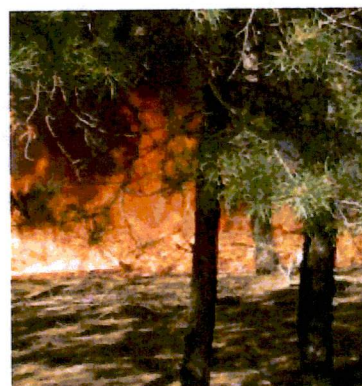
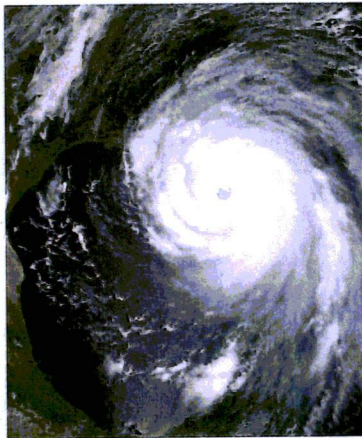


MADISON COUNTY

Hazard Mitigation Plan 2016 - 2021 Edition - Draft



Prepared by



CENTRAL MISSISSIPPI
PLANNING & DEVELOPMENT DISTRICT
1170 Lakeland Drive
Jackson, Mississippi 39296-4935
Phone: 601-981-1511
Fax: 601-981-1515
www.cmpdd.org

Madison County Hazard Mitigation Plan

*Draft
September 2016*

Prepared By:

CMPDD

Central MS Planning
and Development District
1170 Lakeland Drive
Jackson, MS 39216
601.981.1511
www.cmpdd.org

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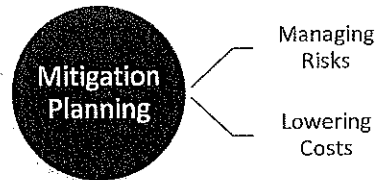
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Appendix A Central Update Mailing List.....

Introduction and Purpose

The Federal Emergency Management Agency (FEMA) defines mitigation as, *“the effort to reduce loss of life and property by lessening the impact of disasters. Mitigation is taking action now – before the next disaster – to reduce human and financial consequences later (analyzing risk, reducing risk, insuring against risk).”*

Predicting where the next disaster will occur, and how severe its impact will be on a community is difficult. Natural disasters can occur at anytime and anyplace. Their human and financial consequences can be significant. Mitigation planning is intended to assist communities in determining their risks to natural disasters and developing an action plan to address the known risks by lessening the impact of natural disasters when they do take place.



