian County would be little or no impact. This is based on the lack of exposure of any structure or facility critical to the safety and health of the citizens of the county.

Roads are the primary target of impact and would cause traffic disruptions should the slide affect the roadway. There are some minor roads (local dirt roads) that could be impacted.

Larger slides or those on major highways can be quite costly. Recent landslides in Franklin County cost the Arkansas Department of Transportation $2.3 million for repairs to Interstate 40 and $1.8 million for repairs to Highway 23.

Excerpt from the State of Arkansas All-Hazards Mitigation Plan (September 2013):
To estimate potential losses associated with expansive soils, the NRCS soils data along with census block data available in HAZUS MH 2.1 was used to determine the building values within the identified landslide-prone soil areas of Counties with a moderate to high vulnerability rating. This methodology consisted of calculating the percentage of the census block areas inside the expansive soils areas. This percentage was then applied to the HAZUS MH 2.1 building data.

Building Values within Identified Landslide-Prone Soil Areas

County	Structure Value Exposure in Landslide Areas ($1,000)	Contents Value Exposure in Landslide Areas ($1,000)	Total Building Exposure Value in Landslide Areas ($1,000)
Sebastian	$894,569	$526,066	$1,420,635

Source: NRCS and HAZUS MH 2.1

2.5.10.7 Vulnerability and Estimating Potential Loss

Per the earlier map, landslide risk within Sebastian County varies. Location, rather than structure type, is the primary control on the vulnerability of structures to landslide events. Landslides can destroy or damage roads, railroads, bridges, residential and commercial buildings, sewers, dams, reservoirs, pipelines, and other structures. Most landslides in the State are human induced and result from cutting into the lower slope of a previously stable hill. The most vulnerable structures are therefore those buildings, roads, distribution lines, and other structures adjacent to slope cuts. All types of building stock (wood, steel, masonry, etc.) are equally vulnerable to the effects of landslides.

The following table provides a breakdown of the percent of area with landslide-prone soils and the estimated number of structures within the landslide-prone soils areas.

Area and Building Counts within Landslide-Prone Soil Areas

County	% of Area within County with High Potential for Landslide	Residential Building Exposure in Areas with High Potential for Landslide	Commercial Building Exposure in Expansive Soil Areas	Industrial Building Exposure in Areas with High Potential for Landslide	Other Building Exposure in Areas with High Potential for Landslide	Overall Vulnerability
Sebastian	16.8%	4449	172	49	36	Moderate

Source: NRCS and HAZUS MH 2.1

Excerpt from the State of Arkansas All-Hazards Mitigation Plan (September 2013):
This data is to be used only for general determination of those areas that could suffer the greatest losses in the event of soil expansion events. Data limitations prevent a more accurate analysis including.
To complete the vulnerability analysis, a rating value of low, moderate, and high was assigned to each county based upon the percentage of landslide-prone soils within the county. These rating values correspond to the following descriptive terms:
1) Low Vulnerability – Less than 10-percent landslide-prone soils
2) Moderate Vulnerability – Between 10 and 20-percent landslide-prone soils
3) High Vulnerability – Over 20-percent landslide-prone soils within County

2.5.10.8 Multi-Jurisdictional Risk Assessment

Landslide risk is not unique to any area of the county; the threat is countywide with no significant variation at the county or jurisdiction levels. Jurisdictions with higher infrastructure density make up the landslide high risk zone as they carry a higher exposure to a landslide event in Sebastian County.

A landslide occurrence has not been recorded in Sebastian County to date. Based on USGS data, the southern quarter of the county has more landslide exposure that the other locations.

Economic loss due landslides has not been well documented. The Arkansas State Highway and Transportation Department (AHTD) has estimated that during the five-year period of 1986-1990, it spent about $600,000 per year statewide for road repairs damaged by landslides. Landslide loss statistics have not been kept at the county level by AHTD, so it is impossible to say how much of this was spent in Sebastian County.

2.5.11 Expansive Soil

2.5.11.1 Description of Expansive Soil

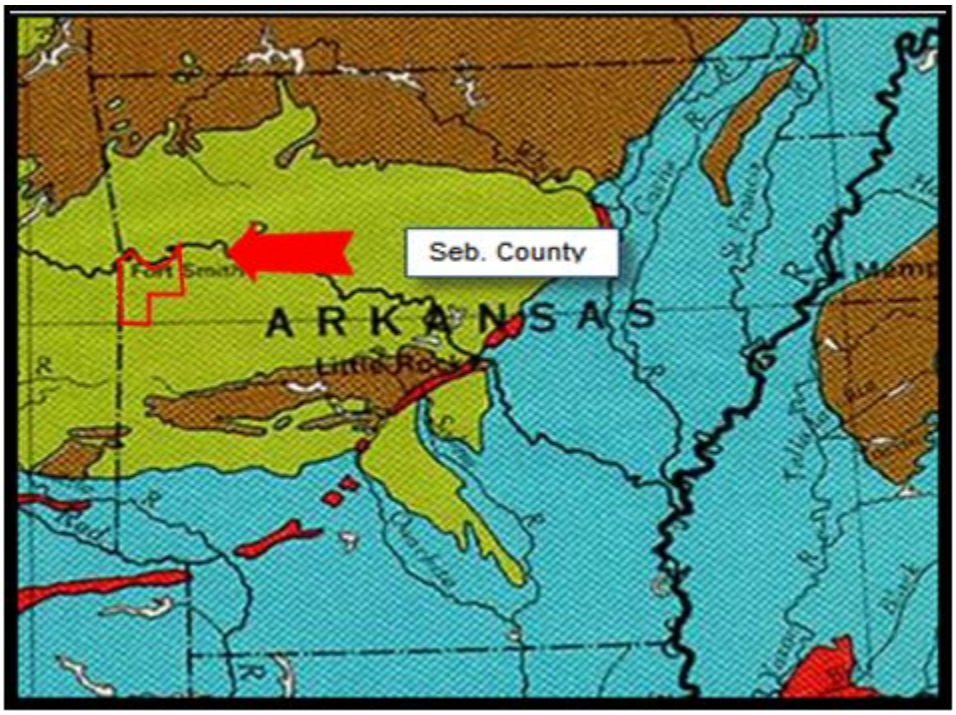
Expansive soils contain minerals such as smectite clays that are capable of absorbing water. When they absorb water they increase in volume. The more water they absorb the more their volume increases. Expansions of ten percent or more are not uncommon. This change in volume can exert enough force on a building or other structure to cause damage.

Cracked foundations, floors and basement walls are typical types of damage done by swelling soils. Damage to the upper floors of the building can occur when motion in the structure is significant.

Expansive soils will also shrink when they dry out. This shrinkage can remove support from buildings or other structures and result in damaging subsidence. Fissures in the soil can also develop. These fissures can facilitate the deep penetration of water when moist conditions or runoff occurs. This produces a cycle of shrinkage and swelling that places repetitive stress on structures.

2.5.11.2 Location of Expansive Soil Events

Expansive soils exist in the county; however, they are not geographically pervasive. Occurrences of damages related to expansive soils are isolated. The presence of expansive soils can be determined by professionally conducted soils test; the tests, however, are not always required nor performed for lower-cost, privately financed structures, such as single-family residential houses.



MAP LEGEND	
	Unit contains abundant clay having high swelling potential
	Part of unit (generally less than 50%) consists of clay having high swelling potential
	Unit contains abundant clay having slight to moderate swelling potential
	Part of unit (generally less than 50%) consists of clay having slight to moderate swelling potential
	Unit contains little or no swelling clay
	Data insufficient to indicate clay content of unit and/or swelling potential of clay (Shown in westernmost states only)

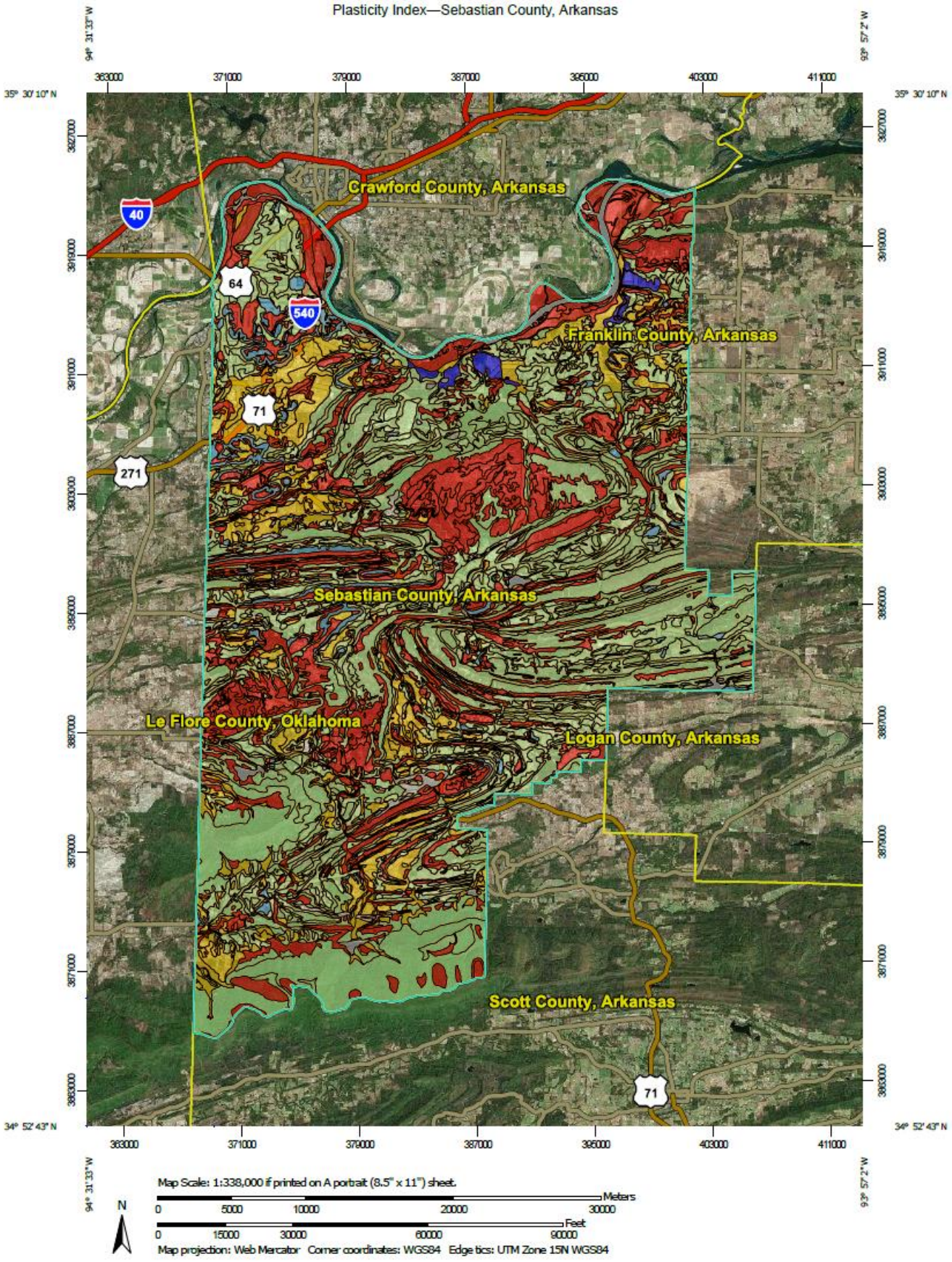
2.5.11.3 Extent, Magnitude or Severity of Expansive Soil