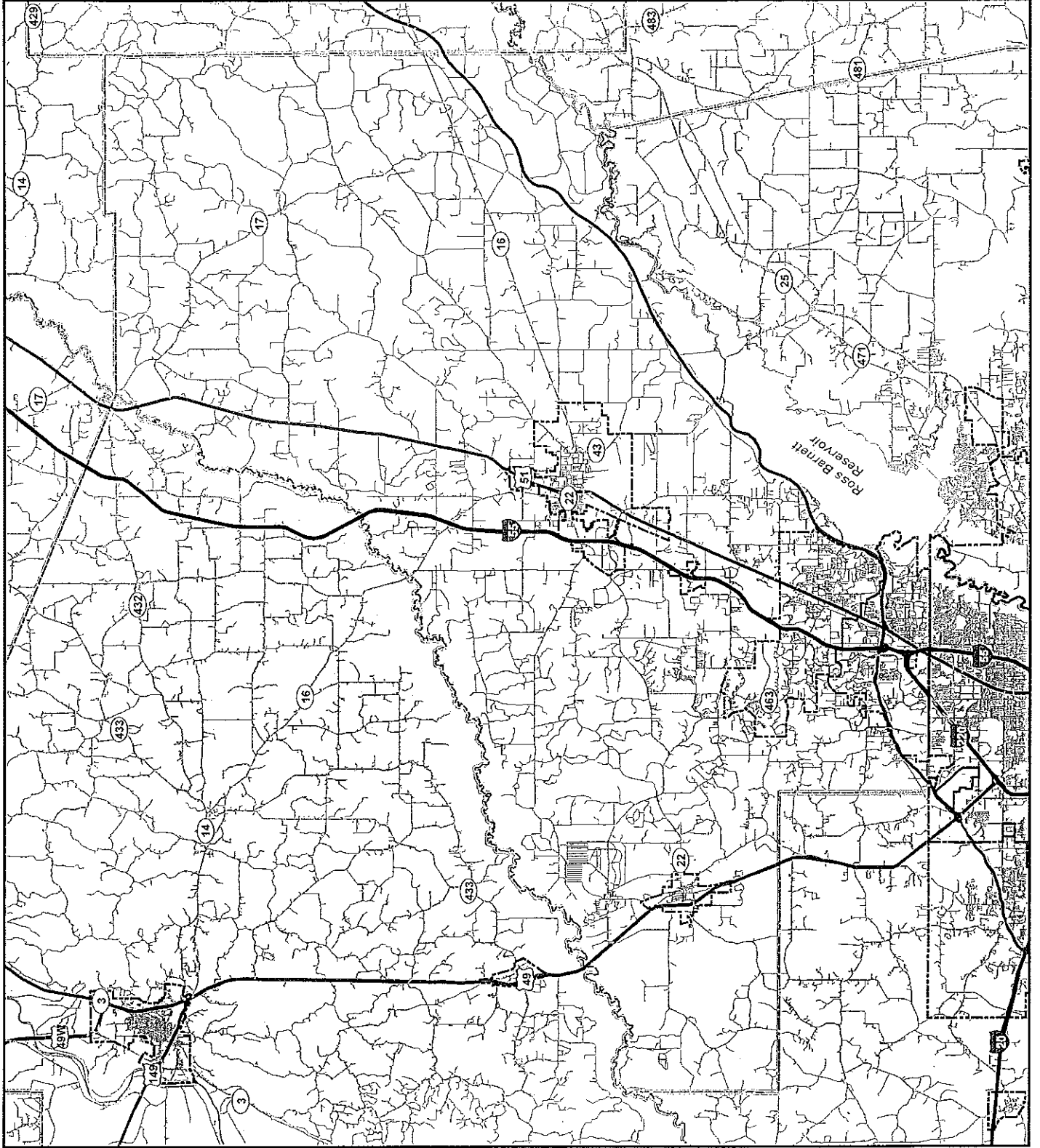
The Disaster Mitigation Act of 2000 (Public Law 106-390) provides the legal basis for mitigation planning requirements for State, local and Indian Tribal governments as a condition for receiving pre- and post- disaster mitigation grant assistance. The Disaster Mitigation Act of 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by establishing a new set of requirements that emphasize the need for an on-going coordinated mitigation planning process.

In response to the Disaster Mitigation Act of 2000, Madison County has developed this Hazard Mitigation Plan; this is an update to the county’s existing Hazard Mitigation Plan approved in 2011.







The purpose of this plan is to document the mitigation planning process carried-out by Madison County, and to provide an integrated strategy for implementing hazard mitigation projects that will minimize future disaster impacts and losses. This plan is intended to meet all hazard mitigation planning requirements established by the Disaster Mitigation Act of 2000.

Local officials should use the information contained in this document as a blue print to help reduce the future impacts of known risks in the county. When possible, local officials should commit local funds, as well as seek Federal and State assistance to carry out the action plan detailed in this document. This plan should; however, be updated as outlined in Section 7 of this plan in order for it to continue to be effective, and to maintain compliance with the Disaster Mitigation Act of 2000.

Madison County, MS



LEGEND

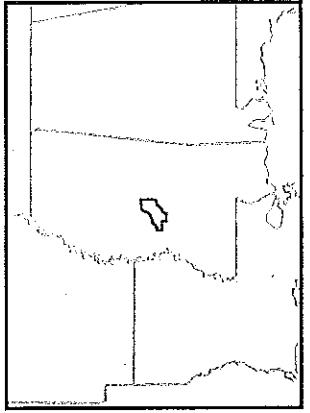
-  Interstates
-  Major Highways
-  Major Local Roads
-  Local Roads
-  Municipalities
-  Counties