Unlike other natural hazards discussed in this plan, expansive soil is a long-term condition that often causes incremental damage to a structure over a period of many years. It therefore cannot easily be attributed to an event or occurrence. When there is a significant natural or human induced excursion in expansive soil moisture content near a structure, accelerated damage may occur.

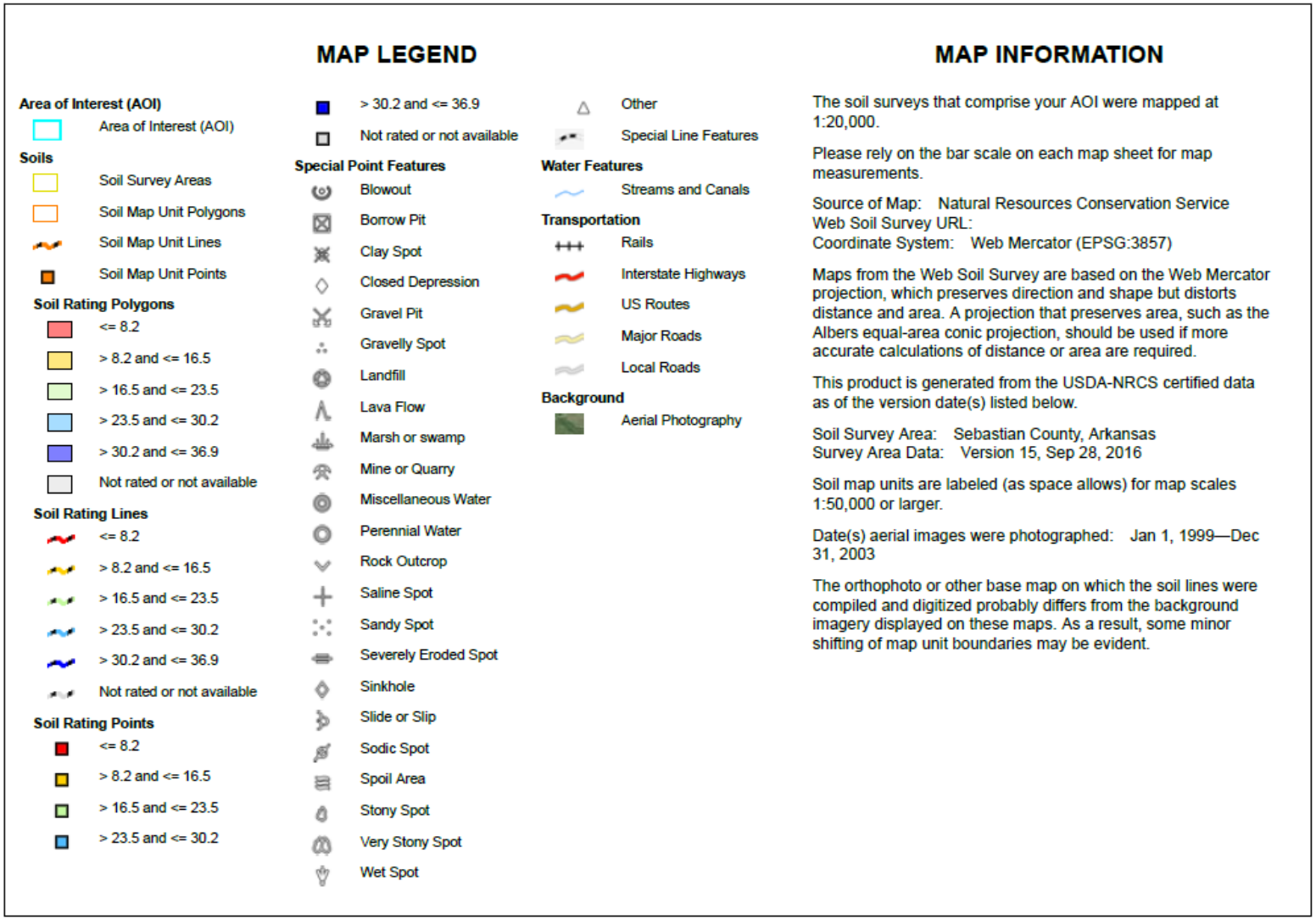
Although little noticed, soil expansion and contraction in the state is a high frequency & high probability event as it occurs daily and therefore causes damage to structures daily. However, this incremental damage is not known to lead to significant damages in this county. Also worth noting, a study by Olive and others published in 1989 places western Arkansas in an area of ―slight to moderate clay swelling potential, which means the county generally has a modest likelihood for having expansive soils as compared to other areas of the U.S.

Because no significant expansive soil events are known to have affected the county, the severity of this hazard is not well known. Because of the low frequency of significant reported events, the potential severity of this hazard is negligible and the potential magnitude negligible.

The entire area of Sebastian County carries a standard Expansive Soil ranking. Based on USGS data, Part of Sebastian County (generally less than 50%) consists of clay having slight to moderate swelling potential. This is not expected to change over time.


Plasticity Index—Sebastian County, Arkansas
94° 31' 33" W
93° 57' 2" W
35° 30' 10" N
34° 52' 43" N
363000
371000
379000
387000
395000
403000
411000
3927000
3919000
3911000
3903000
3895000
3887000
3879000
3871000
3863000
Crawford County, Arkansas
Franklin County, Arkansas
Sebastian County, Arkansas
Le Flore County, Oklahoma
Logan County, Arkansas
Scott County, Arkansas
40
64
540
71
271
71
Map Scale: 1:338,000 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0
5000
10000
20000
30000
Feet
0
15000
30000
60000
90000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Plasticity Index—Sebastian County, Arkansas



Plasticity Index

Plasticity Index— Summary by Map Unit — Sebastian County, Arkansas (AR131)				
Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
Ba	Barling silt loam	4.4	4,112.5	1.2%
BPI	Pits, borrow		6.6	0.0%
CaC	Cane fine sandy loam, 3 to 8 percent slopes	8.2	17,287.6	5.0%
Cr	Cleora fine sandy loam	4.7	345.4	0.1%
Cv	Crevasse soils	0.0	5,929.8	1.7%
DAM	Dams		29.9	0.0%
EdC	Enders silt loam, 3 to 8 percent slopes	27.6	1,261.0	0.4%
EdD	Enders silt loam, 8 to 12 percent slopes	27.6	975.0	0.3%
EeE	Enders stony silt loam, 12 to 30 percent slopes	27.2	8,861.5	2.5%
EmC	Enders-Mountainburg association, rolling	20.4	30,637.4	8.8%
EmE	Enders-Mountainburg association, steep	19.3	49,754.7	14.3%
GPI	Pits, gravel		25.7	0.0%
Ib	Iberia clay	36.9	2,244.9	0.6%
LeB	Leadvale silt loam, 1 to 3 percent slopes	18.6	43,153.3	12.4%
LeC	Leadvale silt loam, 3 to 8 percent slopes	18.8	43,983.1	12.6%
LnC	Linker fine sandy loam, 3 to 8 percent slopes	14.7	6,995.1	2.0%
MkC	McKamie silt loam, 3 to 8 percent slopes	23.3	1,444.5	0.4%
MID	Montevallo gravelly loam, 3 to 12 percent slopes	6.8	2,720.0	0.8%
MmD	Mountainburg sandy loam, 3 to 12 percent slopes	7.3	25,371.5	7.3%
MnD	Mountainburg stony sandy loam, 3 to 12 percent slopes	6.8	20,347.3	5.8%
MnE	Mountainburg stony sandy loam, 12 to 35 percent slopes	6.8	6,435.6	1.8%
MPI	Pits, quarries		3,174.3	0.9%

Plasticity Index— Summary by Map Unit — Sebastian County, Arkansas (AR131)				
Map unit symbol	**Map unit name**	**Rating (percent)**	**Acres in AOI**	**Percent of AOI**
MuC	Muskogee silt loam, 3 to 8 percent slopes	23.5	3,587.8	1.0%
No	Norwood silty clay loam	16.5	1,089.1	0.3%
SaB	Sallisaw loam, 1 to 3 percent slopes	12.2	2,572.6	0.7%
SaC	Sallisaw loam, 3 to 8 percent slopes	12.2	3,060.7	0.9%
SlC	Sallisaw stony loam, 1 to 8 percent slopes	12.2	3,096.9	0.9%
Sn	Severn silt loam	3.8	4,373.8	1.3%
Tf	Taft silt loam, 0 to 1 percent slopes	18.2	27,892.6	8.0%
W	Water		7,627.7	2.2%
Wg	Wing silt loam	30.2	809.3	0.2%
Wr	Wrightsville silt loam	15.6	2,734.2	0.8%
WsA	Wrightsville complex, 0 to 2 percent slopes	15.6	10,689.7	3.1%
Wt	Wrightsville-Messer complex	13.9	6,513.8	1.9%
Totals for Area of Interest			**349,145.0**	**100.0%**

Description

Plasticity index (PI) is one of the standard Atterberg limits used to indicate the plasticity characteristics of a soil. It is defined as the numerical difference between the liquid limit and plastic limit of the soil. It is the range of water content in which a soil exhibits the characteristics of a plastic solid.