Prepared by



Central Mississippi
Planning & Development District



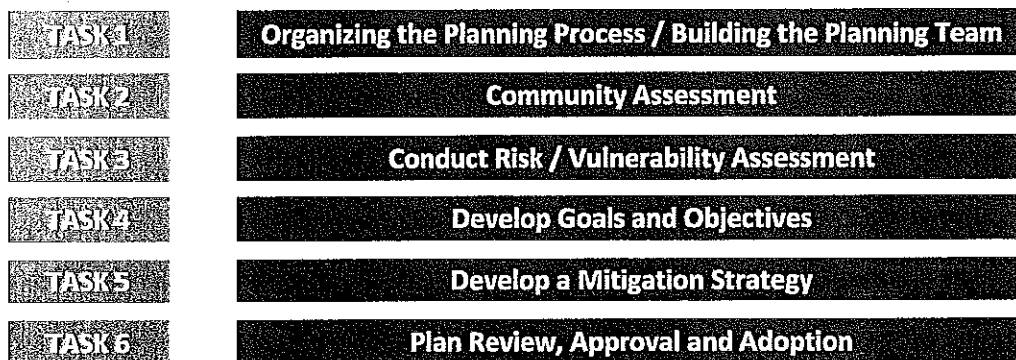
Planning Process

This section of Madison County’s Mitigation Plan describes the planning process undertaken to develop this plan. This section includes a description of who was involved in preparing this document; the process utilized to prepare this document; how the public was involved; and an explanation of the major differences between this plan and previous developed plans in Madison County.

Planning Process Summary

The planning process used to develop this plan was based on Section 322 of the Stafford Act, as amended by the Disaster Mitigation Act of 2000 and supporting guidance developed by FEMA. To maintain compliance with the five-year required update process, in January 2016 the county began the plan update process. This document serves as an update for the county’s plan approved in 2011.

As the initial step in the planning process, CMPDD, in January 2016, contacted the county and requested an updated list of committee members to serve on Madison County’s Mitigation Council. The purpose of the Mitigation Council is to serve as the primary point of contact for completing the planning process, and to coordinate information between CMPDD and local officials. Once the county appointed committee members, CMPDD was ready to proceed with the planning process. The process used to develop a plan for Madison County included six (6) basic steps:

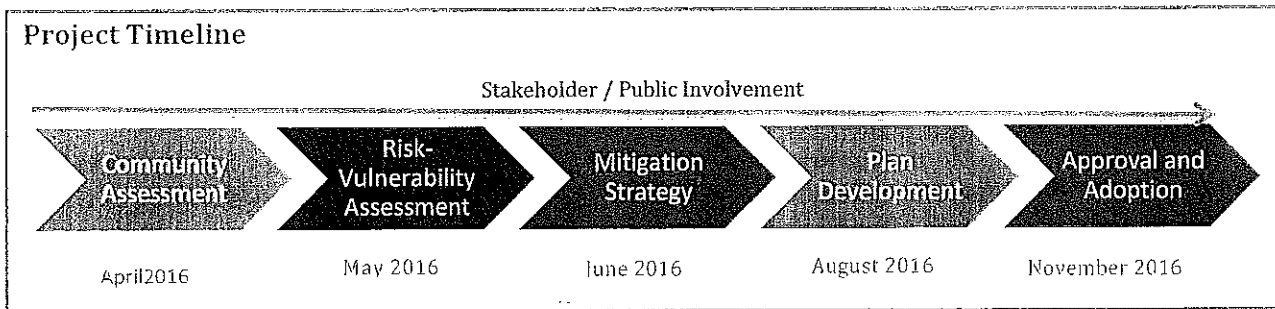


Each step involved in creating this document built upon the efforts of previous steps to ensure that the mitigation actions outlined at the end of this document have a valid basis for their implementation and truly address actions that will reduce the individual vulnerabilities identified in Madison County. The planning process carried out by the Mitigation Council is detailed below with a listing of basic steps completed during each task, as well as the project timeline:

1. **Organizing the Planning Process/Building the Planning Team**
 - Engage local leadership
 - Establish a Mitigation Council
 - Develop and implement an outreach strategy
 - Develop a project timeline

2. **Community Assessment**
 - Review existing plans and policies

- Develop community profiles
 - Identify critical facilities
 - Identify Madison County's capabilities
 - Identify participation in the National Flood Insurance Program
3. Conduct Risk/Vulnerability Assessment
- Identify hazards
 - Develop hazard profiles
 - Identify community assets
 - Analyze risks to determine individual vulnerabilities
 - Summarize Madison County's overall vulnerabilities
4. Develop Goals and Objectives
- Develop long-term outcomes through goal statements
 - Develop specific objectives for each long-term goal
5. Develop a Mitigation Strategy
- Document progress implementing previous actions
 - Identify an action plan specific to each community
6. Plan Review, Approval, and Adoption
- Draft plan review
 - Plan amendments as needed
 - Final plan review
 - Plan adoption



The results of the comprehensive planning process completed by Madison County resulted in the development of this document which contains eight (8) sections. A brief description of each section is provided below:

Section 1 Introduction and Purpose: states the general overall purpose of this document and lists the jurisdiction participating in the planning process.