The plastic limit is the water content that corresponds to an arbitrary limit between the plastic and semisolid states of a soil. The liquid limit is the water content, on a percent by weight basis, of the soil (passing #40 sieve) at which the soil changes from a plastic to a liquid state.

Soils that have a high plasticity index have a wide range of moisture content in which the soil performs as a plastic material. Highly and moderately plastic clays have large PI values. Plasticity index is used in classifying soils in the Unified and AASHTO classification systems.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The Plasticity Index Table above shows Sebastian County to have soil plasticity ranging from 0.0 to 36.9. Likewise, the map preceding the Plasticity Index Table shows where within Sebastian County each range is located. The table below outlines the correlation between Plasticity Index and Expansion Index to show that Sebastian County has a soil expansion potential ranging from very low (0.0) to very high (36.9).

Expansion Index (%)	0-20	21-50	51-90	91-130	130+
Plasticity Index (%)	0-10	10-15	15-25	25-35	35-100
Expansion Potential	Very Low	Low	Medium	High	Very High

2.5.11.4 Previous Occurrences

Although expansive soils are present throughout much of the county, the soils are rarely highly expansive; therefore the average citizen does not notice their effects. There are no documented expansive soil events for the county causing substantial damage.

2.5.11.5 Probability of Future Expansive Soil

Location (All participating jurisdictions of the entire planning area.)
***Limited*:** 10 to 25 percent of planning area or limited single-point of occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)
Weak: Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage.

Probability of Future Events
Occasional:1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.

Overall Significance
Low: Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area.

2.5.11.6 Impact of Expansive Soil

Expansive soils cause differential movement and horizontal pressure on structures resulting in cracked driveways, cracked sidewalks and basement floors, heaving of roads and highway structures, and disruption of pipelines and sewer lines. Damage to homes can range from hairline plaster cracks and sticking doors to condemnation or complete destruction. Expansive soils occurring on slopes can also result in slow but damaging down slope movement of material (creep) or even landslides.

The impact that expansive soils create can be significant although they have, for the most part, been recognized and mitigated in urbanized areas. Expansive Soil locations do not usually cause widespread damage. However, they can disrupt supply lines (i.e. roads, power lines, railways, and bridges) and damage structures. Expansive soils do not change size quickly; observing damage in real-time can sometimes be difficult. Although the damage might not occur in a matter of minutes, it still has the potential to severely damage structures and roads over a matter of time if not sufficiently mitigated.

2.5.11.7 Vulnerability and Estimating Potential Loss

Although not well known to the general public, expansive soils are responsible for major economic losses. Various studies estimate that expansive soils result in somewhere between $2 and $11 billion in annual losses in the United States, significantly more than other natural hazards. Other studies have suggested that approximately 10% of the new homes constructed annually in the United States are subjected to significant damage during their useful lives by expansive soils, and an additional 60% of homes sustain minor damage.

From the State of Arkansas All-Hazards Mitigation Plan (September 2013) the following table provides a breakdown of the percent of area with expansive soils and the estimated number of structures within the expansive soils areas.

Area and Building Counts within Identified Expansive Soil Areas

County	% of Area within County with Expansive Soils	Residential Building Exposure in Expansive Soil Areas	Commercial Building Exposure in Expansive Soil Areas	Industrial Building Exposure in Expansive Soil Areas	Other Building Exposure in Expansive Soil Areas	Overall Vulnerability
Sebastian County	1.06%	651	18	4	5	Low

Source: NRCS and HAZUS MH 2.1

Excerpt from the State of Arkansas All-Hazards Mitigation Plan (September 2013):

This data is to be used only for general determination of those areas that could suffer the greatest losses in the event of soil expansion events. Data limitations prevent a more accurate analysis including. To complete the vulnerability analysis, a rating value of low, moderate, and high was assigned to each county based upon the percentage of expansive soils within the county. These rating values correspond to the following descriptive terms:

1) Low Vulnerability – Less than 10-percent expansive soils

2) Moderate Vulnerability – Between 10 and 35-percent expansive soils

3) High Vulnerability – Over 35-percent expansive soils within County

2.5.11.8 Multi-Jurisdictional Risk Assessment

An expansive soil occurrence is not unique in that it does not affect a specific area within Sebastian County. Jurisdictions with a higher population and infrastructure density carry a higher exposure to the expansive soil hazard.

Expansive Soils risk is not unique to any area of the county; the threat is countywide with no significant variation at the county or jurisdiction levels. Jurisdictions with higher infrastructure density make up the landslide high risk zone as they carry a higher exposure to a landslide event in Sebastian County

SECTION 3-Mitigation Strategy

Mitigation Strategy: 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.*

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*

Requirement 201.6(c)(3)(ii)*:[The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. The plan must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate*

Requirement 201.6(c)(3)(iii):*[The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(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 benefit review of the proposed projects and their associated costs*

Requirement 201.6(c)(3)(iv): *For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan*

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 improvements, when appropriate*

3.1 Mitigation Goals and Objectives for Each Hazard

Based upon the results of the local and State risk assessments, the Sebastian County Hazard Mitigation Planning Team, with input from local jurisdictions and officials, developed hazard mitigation goals and selected those that were determined to be of greatest benefit. These goals represent what Sebastian County believes is a long-term vision for reduction and enhancement of mitigation capabilities:

Goal 1. Reduce the potential for loss of life and personal injury from natural disasters.

Goal 2. Protect existing and future properties from natural disasters.

3.2 NFIP Participation/Capability Assessment

Sebastian County is located in the State of Arkansas.

National Flood Insurance Program (NFIP)
Sebastian County participates in the National Flood Insurance Program, Community Identification Number 050462

Sebastian County Capability Assessment

Storm Water Management	Yes	Erosion Management	No
Stream Management	No	Floodplain Management	Yes
Zoning Management	No	Building Codes	No
Subdivision Management	No	Land Use Plan	No
Comprehensive Plan	NO	Capital Improvement Plan	YES
Economic Development Plan	YES	Emergency Operations Plan	YES
Continuity of Operations Plan	YES	Community Wildfire Plan	NO
ISO Rating	N/A	Planning Commission	NO
Elevation Certificates: Yes			
Flood Insurance Claims:			

Capabilities include current staff and budget as well as partnerships with the U.S. Forestry Service, Arkansas Natural Resources Commission (ANRC), Natural Resources Conservation Service (NRCS), Arkansas Game and Fish, and area Watershed Improvement Districts. Sebastian County also has capital improvements project funding and the ability to incur debt through general obligation bonds or special tax bonds.

Based on the rural nature and natural features of Sebastian County, it could expand its current capabilities by adding stream and erosion management. Sebastian County could also expand the road department budget to improve culverts, box tiles, and water crossings.

City of Barling

National Flood Insurance Program (NFIP)
City of Barling participates in the National Flood Insurance Program, Community Identification Number 050305

Barling Capability Assessment

Storm Water Management	Yes	Erosion Management	No
Stream Management	No	Floodplain Management	Yes
Zoning Management	Yes	Building Codes	Yes
Subdivision Management	Yes	Land Use Plan	Yes
Comprehensive Plan	YES	Capital Improvement Plan	YES
Economic Development Plan	YES	Emergency Operations Plan	YES
Continuity of Operations Plan	YES	Community Wildfire Plan	NO
ISO Rating	3	Planning Commission	YES
Elevation Certificates: Yes			
Flood Insurance Claims:			
Electric Utilities: OG&E			
Water Utilities: Barling Water (purchased from Fort Smith)			
Wastewater Treatment: Barling			
Natural Gas: AOG			
Telephone Services: ATT/Pinnacle Newroads			

The City of Barling also has capital improvements project funding, the authority to levy taxes for specific purposes and to incur debt through general obligation bonds or special tax bonds, as well as fees for water and sewer services, and

storm water utility fees. Western Arkansas Planning and Development District provides GIS/Mapping services for Barling.

Barling could expand its current capabilities by adding stream water and erosion management and by joining the Firewise Program.

Town of Bonanza

National Flood Insurance Program (NFIP)
Town of Bonanza participates in the National Flood Insurance Program, Community Identification Number 050392

Bonanza Capability Assessment

Storm Water Management	No	Erosion Management	No
Stream Management	No	Floodplain Management	Yes
Zoning Management	No	Building Codes	No
Subdivision Management	No	Land Use Plan	No
Comprehensive Plan	NO	Capital Improvement Plan	NO
Economic Development Plan	NO	Emergency Operations Plan	NO
Continuity of Operations Plan	NO	Community Wildfire Plan	NO
ISO Rating	5	Planning Commission	NO
Elevation Certificates: Yes			
Flood Insurance Claims:			
Electric Utilities: Arkansas Valley Cooperative			
Water Utilities: South Sebastian County WUA			
Wastewater Treatment: City of Bonanza			
Natural Gas: AOG			
Telephone Services: Centurytel			

The City of Bonanza has only a small staff. Bonanza utilizes Western Arkansas Planning and Development District for GIS/Mapping as well as Community and Economic Development and Transportation Planning.

Bonanza could expand its current capabilities by adding stream and storm water management as well as erosion management. Bonanza could also develop a land use plan that incorporates zoning and subdivision management.

Town of Central City

National Flood Insurance Program (NFIP)
Town of Central City does not participate in the National Flood Insurance Program

Central City Capability Assessment

Storm Water Management	No	Erosion Management	No
Stream Management	No	Floodplain Management	No
Zoning Management	No	Building Codes	No
Subdivision Management	No	Land Use Plan	No
Comprehensive Plan	NO	Capital Improvement Plan	NO
Economic Development Plan	NO	Emergency Operations Plan	NO
Continuity of Operations Plan	NO	Community Wildfire Plan	NO
ISO Rating	3	Planning Commission	NO
Elevation Certificates: No			
Flood Insurance Claims:			
Electric Utilities: OG&E			
Water Utilities: Central Water			
Wastewater Treatment: none			

Natural Gas: AOG
Telephone Services: Cox

Central City has only a small staff. Central City utilizes Western Arkansas Planning and Development District for GIS/Mapping as well as Community and Economic Development and Transportation Planning.

Central City could expand its current capabilities by adding stream and storm water management as well as erosion management. Central City could also develop a land use plan that incorporates zoning and subdivision management.

City of Fort Smith

National Flood Insurance Program (NFIP)
City of Fort Smith participates in the National Flood Insurance Program, Community Identification Number 055013

Fort Smith Capability Assessment

Storm Water Management	Yes	Erosion Management	No
Stream Management	No	Floodplain Management	Yes
Zoning Management	Yes	Building Codes	Yes
Subdivision Management	Yes	Land Use Plan	Yes
Comprehensive Plan	YES	Capital Improvement Plan	YES
Economic Development Plan	YES	Emergency Operations Plan	YES
Continuity of Operations Plan	NO	Community Wildfire Plan	NO
ISO Rating	2	Planning Commission	YES
Elevation Certificates: Yes			
Flood Insurance Claims:			
Electric Utilities: OG&E, Arkansas Valley Electric Cooperative			
Water Utilities: City of Fort Smith			
Wastewater Treatment: City of Fort Smith			
Natural Gas: AOG			
Telephone Services: AT&T			

Additional capabilities include current staff which includes the city's engineering, GIS, and planning departments. The City of Fort Smith also has capital improvements project funding, the authority to levy taxes for specific purposes and to incur debt through general obligation bonds or special tax bonds, as well as fees for water, sewer, gas, or electric services and impact fees for new development.

Fort Smith could expand its current capabilities by adding stream water and erosion management.

City of Greenwood

National Flood Insurance Program (NFIP)
City of Greenwood participates in the National Flood Insurance Program, Community Identification Number 050198

Greenwood Capability Assessment

Storm Water Management	No	Erosion Management	No
Stream Management	No	Floodplain Management	Yes
Zoning Management	Yes	Building Codes	Yes
Subdivision Management	Yes	Land Use Plan	Yes
Comprehensive Plan	YES	Capital Improvement Plan	YES
Economic Development Plan	YES	Emergency Operations Plan	YES
Continuity of Operations Plan	NO	Community Wildfire Plan	YES
ISO Rating	4/5	Planning Commission	YES

Elevation Certificates: Yes
Flood Insurance Claims:
Electric Utilities: SWEPCO
Water Utilities: City of Greenwood
Wastewater Treatment: City of Greenwood
Natural Gas: AOG
Telephone Services: Cox

Additional capabilities include current staff which includes the city's planning and development department. Greenwood is also the only Firewise Community in Sebastian County.

Greenwood could expand its current capabilities by adding stream and storm water as well as erosion management.

City of Hackett

National Flood Insurance Program (NFIP)
City of Hackett participates in the National Flood Insurance Program, Community Identification Number 050199

Hackett Capability Assessment

Storm Water Management	No	Erosion Management	No
Stream Management	No	Floodplain Management	Yes
Zoning Management	Yes	Building Codes	Yes
Subdivision Management	Yes	Land Use Plan	Yes
Elevation Certificates: Yes			
Comprehensive Plan	NO	Capital Improvement Plan	NO
Economic Development Plan	NO	Emergency Operations Plan	NO
Continuity of Operations Plan	NO	Community Wildfire Plan	NO
ISO Rating	5	Planning Commission	YES
Flood Insurance Claims:			
Electric Utilities: SWEPCO, Arkansas Valley Electric Cooperative			
Water Utilities: City of Hackett (purchased from James Fork Regional Water)			
Wastewater Treatment: City of Hackett			
Natural Gas: AOG			
Telephone Services: Centurylink			

Hackett has only a small staff. Hackett utilizes Western Arkansas Planning and Development District for GIS/Mapping as well as Community and Economic Development Planning.

Hackett could expand its current capabilities by adding stream and storm water as well as erosion management.

City of Harford

National Flood Insurance Program (NFIP)
City of Hartford participates in the National Flood Insurance Program, Community Identification Number 050200

Hartford Capability Assessment

Storm Water Management	No	Erosion Management	No
Stream Management	No	Floodplain Management	Yes
Zoning Management	No	Building Codes	Yes
Subdivision Management	No	Land Use Plan	No
Comprehensive Plan	NO	Capital Improvement Plan	NO
Economic Development Plan	NO	Emergency Operations Plan	NO

Continuity of Operations Plan	NO	Community Wildfire Plan	NO
ISO Rating	4/5	Planning Commission	NO
Elevation Certificates: Yes			
Flood Insurance Claims:			
Electric Utilities: Arkansas Valley Electric Cooperative			
Water Utilities: City of Hartford			
Wastewater Treatment: City of Hartford			
Natural Gas: AOG			
Telephone Services: Centurytel			

Hartford has only a small staff. Hartford utilizes Western Arkansas Planning and Development District for GIS/Mapping as well as Community and Economic Development Planning.

Hartford could expand its current capabilities by adding stream and storm water management as well as erosion management. Hartford could also develop a land use plan that incorporates zoning and subdivision management.

City of Huntington

National Flood Insurance Program (NFIP)
City of Huntington does not participate in the National Flood Insurance Program

Huntington Capability Assessment

Storm Water Management	No	Erosion Management	No
Stream Management	No	Floodplain Management	No
Zoning Management	No	Building Codes	No
Subdivision Management	No	Land Use Plan	No
Comprehensive Plan	NO	Capital Improvement Plan	NO
Economic Development Plan	NO	Emergency Operations Plan	NO
Continuity of Operations Plan	NO	Community Wildfire Plan	NO
ISO Rating	4/6	Planning Commission	NO
Elevation Certificates: No			
Flood Insurance Claims:			
Electric Utilities: SWEPCO			
Water Utilities: James Fork Water			
Wastewater Treatment: none			
Natural Gas: AOG			
Telephone Services: Centurylink			

Huntington has only a small staff. Huntington utilizes Western Arkansas Planning and Development District for GIS/Mapping as well as Community and Economic Development Planning.

Huntington could expand its current capabilities by adding stream and storm water management as well as erosion management. Huntington could also develop a land use plan that incorporates zoning and subdivision management.

City of Lavaca

National Flood Insurance Program (NFIP)
City of Lavaca participates in the National Flood Insurance Program, Community Identification Number 050201

Lavaca Capability Assessment

Storm Water Management	No	Erosion Management	No
Stream Management	No	Floodplain Management	Yes

Zoning Management	Yes	Building Codes	Yes
Subdivision Management	Yes	Land Use Plan	Yes
Comprehensive Plan	NO	Capital Improvement Plan	NO
Economic Development Plan	NO	Emergency Operations Plan	NO
Continuity of Operations Plan	NO	Community Wildfire Plan	NO
ISO Rating	4	Planning Commission	YES
Elevation Certificates: No			
Flood Insurance Claims:			
Electric Utilities: OG&E			
Water Utilities: City of Lavaca			
Wastewater Treatment: City of Lavaca			
Natural Gas: AOG			
Telephone Services: Cox			

The City of Lavaca also has capital improvements project funding, the authority to levy taxes for specific purposes and to incur debt through general obligation bonds or special tax bonds or private activities, as well as fees for water, sewer, gas, or electric services.

Lavaca could expand its current capabilities by adding stream and storm water management as well as erosion management.

City of Mansfield

National Flood Insurance Program (NFIP)
City of Mansfield participates in the National Flood Insurance Program, Community Identification Number 050202

Mansfield Capability Assessment

Storm Water Management	Yes	Erosion Management	No
Stream Management	No	Floodplain Management	Yes
Zoning Management	Yes	Building Codes	Yes
Subdivision Management	Yes	Land Use Plan	Yes
Elevation Certificates: Yes			
Comprehensive Plan	NO	Capital Improvement Plan	NO
Economic Development Plan	NO	Emergency Operations Plan	YES
Continuity of Operations Plan	YES	Community Wildfire Plan	NO
ISO Rating	4/4	Planning Commission	YES
Flood Insurance Claims:			
Electric Utilities: AEP/SWEPCO			
Water Utilities: James Fork Water			
Wastewater Treatment: City of Mansfield			
Natural Gas: AOG			
Telephone Services: Centurytel			

The City of Mansfield also has capital improvements project funding, the authority to levy taxes for specific purposes and to incur debt through general obligation bonds or special tax bonds, as well as fees for water, sewer, gas, or electric services and impact fees for new development.

Mansfield could expand its current capabilities by adding stream and erosion management.

Town of Midland

National Flood Insurance Program (NFIP)

Town of Midland participates in the National Flood Insurance Program, Community Identification Number 050203

Midland Capability Assessment

Storm Water Management	No	Erosion Management	No
Stream Management	No	Floodplain Management	Yes
Zoning Management	No	Building Codes	No
Subdivision Management	No	Land Use Plan	No
Elevation Certificates: No			
Comprehensive Plan	NO	Capital Improvement Plan	NO
Economic Development Plan	NO	Emergency Operations Plan	NO
Continuity of Operations Plan	NO	Community Wildfire Plan	NO
ISO Rating	5	Planning Commission	NO
Flood Insurance Claims:			
Electric Utilities: SWEPCO, Arkansas Valley Electric Cooperative			
Water Utilities: Midland			
Wastewater Treatment: none			
Natural Gas: AOG			
Telephone Services: Centurytel			

Midland has only a small staff. Huntington utilizes Western Arkansas Planning and Development District for GIS/Mapping as well as Community and Economic Development Planning.

Midland could expand its current capabilities by adding stream and storm water management as well as erosion management. Midland could also develop a land use plan that incorporates zoning and subdivision management.

Fort Smith School District: Fort Smith School District is a public school district based in Fort Smith in Sebastian County. The Fort Smith School District has multiple severe weather policies in place. The Superintendent is responsible for determining if classes are cancelled or delayed because of winter weather or if classes will dismiss early. There are also policies in place regarding whether students should recess outdoors in extreme heat or cold. The Fort Smith School District conducts regular tornado and fire drills. The Fort Smith School District is planning to increase its educational programs relating to potential hazards.