Section 2 Planning Process: includes a description of who was involved in preparing this document; the process utilized to prepare this document; how the public was involved; and an explanation of the major differences between this plan and previous mitigation plans.

Section 3 Community Profile: describes general information pertaining to Madison County's physical setting, population, demographics, and land uses.

Section 4 Risk Assessment: provides a description of the type, location and extent of all natural hazards that can impact Madison County. Each hazard identified includes a description of the type of hazard, the area that can be affected by the potential hazard, and an analysis of the impact the hazard may have on the area. The assessment conducted in this section is based upon previous occurrences of natural hazards, research material reviewed and a vulnerability assessment completed by the Mitigation Council.

Section 5 Capability Assessment: the capability assessment serves as an instrument for identifying local capabilities, it also provides a means for recognizing gaps and weaknesses that can be resolved through future mitigation actions. The capability assessment section addresses Madison County's participation in the National Flood Insurance Program, as well as capabilities such as administrative, regulatory, and financial abilities.

Section 6 Mitigation Strategy: provides a blueprint Madison County can use to reduce overall vulnerabilities identified in Section 4. This section describes the goals and objectives established by the Mitigation Council and provides an explanation of how individual mitigation actions were prioritized.

Section 7 Plan Maintenance: outlines how this plan will continue to be monitored, evaluated, and updated within a five-year cycle as required by federal regulations. This section explains who will be responsible for maintenance activities. It also provides a methodology and schedule of maintenance activities including a description of how the public will be involved on a continuous basis, and how mitigation practices outlined in this plan will be incorporated into future planning mechanisms.

Section 8 Plan Adoption: documents Madison County's formal adoption of this plan.

The Planning Team

Those appointed to the Madison County Mitigation Council are listed in Table 2.1. CMPDD met with Mitigation Council members throughout the project to explain each step in the planning process and to provide forms and other tools needed to complete the planning process. It was the responsibility of the Mitigation Council members to meet with small working groups, as needed, to collect data and analyze any information provided by CMPDD.

Table 2.1 Madison County Mitigation Council Members

<p>Butch Hammack Madison County EMA Director 1633 W. Peace Street Canton, MS 601-859-4188</p>	<p>Randy Tucker Madison County Sheriff 2941 Hwy 51 Canton, MS 601-859-2345</p>
<p>Norman Cannady Madison County Tax Assessor 125 W North Street Canton, MS 601-859-1921</p>	<p>Tom Lariviere Madison County Asst. Fire Coordinator 1633 W. Peace Street Canton, MS 601-859-4188</p>
<p>Scott Weeks Planning and Zoning Director 125 W North Street Canton, MS 601-859-5501</p>	

Plan Development Meetings

CMPDD facilitated a series of meetings with the Mitigation Council to ensure continuous involvement of local staff and stakeholders in the development of this plan. The meetings were strategically scheduled throughout the project to gain valuable input from the Mitigation Council and to keep everyone informed of the project’s progress. The initial kick-off meeting was held March 31, 2016. The primary purpose of this meeting was to review the planning process in detail, describe individual roles and responsibilities, and begin the data gathering process. CMPDD provided Mitigation Council members with forms to aid in gathering data and deadlines to complete each phase of the planning process during each meeting. Following the initial meeting, over the course of several additional meetings, phone calls, mail, and email exchanges, CMPDD gathered the data needed to complete this plan update.