National Flood Insurance Program (NFIP)
The Fort Smith School District is not required to be a member of the NFIP, but all its facilities are located within the City of Fort Smith who is a member of NFIP.

Future School of Fort Smith School District: Future School of Fort Smith School District is a public school district based in Fort Smith in Sebastian County. The Future School of Fort Smith School District has multiple severe weather policies in place. The Superintendent is responsible for determining if classes are cancelled or delayed because of winter weather or if classes will dismiss early. There are also policies in place regarding whether students should recess outdoors in extreme heat or cold. The Future School of Fort Smith School District conducts regular tornado and fire drills. The Future School of Fort Smith School District is planning to increase its educational programs relating to potential hazards.

National Flood Insurance Program (NFIP)
The Future School of Fort Smith School District is not required to be a member of the NFIP, but all its facilities are located within the City of Fort Smith who is a member of NFIP.

Greenwood School District: Greenwood School District is a public school district based in Greenwood in Sebastian County. The Greenwood School District has multiple severe weather policies in place. The Superintendent is responsible for determining if classes are cancelled or delayed because of winter weather or if classes will dismiss early. There are also policies in place regarding whether students should recess outdoors in extreme heat or cold. The Greenwood School

District conducts regular tornado and fire drills. The Greenwood School District is planning to increase its educational programs relating to potential hazards.

National Flood Insurance Program (NFIP)
The Greenwood School District is not required to be a member of the NFIP, but all its facilities are located within the City of Greenwood who is a member of NFIP.

Hackett School District: Hackett School District is a public school district based in Hackett in Sebastian County. The Hackett School District has multiple severe weather policies in place. The Superintendent is responsible for determining if classes are cancelled or delayed because of winter weather or if classes will dismiss early. There are also policies in place regarding whether students should recess outdoors in extreme heat or cold. The Hackett School District conducts regular tornado and fire drills. The Hackett School District is planning to increase its educational programs relating to potential hazards.

National Flood Insurance Program (NFIP)
The Hackett School District is not required to be a member of the NFIP, but all its facilities are located within the City of Hackett who is a member of NFIP.

Lavaca School District: Lavaca School District is a public school district based in Lavaca in Sebastian County. The Lavaca School District has multiple severe weather policies in place. The Superintendent is responsible for determining if classes are cancelled or delayed because of winter weather or if classes will dismiss early. There are also policies in place regarding whether students should recess outdoors in extreme heat or cold. The Lavaca School District conducts regular tornado and fire drills. The Lavaca School District is planning to increase its educational programs relating to potential hazards.

National Flood Insurance Program (NFIP)
The Lavaca School District is not required to be a member of the NFIP, but all its facilities are located within the City of Lavaca who is a member of NFIP.

Mansfield School District: Mansfield School District is a public school district based in Mansfield in Sebastian County. The Mansfield School District has multiple severe weather policies in place. The Superintendent is responsible for determining if classes are cancelled or delayed because of winter weather or if classes will dismiss early. There are also policies in place regarding whether students should recess outdoors in extreme heat or cold. The Mansfield School District conducts regular tornado and fire drills. The Mansfield School District is planning to increase its educational programs relating to potential hazards.

National Flood Insurance Program (NFIP)
The Mansfield School District is not required to be a member of the NFIP, but all its facilities are located within the City of Mansfield who is a member of NFIP.

University of Arkansas-Fort Smith: UAFS is one of 18 academic institutions and affiliates governed by the University of Arkansas System board of trustees and administered by the president of the system. Located in Fort Smith in Sebastian County, UAFS was established as a junior college with 34 students in 1928, the university expanded in size and vision over the years, finally taking on its current name and identity as a premier regional university when it joined the University of Arkansas System in 2002. UAFS has multiple severe weather policies in place. The Chancellor is responsible for determining if classes are cancelled or delayed because of winter weather or if classes will dismiss early. UAFS conducts regular tornado and fire drills. UAFS is planning to increase its educational programs relating to potential hazards.

National Flood Insurance Program (NFIP)

University of Arkansas-Fort Smith is not required to be a member of the NFIP, but all its facilities are located within the City of Fort Smith who is a member of NFIP.

Arkansas College of Osteopathic Medicine: ACOM is a private, non-profit, medical school for osteopathic medicine located Fort Smith in Sebastian County. ACOM has multiple severe weather policies in place. The President is responsible for determining if classes are cancelled or delayed because of winter weather or if classes will dismiss early. ACOM conducts regular tornado and fire drills. ACOM is planning to increase its educational programs relating to potential hazards.

National Flood Insurance Program (NFIP)
Arkansas College of Osteopathic Medicine Smith School District is not required to be a member of the NFIP, but all its facilities are located within the City of Fort Smith who is a member of NFIP.

Opportunities exist for capabilities to be increased across the county through county-wide initiatives that would incorporate all participating jurisdictions. Currently, there is only one Firewise Community in Sebastian County, Greenwood. Sebastian County Emergency Management could assist with providing the other communities the knowledge and resources needed to join the program. Additionally, Sebastian County Emergency Management could assist communities with becoming Storm Ready communities. None of the cities in Sebastian County currently participate in the Community Rating System. This is another area where capacity and capabilities could increase with participation. Additional ICS and NIMS training through FEMA could be provided to the participating jurisdictions through Sebastian County Emergency Management.

3.3 Implementation of Mitigation Actions

The mitigation actions are prioritized based upon their effect on the overall risk to life and property. Ease of implementation, community and agency support and ease of obtaining funding. The County and participating jurisdictions have used the STAPLEE method to prioritize mitigation actions. This method has the benefit that the Mitigation actions are considered in discrete categories of Social, Technical, Administrative, Political, Economic and Environmental. Prioritization can therefore be made taking each of these categories into account, so that nothing is overlooked when considering which actions may be best for each jurisdiction to consider.

Criteria used for prioritization and review of mitigation actions based on STAPLEE

Evaluation Category	Sources of Information
Social	Members of Local governments and the Sebastian County Government were members of the Hazard Mitigation Planning Team and had input throughout the planning process. It must be noted that many small town political leaders are also business or professional persons. They are also members of the LEPC. Existing community plans were and will be relied on wherever possible. Members of the media were contacted and invited to all attend all HMPT meetings.
Technical	The following persons/agencies were consulted as to the technical feasibility of the various projects: Arkansas Geological Commission, University of Arkansas Extension Service, Arkansas Soil and Water Conservation Commission, Arkansas Health Department, Arkansas Highway and Transportation Department, Arkansas Department of Environmental Quality, Arkansas Governor's Pre-Disaster Advisory Council, Arkansas Governor's Earthquake Advisory Council, and Arkansas Forestry Service. Arkansas Department of Emergency Management. All of these had their comments and suggestions incorporated.
Administrative	Staffing for proper implementation of the plan currently will rely largely on existing members of the various agencies involved. Technical assistance is available from various local and state agencies. Some local jurisdictions have incorporated Hazard Mitigation efforts into their Capital Improvement Plans. Operations costs are under discussion by the appropriate agency or department heads.
Political	The County Quorum Court has passed resolutions in support of mitigation activities involving floodplain ordinances, mitigation planning, and fire districts, among others. The Governor of Arkansas issued an Executive Order in August of 2004 (EO 04-02) instructing all state agencies to assist ADEM in mitigation planning and implementation of mitigation goals.
Legal	Members of the HMPT discussed legal issues, and it was their opinion that no significant legal issues were involved in the projects that were selected by the HMPT. However, where legalities may be an issue, this is noted.
Economic	Economic and benefit cost issues were the predominant topics discussed by all concerned. Each entity felt that the projects selected would have positive effects, but yet realized that actions often have costs, sometimes hidden, imposed

	on the community, residents and businesses. Funding for the various activities was a major concern as local budgets are always under pressures with existing and competing projects and activities. Where necessary, particularly for costly capital projects, outside grants would be relied on heavily.
Environmental	The Arkansas Geological Survey, Arkansas Department of Environmental Quality, Arkansas Forestry Commission, and Arkansas Soil and Water Conservation Commission were all consulted as to the environmental impact of the various projects and it was felt that there would be no negative impact. Local environmental issues and concerns were also taken into consideration.

The Planning Team prioritized the list of mitigation actions by conducting a cost-benefit review. This review was conducted by; first considering the number of people who would be affected by a chosen project, determining the area the project would cover, considering how critical the structures were within in the project area, and which structure were most critical, and finally how would it benefit the entire community. Actions are prioritized in three different categories; **High** *need for immediate action*, **Medium** *need for action*, **Low** *lacking in urgency.*

All Sebastian County actions are the responsibility of the director of Sebastian County Office of Emergency Management and the County Judge. The City's actions are the responsibility of the Mayor. The School District's actions will be the responsibility of their School Board Administration.

The Responsible Agency for each mitigation action will identify resources. Their responsibility will be to examine resources from all levels of government. The responsible parties will integrate the requirements of the mitigation plan into other plans when appropriate. This also, includes funding and support for enacting and enforcing building codes and zoning ordinances, and developing public education programs to alert residents to risks and how they can reduce hazard losses. Plans will be made to earmark resources for implementing these actions.

Each jurisdiction and school district within the County that participated in the planning process has at least two actions that will benefit the jurisdiction.

For the purpose of developing the Sebastian County Hazard Mitigation Plan, mitigation actions are categorized into six groups;

- Actions that will keep problems from getting worse (Prevention).
- Actions that address individual buildings (Property protection)
- Actions that will inform the public (Public education and awareness)
- Actions that will protect natural resources (Natural resource protection)
- Actions that will protect emergency services before, during, and immediately after an occurrence (Emergency services protection)
- Actions that will control the hazard (Structural projects)

3.4 Mitigation Actions/Projects

This table, taken from the 2010 Sebastian County Hazard Mitigation Plan has been updated to show the actions which have been implemented since adoption of that plan.

Actions Implemented Since Adoption of Sebastian County Hazard Mitigation Plan in 2010

Note: The term "All Jurisdictions" refers to Sebastian County, Cities of Barling, Bonanza, Central City, Fort Smith, Greenwood, Hackett, Hartford, Huntington, Lavaca, Mansfield, Midland, and the School Districts of Fort Smith, Greenwood, Hackett, Lavaca, Mansfield, and University of Arkansas-Fort Smith and the Arkansas College of Osteopathic Medicine.

The term "All Hazards" refers to Dam Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flood, Thunderstorm, Landslide, Winter Storm, Tornado, and Wildfire.

Implementing Jurisdiction	Hazard	Action	Responsible Agency / Personnel
Sebastian County	Tornado, Thunderstorm	Saferoom at Ben Geren Park	County Judge
Sebastian County	All Hazards	Enhance EOC	County Judge, OEM
Sebastian County	All Hazards	Weather Radio Program	OEM
Sebastian County	All Hazards	Resource Management Software	OEM
Schools Districts of Fort Smith, Greenwood, Hackett, Lavaca, and Mansfield	Thunderstorm, Tornado	Build safe rooms at schools	Superintendent

Actions Selected for Implementation in 2016 Plan Update

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Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
Sebastian County, Cities of Mansfield, Greenwood, Hackett, Hartford, Fort Smith, Barling	Dam Failure, Flooding	Conduct inspections, maintenance and enforce programs on dams to ensure structural integrity. (NFIP consideration; CRS 330 Outreach, CRS 350 Flood Protection Information)	County Judge and OEM, Mayors and Public Works Dept.	Corps of Engineers, NRCS	Ongoing	Unknown	County and Cities, Corps of Engineers, NRCS
Sebastian County, Cities of Mansfield, Greenwood, Hackett, Hartford, Fort Smith, Barling	Dam Failure, Flooding	Coordinate with dam owners/operators on preparation and maintenance of Emergency Action Plans	County Judge and OEM, Mayors and Public Works Dept.	Corps of Engineers, NRCS, Dam Owners/ Operators	Ongoing	Unknown	County and Cities, Corps of Engineers, NRCS, Dam Owners/Operators
All Jurisdictions	Dam Failure, Flooding	Complete a detailed flood inundation study for all current dam locations	County Judge and OEM, Mayors and Public Works Dept., Public School Superintendents, UAFS Chancellor, ACOM President	Engineering, Consultants	5 years	Extensive	FEMA
All Jurisdictions	Dam Failure, Flooding	Educate public and developers of hazards that can be caused by flooding caused by dam failure	County Judge and OEM, Mayors and Public Works Dept., Public School Superintendents, UAFS Chancellor, ACOM President	NRCS, Corps of Engineers	Ongoing	Minimal	County, Cities, Schools, NRCS, Cooperative Extension Services
City of Lavaca	Drought	Pass ordinances to prioritize or control water, particularly for emergency situations to make more water available for firefighting	Mayor and City Council	None	1 year	None	None required

Actions Selected for Implementation in 2016 Plan Update

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The term "All Hazards" refers to Dam Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flood, Thunderstorm, Landslide, Winter Storm, Tornado, and Wildfire.

Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
City of Lavaca	Drought	Pass ordinance to regulate the times when watering of gardens is allowable.	Mayor and City Council	None	1 year	None	None required
City of Fort Smith	Drought	Acquire low-flow faucets and fixtures for new or existing buildings and/or for public facilities	Mayor, Public Works Dept.	None	Ongoing	Minimal	City funds
All Jurisdictions	Drought	Develop a countywide drought emergency plan	County Judge, Mayors, Public School Superintendents, UAFS Chancellor, ACOM President	FEMA, ADEM	1 year	None	None required
City of Fort Smith	Drought	Develop a drought communication plan and early warning systems to facilitate timely communications of relevant information to officials, decision makes, emergency managers, and the public	Mayor, Public Works Department	None	Ongoing	None	None required
Sebastian County, Cities of Fort Smith Lavaca, Central City, Greenwood, Hackett, Hartford and Midland, and Fort Smith Schools, Future School of Fort Smith	Drought	Check regularly for leaks to minimize water supply losses and improve water supply monitoring	County Judge and OEM, Mayors and Public Works Depts., Superintendent and School Maintenance Staff	None	Ongoing	None	None
Cities of Fort Smith, Barling, Mansfield,	Drought	Upgrade existing water delivery systems to eliminate breaks and leaks	Mayors and Public Works Depts.	Engineering, ANRC and USDA for funding	5 years	Unknown	USDA and ANRC

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Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
Hackett, and Lavaca							
City of Barling	Drought	Rehabilitate reservoirs to operate at design capacity	Mayor, City Administrator, Public Works Department	ANRC, NRCS, Engineering,	5 years	Unknown	ANRC, NRCS, USDA, County
Cities of Barling, Lavaca, and Hackett and Fort Smith Schools, Future School of Fort Smith	Drought	Design and implement leak detection programs	Mayors, Public Works Departments and Superintendent, Maintenance Staff	None	Ongoing	Minimal	Cities and Schools
Sebastian County, Cities of Barling, Lavaca, Bonanza, Huntington, and Mansfield	Drought	Establish MOU with adjacent communities designed to source additional sources of water	County Judge and OEM, Mayors	Rural Water Associations	3 years	Minimal	County, Cities, Rural Water Associations
Cities of Lavaca, Bonanza, Central City, Greenwood, Hartford, and Midland and Public School Districts of Fort Smith, Future School of Fort Smith, Greenwood, Hackett, Lavaca	Drought	Collect rainwater/install rain capturing devices for watering at public facilities	Mayor and Public Works Dept. Superintendent, Maintenance Staff, Teachers	None	Ongoing	Minimal	City and School

Actions Selected for Implementation in 2016 Plan Update

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The term "All Hazards" refers to Dam Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flood, Thunderstorm, Landslide, Winter Storm, Tornado, and Wildfire.

Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
and Mansfield, and UAFS and ACOM							
Cities of Barling and Lavaca	Drought	Educate agricultural interests, general public, and business/commercial entities on water rights and water use policies	Mayors	Cooperative Extension Service	Ongoing	Minimal	Cites, Cooperative Extension Service
Sebastian County and City of Barling	Drought	Form partnership with Cooperative Extension Service and AR Natural Resources Commission to promote awareness of drought and maintain better records of local events and losses	County Judge and OEM, Mayors	Cooperative Extension Service, ANRC	Ongoing	Minimal	County, Cities, Cooperative Extension Service, ANRC
Pubic School Districts of Fort Smith, Future School of Fort Smith, Greenwood, Hackett, Mansfield, and Lavaca UAFS, ACOM	All Hazards	Establish a school survey procedure and guidance document to inventory structural and non- structural hazards in an around school buildings.	Superintendents and Maintenance Staff, UAFS Chancellor and Maintenance Staff, ACOM President and Maintenance Staff	ADEM, FEMA	Ongoing	Minimal	County, Schools
Cities of Fort Smith, Barling, and Lavaca	Earthquake	Adopt and enforce updated building code provisions to reduce earthquake damage	Mayors, City Councils, Building Inspectors	None	Ongoing	Minimal	Cities
All Jurisdictions	All Hazards	Use GIS to map hazard areas, at-risk structures and associated hazards to assess high risk areas	County Judge and OEM, Mayors and Public Works Depts., Public School Superintendents and Maintenance Staff,	WAPDD	Ongoing	Minimal	County, Cities, Schools

Actions Selected for Implementation in 2016 Plan Update

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The term "All Hazards" refers to Dam Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flood, Thunderstorm, Landslide, Winter Storm, Tornado, and Wildfire.

Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
			UAFS Chancellor and Maintenance Staff, ACOM President and Maintenance Staff				
Sebastian County	All Hazards	Establish a county survey and guidance document to inventory structural and non-structural hazards in and around county buildings	County Judge and OEM	None	Ongoing	Minimal	County
Sebastian County, Cities of Fort Smith and Mansfield, Fort Smith Public Schools, Future School of Fort Smith	Earthquake, Tornado, Winter Storm, Thunder-storm	Purchase and install emergency back-up generators in all public buildings where safe rooms are installed and at public utilities to maintain emergency functionality during power outages.	County Judge and OEM, Mayors and Public Works Depts., Superintendents and Maintenance Staff	ADEM, FEMA, Engineering, WAPDD	5 years	Unknown	County, Cities, Schools, FEMA, AEDC-CDBG, AEDC-Rural Services, USDA
City of Lavaca, Bonanza, Central City, Greenwood, Hackett, Hartford, Huntington, Midland and Public School Districts of Fort Smith, Hackett, Greenwood, Lavaca, and Mansfield UAFS, ACOM	Earthquake, Tornado, Thunder-storm, Wildfire	Apply window film to windows at public schools and public buildings as able to prevent shattering.	County Judge and OEM, Mayors and Public Works Depts., Superintendents and Maintenance Staff	None required	5 years	Unknown	County, Cities, Schools

Actions Selected for Implementation in 2016 Plan Update

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The term "All Hazards" refers to Dam Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flood, Thunderstorm, Landslide, Winter Storm, Tornado, and Wildfire.

Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
Fort Smith Schools, Future School of Fort Smith	Earthquake, Tornado, Thunder-storms	Require bracing of generators, elevators, and other vital equipment and anchoring of rooftop equipment	Superintendent and Maintenance Staff	None	Ongoing	Minimal	School
All Jurisdictions	Expansive Soil	Participate in mapping studies to determine extent of expansive soils	County Judge and OEM, Mayors and Public Works Depts., Public School Superintendents and Maintenance Staff, UAFS Chancellor and Maintenance Staff, ACOM President and Maintenance Staff	Arkansas Geological Survey	Ongoing	Unknown	County, Cities, Schools
School Districts of Fort Smith, Future School of Fort Smith, Greenwood, Hackett, Lavaca, Mansfield, and UAFS and ACOM	Expansive Soils, Wildfire, Drought, Landslide	Develop reseeding plans for losses due to hazard events	Superintendents and Grounds Maintenance Staff, UAFS Chancellor and Maintenance Staff, ACOM President and Maintenance Staff	None	Ongoing	Minimal	Schools
Sebastian County, Cities of Barling, Bonanza, Central City, Fort Smith, Greenwood, Hackett,	Expansive Soil	Develop a brochure describing risk and potential mitigation techniques	County Judge and OEM, Mayors and Public Works Dept.	ADEM, Arkansas Geological Survey	Ongoing	Minimal	County and Cities, Cooperative Extension Services

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The term "All Hazards" refers to Dam Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flood, Thunderstorm, Landslide, Winter Storm, Tornado, and Wildfire.

Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
Hartford, Huntington, Lavaca, Mansfield, Midland							
All Jurisdictions	Expansive Soil, Flood	Modify existing structures and make improvements to allow proper draining of excess rainwater away from the facility, such as installing a French Drain	County Judge and OEM, Mayors and Public Works Depts., Public School	Contractors	5 years	Unknown	County, Cities, Schools
All Jurisdictions	All Hazards	Notifying property owners located in high-risk areas	County Judge and OEM, Mayors and Public Works Dept, Superintendents of Public Schools, UAFS Chancellor, ACOM President	Rural Fire Districts	Ongoing	Minimal	County, Cities, Rural Fire Districts
City of Fort Smith and School Districts of Fort Smith, Future School of Fort Smith, and Hackett	Extreme Heat	Increase tree plantings around buildings to shade parking lots and along public rights-of-way	Mayors and Superintendents	Arkansas Forestry Commission, Arbor Foundation	Ongoing	Minimal	City and Schools, Arkansas Forestry Commission, Arbor Foundation
All Jurisdictions	Extreme Heat and Winter Storm	Establish and promote accessible heating/cooling centers/shelters for vulnerable, special-needs, and at risk population	County Judge and OEM, Mayors, Superintendents of Public Schools, UAFS Chancellor, ACOM President	Area Churches	Ongoing	Minimal	County, Cities, Schools
All Jurisdictions	Extreme Heat and	Create a database to track those individuals at high risk of death, such as the elderly, homeless, and sickly, etc.	County Judge and OEM, Mayors, Superintendents of	Area Churches, Home-health agencies	Ongoing	Minimal	County, Cities, Schools

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The term "All Hazards" refers to Dam Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flood, Thunderstorm, Landslide, Winter Storm, Tornado, and Wildfire.

Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
	Winter Storm		Public Schools, UAFS Chancellor, ACOM President				
All Jurisdictions	Extreme Heat and Winter Storm	Acquire power generators to service buildings used as food supply and warming/cooling centers and also for schools, critical facilities and water supplies during power outages due to extreme weather conditions	County Judge, Mayors, Superintendents of Public Schools, UAFS Chancellor, ACOM President	Engineering	5 years	Unknown	County, Cities, Schools, FEMA, AEDC-Rural Services, AEDC-CDBG, USDA
All Jurisdictions	All Hazards	Provide emergency preparedness information and resource for extreme weather conditions through an active education outreach program with specific plans and procedures for at-risk population	County Judge, Mayors, Superintendents of Public Schools, UAFS Chancellor, ACOM President	FEMA, Red Cross, Firewise	Ongoing	Minimal	County, Cities, Schools
School Districts of Fort Smith, Hackett, and Greenwood	Flood, Winter Storm	Include safety strategies for severe weather in driver education classes and materials	County Judge and Sheriff, Mayor and Police Dept., Superintendent, Drivers Ed. instructor	Arkansas State Police	Ongoing	Minimal	County, City and School
City of Barling, Future School of Fort Smith	Extreme Heat	Install green roofs which provide shade and remove heat from roof surface and surrounding air	Mayor, Superintendent	Engineering	Ongoing	Unknown	City, School
Sebastian County, Cities of Barling and Lavaca	Flood and Dam Failure	Enact ordinance requiring one extra foot of freeboard for any building proposed in the floodplain or inundation area	Mayors, City Councils, Building Inspectors	None	Ongoing	None	None

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The term "All Hazards" refers to Dam Failure, Drought, Earthquake, Expansive Soil, Extreme Heat, Flood, Thunderstorm, Landslide, Winter Storm, Tornado, and Wildfire.

Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
Cities of Barling and Lavaca	Flood	Require all new public buildings be elevated above the 0.2% or 500-year flood level	Mayors, Building Inspectors, Superintendent	None	Ongoing	Unknown	City
City of Lavaca	Flood	Setting the design flood elevation at or about the historical high water mark if it is above the mapped base flood elevation.	Mayor, Building Inspector, Planning Dept.	ADEM, FEMA	5 years	Unknown	City
Cities of Barling and Lavaca	Flood	Enact ordinance requiring the separation of storm and sanitary sewage systems as well as higher engineering standards for drain and sewer capacity	County Judge, Quorum Court, Mayors, City Councils	Engineering	Ongoing	Unknown	Cities
City of Barling and Mansfield	Flood	Adopt a land use plan with zoning and development restrictions that require floodplains to be kept as open space and prohibit fill in floodplains to protect residents from hazardous floodways	Mayor, City Council	WAPDD	3 years	Minimal	City
City of Barling	Flood and Dam Failure	Develop a stream buffer ordinance to protect water resources and limit flood impacts	Mayor, City Council	Conservation District	1 year	Minimal	City
Sebastian County	Flood	Implement and retrofit construction plans to modify low water bridges in the area that are susceptible to flooding	County Judge, OEM, and Road Department	Engineering	5 years	Varies for each bridge	County, FEMA, AEDC
Sebastian County, Cities of Fort Smith, Barling, and Lavaca	Flood	Enact an ordinance prohibiting dumping in streams and ditches	County Judge and Quorum Court, Mayors and City Councils	County Road Dept. and City Street Depts.	Ongoing	Minimal	County and Cities
City of Fort Smith	Flood	Enact ordinance governing large scale commercial development to include a retention/detention pond to mitigate	Mayor and City Council, Building Inspector and Planning Dept.	None	1 year	Minimal	City

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Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
		effects of water run-off during flash floods					
City of Fort Smith	Flood	Prepare and adopt a stormwater drainage plan	Mayor, Public Works Department	Engineering	1 year	Minimal	County, Cities
Cities of Fort Smith and Lavaca	Flood	Require drainage study with new development and/or develop engineering guidelines for drainage from new development	Mayor and City Council, Building Inspector and Planning Dept.	Engineering	Ongoing	Minimal	Cities
Cities of Barling and Lavaca	Flood and Landslide	Regulate development in upland areas to reduce stormwater run-off; examples of such erosion control techniques that may be employed within a watershed are include proper bank stabilization with sloping or grading techniques, planting vegetation on slopes, terracing hillsides, or installing riprap boulders or geotextile fabric	Mayor and Planning Depts.	Engineering	Ongoing	Unknown	City
Sebastian County and Fort Smith Schools, Future School of Fort Smith	Flood and Dam Failure	For critical facilities and public buildings-keep water out by strengthening walls, sealing openings, and/or using waterproof compounds or plastic sheeting on walls	County Judge, Superintendent	AHPP, if historic	Ongoing	Varies for each structure	County, School, AHPP
Sebastian County and City of Hackett	Flood	Increase the sizing of all culverts when upgrading roads, bridges, and similar infrastructure	County Judge, Road Department and Mayors, Street Dept.	Engineering	Ongoing	Varies for each project	County, Cities
City of Lavaca	Flood and Dam Failure	Retrofit or elevate utilities built within the floodplain or inundation area	Mayor and Public Works	Engineering, Utility Companies	Ongoing	Varies	City

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Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
Sebastian County	Flood	Raise low lying bridges	County Judge and Road Department	Engineering	Ongoing	Varies for bridge	County, ADEM
City of Lavaca	Flood	Floodproof water/wastewater treatment facilities located in flood hazards	Mayor and Public Works	Engineering	3 years	Unknown	City, ANRC, USDA
Sebastian County, Cities of Lavaca and Hackett	Flood	Routinely clean debris from support bracing underneath low water bridges	County Judge and Road Department, Mayors and Street Departments	None	Ongoing	Minimal	County and Cities
Sebastian County and City of Lavaca	Flood	Routinely clean/repair stormwater drains	County Judge and Road Department, Mayor and Street Department	None	Ongoing	Minimal County and City	
City of Hackett	Flood	Implement a higher standard of road elevation and culvert sizing on city roads and school drives.	Mayor and Street Department	Engineering	Ongoing	Varies for project	City
City of Barling	Flood	Prohibit any fill in floodplain areas.	Mayor, City Council, Planning Dept.	None	Ongoing	Unknown	City
Cities of Barling and Lavaca	Flood	Determine and enforce acceptable land uses to alleviate the risk of damage by limiting exposure in flood hazard areas	Mayors and Planning Departments	WAPDD	Ongoing	Unknown	City
Sebastian County and City of Barling	Flood	Conduct NFIP community workshops to provide information for property owners to acquire flood insurance	County Judge and OEM, Mayors, Floodplain Managers	NFIP, Insurance Agents	Ongoing	None	County and Cities
Sebastian County	Flood	Install warning signs at all low water bridges	County Judge and OEM	None	5 years	Minimal	County

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Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
City of Barling	Flood	Develop early warning system for flooding using existing or new storm sirens	Public Works Dept.	None	Ongoing	Minimal	City
City of Barling	Landslide	Define steep slope/high risk areas in land use and comprehensive plans and create guidelines on restricting new development in those areas	Mayor, Planning Department	AHTD	1 year	Minimal	City
Sebastian County	Landslide	Study areas where riparian landslides may occur	County Judge and OEM	Engineering, Consultant	3 years	Unknown	County
Cities of Barling and Mansfield	Landslide	Restricting or limiting industrial activity that would strip slopes of essential top soil	Mayor, City Council, Planning Dept.	None	Ongoing	Unknown	City
City of Barling	Landslide	Install catch-fall nets for rocks at steep slopes near roadways	Mayor, Street Dept.	AHTD	3 years	Varies	City, AHTD
Cities of Mansfield, Barling, Lavaca, Bonanza, Central City, Fort Smith, Greenwood, Hackett, Hartford, Huntington, Midland, and School Districts of Fort Smith, Future School of Fort Smith, Greenwood, Hackett,	Landslide	Apply soil stabilization measure, such as planting soil stabilizing vegetation on steep, publicly owned slopes	Mayors, Street Depts., and Public Works Depts.	None	5 years	Unknown	Cities

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Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
Lavaca, Mansfield, and UAFS and ACOM							
City of Lavaca	Land-slide, Wildfire	Assessing vegetation in wildfire-prone area to prevent landslides after fires (e.g. encourage plants with strong root systems).	Mayor, Public Works, Fire Department	Firewise, US Forestry	Ongoing	Unknown	County, Cities
Sebastian County and Cities of Lavaca, Fort Smith, Mansfield and School Districts of Fort Smith, Greenwood, and Hackett	Thunder-storm	Install and maintain lightning protection devices and surge protectors at critical facilities	County Judge, Mayors, Superintendents	None	1 year	Varies	County, Cites, Schools
Cities of Mansfield and Fort Smith, Hackett School District	Thunder-storm, Tornado, Extreme Heat	Post warning signs at public parks and recreation facilities and other outdoor venues about weather related hazards and dangers of remaining outdoors during hazardous events.	Mayor and Parks Dept., Superintendent and Maintenance Staff	None	1 year	Minimal	Cities, School
School Districts of Fort Smith, Greenwood, Hackett, Mansfield, Lavaca, and Future School of Fort Smith	Thunder-storm	Teach school children about the dangers of lightning and how to take safety precautions	Superintendent and Science Teachers	None	1 year	None	Schools

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Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
Fort Smith Schools and Future School of Fort Smith	Thunder-storm	Install hail resistant roofing and window coverings, shutter laminated glass in windowpanes with a focus on critical infrastructure.	Superintendent and Maintenance Staff	None	5 years	Unknown	School
Fort Smith Schools	Thunder-storm	Improve roof sheathing to prevent hail penetration on all critical infrastructure	Superintendent and Maintenance Staff	None	5 years	Unknown	School
Fort Smith Schools	Thunder-storm	Install hail resistant roofing and siding	Superintendent and Maintenance Staff	None	5 years	Unknown	School
City of Hackett and Fort Smith Schools	Thunder-storm	Install car ports or other coverings for parking of publicly owned vehicles	Mayor and Superintendent	None	3 years	Unknown	City and School
Pubic School Districts of Fort Smith, Future School of Fort Smith, Greenwood, Hackett, Mansfield, and Lavaca UAFS, ACOM	Thunder-storm, Winter Storm	Install covered walkways between school buildings	Superintendents and Maintenance Staff, UAFS Chancellor and Maintenance Staff, ACOM President and Maintenance Staff	None	Ongoing	Unknown	School Districts, UAFS, ACOM
Cities of Mansfield and Lavaca	Tornado, Thunder-storm,	Require tie-downs with anchors and ground anchors for manufactured homes	Mayor and City Council, Building Inspectors	None	Ongoing	None	None
Cities of Fort Smith and Lavaca	Earthquake, Tornado, Thunder-storm, Expansive Soil	Adopt the International Building Code (IBC) and International Residential Code (IRC)	Mayor and City Council, Building Inspectors	None	1 year	None	None
All Jurisdictions	Tornado and Thunder-storm	Construct free standing saferooms and/or saferooms within new and existing public buildings	County Judge, Mayors, Superintendents,	FEMA, Engineering, WAPDD	5 years	$1M per saferoom	FEMA, AEDC, County, Cities, Schools

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Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
			UAFS Chancellor, and ACOM President				
Cities of Barling and Lavaca	Tornado and Thunder-storm	Adopt regulations governing residential construction to prevent wind damage, by requiring tie-down with anchors and ground anchors appropriate for the soil type for manufactured homes	Mayors, City Council Building Inspectors	None	1 year	None	None
Sebastian County, Cities of Fort Smith and Mansfield	Dam Failure, Thunder-storm, Tornado	Install warning sirens across planning area	County Judge, Mayors,	WAPDD	5 years	Varies	AEDC-Rural Services, USDA
Cities of Barling and Lavaca	Winter Storm, Tornado, Thunder-storm	Establish standards for all utilities regarding tree pruning around power lines	Mayors	Utility Companies	Ongoing	None	None
City of Barling and School Districts of Hackett and Fort Smith	Winter Storm, Tornado, Thunder-storm	Inspect utility poles to ensure they meet specifications and are wind resistant and for signs of rot	Mayor, and Superintendents	Utility Companies	Ongoing	None	None
Cities of Barling, Fort Smith, Bonanza, Central City, Greenwood, Hackett, Hartford, Huntington, Mansfield, Midland	Wildfire	Mitigate futures losses by regulating development in wildfire hazard areas through land use planning and address density and quantity of development, as well as emergency access, landscaping and water supply.	Mayor and Planning Department	None	Ongoing	Minimal	City

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Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
Sebastian County and City of Mansfield		Expand Firewise program to include more communities	County Judge and OEM, Mayor and Fire Department	Firewise	3 years	Minimal	County, City
Sebastian County and City of Fort Smith	Wildfire	Educate public on dangers of wildfire and how to prevent them by providing free technical assistance brochures and pamphlets from FEMA, Firewise, and ADEM on potential mitigation activities for homeowners	County Judge and OEM, Mayor, Community Development Department	Firewise, US Forestry, Rural Fire Departments	Ongoing	Minimal	County
Cities of Fort Smith, Bonanza, Central City, Greenwood, Hackett, Hartford, Huntington, Mansfield, Midland	Wildfire	Perform arson prevention cleanup activities in areas of abandoned or collapsed structures, accumulated trash or debris, and with a history of storing flammable materials where spills or dumping may have occurred	Mayor, Fire Department	Fort Smith Housing Authority, WAPDD, EPA Brownfields	Ongoing	Varies	City, EPA
City of Lavaca	Wildfire	Employee the use of goats to reduce the amounts of underbrush in wildfire-prone areas.	Mayor, Public Works	Cooperative Extension Services, 4H, FFA	Ongoing	Minimal	City
Cities of Fort Smith and Lavaca, Future School of Fort Smith	Wildfire	Create a defensible space around public buildings by reduce the amount of brush near buildings, and also by using fire-friendly vegetation.	Mayors, Public Works Depts. Fire Departments, Superintendent	Firewise, US Forestry, Rural Fire Departments	Ongoing	Minimal	Cities, School
City of Lavaca	Wildfire	Schedule prescribed burning to reduce fuel loads that threaten public safety and property	Mayor, Fire Department	US Forestry, Rural Fire Departments	Ongoing	Minimal	City, Rural Fire
City of Fort Smith and Fort Smith Schools	Winter Storm	Ensure the development and enforcement of building codes for roof snow loads	Mayor, Building Inspector, Superintendent	None	Ongoing	Minimal	City, School

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Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
Sebastian County, Cities of Mansfield and Lavaca	Thunder-storm, Tornado, Winter Storm	Planning for and maintain adequate road and debris clearing capabilities	County Judge and OEM, Mayors	None	Ongoing	Minimal	County, City,
Sebastian County	Winter Storm	Educate citizens that all fuel burning equipment should be vented to the outside	County Judge and OEM	Firewise	Ongoing	Minimal	County
City of Barling	Winter Storm	Using designed-failure mode for power line design to allow line to fall or fail in small sections rather than as a complete system to enable faster repairs.	Mayor, City Administrator, Public Works Dept.	Local Utilities	Ongoing	Unknown	City, Utilities
Cities of Barling, Mansfield, and Lavaca	Winter Storm	Offer carbon monoxide monitors and alarms through local fire departments	Mayors, Fire Departments	FEMA	Ongoing	Minimal	Cities, FEMA
Cities of Barling and Mansfield	All Hazards	Prepare and adopt an Outdoor Warning Sirens Plan, including consideration of the unique geographical locations, technical requirements, system types and operational procedures of each local jurisdiction. These plans will include a review of existing outdoor warning siren coverage and recommend new locations if and where there are coverage gaps. Install new warning sirens in accordance with plan recommendations.	Mayors	ADEM	Ongoing	Unknown	Cities
Sebastian County	All Hazards	Implement Code RED Weather Warning early telephone warning system designed to automatically deliver targeted weather notifications for the immediate threats of severe weather	County Judge and OEM	Code RED	Ongoing	Unknown	County

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Implementing Participating Jurisdiction	Hazard	Action	Jurisdiction's Responsible Department or Personnel	Required Outside Resources	Length of Project	Cost Estimate (if avail.)	Funding
		events within moments of being issued by the National Weather Service (NWS) throughout the county.					
Cities of Barling and Lavaca, and Fort Smith Schools	Thunder-storm, Tornado, Winter Storm	Burying or otherwise protecting electric and other utility lines or prevent disruption by protecting lines from ice, wind, or snow damage.	Mayors, Public Works, Superintendent	Local Utilities	Ongoing	Unknown	Cities, School, Utilities
All Jurisdictions	All Hazards	Install NOAA weather radios in all public buildings where large numbers of people congregate	County Judge and OEM, Mayors, Superintendents, UAFS Chancellor, ACOM President	FEMA	Ongoing	Unknown	County, Cities, Schools, UAFS, ACOM, FEMA
All Jurisdictions	All Hazards	Use newspapers, local radio stations and websites to promote the use of Weather Apps for iphones and smart phones.	County Judge and OEM, Mayors, Superintendents, UAFS Chancellor, ACOM Presidnet	Local Newspapers and radio stations	Ongoing	Minimal	County, Cities, Schools, UAFS, ACOM

SECTION 4

Acronyms

ADA	Average Daily Attendance
ADEM	Arkansas Department of Emergency Management
BCA	Benefit-Cost Analysis
BMPs	Best Management Practices
FCOEM	Sebastian County Office of Emergency Management
FCOES	Sebastian County Office of Emergency Services
CFR	Code of Regulations
CRS	Community Rating System
DMA 2000	Disaster Mitigation Act of 2000
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
GIS	Geographic Information System
HMC	Hazard Mitigation Committee
HMGP	Hazard Mitigation Grant Program
IBC	Internal Building Code
IFR	Interim Final Rule
LEPC	Local Emergency Planning Committee
MOU	Memorandum of Understanding
NFIP	National Flood Insurance Program
PDM	Pre-Disaster Mitigation Program
PGA	Peak Ground Acceleration
SHMO	State Hazard Mitigation Officer
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic
UCC	Uniform Construction Code
WUI	Wildland Urban Interface

SECTION 5

Plan Adoption

Attached are approved resolutions the county, cities and school districts passed after FEMA approved the Sebastian Hazard Mitigation Plan.

5.1 Resolutions

(To be added after FEMA approves DRAFT copy of Hazard Mitigation Plan)