Mitigation Council Meeting Sign-in Sheets

SIGN IN SHEET

March 31, 2016
Madison County Hazard Mitigation Council

Name	Title	Email Address
Butch Hammack	Director	bhammack@madison-co.com
Norman Cannady	Tax Assessor	Norman.Cannady@madison-co.com
Tom LARIVIERE	FIRE COORDINATOR	TOM.LARIVIERE@MADISON-CO.COM
Lesley Callender	Senior Planner	lcallender@compdd.org

Madison Hazard Mitigation Council
June 6, 2016

Butch Hammack, EMA Director

Lesley Callender, Senior Planner

Madison Hazard Mitigation Council
August 22, 2016

Butch Hammack, EMA Director

Lesley Callender, Senior Planner

Public Participation and Additional Stakeholder Involvement

CMPDD took an active approach to engaging the public and others that hold a stake in mitigation planning in the development of this mitigation plan. Following a review of steps taken in the development of previous plans, CMPDD devised a public outreach strategy that provided several opportunities for participation by stakeholders, as well as the general public throughout the development of this plan. These opportunities included:

- o Visiting the CMPDD Mitigation Planning website page
- o Contacting CMPDD to become involved in the planning process
- o Reviewing and commenting on the draft document

Mitigation Planning Website

In coordination with the start of this project, CMPDD updated its Mitigation Planning website page, <http://www.cmpdd.org/mitigation-planning/>, to provide information about Madison County's mitigation planning process. The content for the page was updated to include a brief introduction to the mitigation planning process. In addition, those visiting the site were encouraged to get involved in the planning process by contacting CMPDD through the link provided on the site.

What are the current mitigation planning efforts?

CMPDD is currently working with several communities in CMPDD's area to develop revised Hazard Mitigation Plans as part of each communities next five-year update. Communities currently working with CMPDD to develop revised Hazard Mitigation Plans include:

Brandon	Flora	Pelahatchie	Bentonia
Sataria	Madison County	Clinton	Eden
Hazlehurst	Ridgeland	Vicksburg	
Rankin County	Florence	Jackson	
Richland	Yazoo City	Yazoo County	

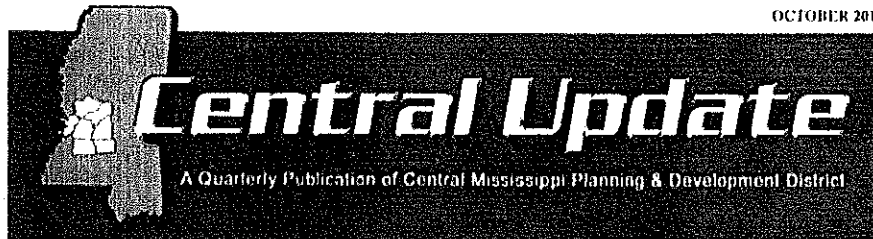
How can you get involved in the planning process?

Public participation is very important to the hazard mitigation planning process, and CMPDD is seeking involvement from mitigation stakeholders and the general public to participate in the planning process to update various Hazard Mitigation Plans for communities in Central Mississippi. As with any mitigation planning process, open public involvement is essential to the development of an effective comprehensive plan. For more information concerning the mitigation planning process underway for any of the communities listed above or to find out how you can be involved in the process contact Lesley Callender at (601) 981-1511.

<http://www.cmpdd.org/mitigation-planning/>

News Articles

In addition to the Mitigation Planning website page, CMPDD published news articles in its quarterly newsletters, *The Central Update*, on a regular basis. The newsletter is posted on CMPDD's website, as well as mailed to over 1,100 recipients. Those receiving the newsletter include neighboring communities, regional non-profit organizations, state and federal agencies, local utility providers, colleges and many other key stakeholders across Mississippi. A complete listing of neighboring communities and other key stakeholders receiving the newsletter by mail is available in Appendix A of this document. Each article published encouraged those interested in finding out more about the planning process underway in Madison County to contact CMPDD or to visit the mitigation planning website page for more information.



CMPDD's Medicaid Waiver Program Update

CMPDD's Elderly and Disabled Home and Community Based Medicaid Waiver Program provides case management and home-delivered meal services to Medicaid eligible elderly and/or disabled recipients who desire to remain in their home setting. The Registered Nurse and Licensed Social Worker teams assess the needs of the recipients, coordinate, and manage the services. As the need for in-home services is rapidly increasing, the District has expanded its staff to accommodate those needs.

- The District employs 22 teams serving 2,411 clients - a 15% increase in clients served over the last month.
- The third Rankin County team (Rankin 3) was added in July 2015 in an effort to serve more potential clients from the waiting list.
- An additional Hinds County team will be added soon, also as an effort to serve more potential clients from the Hinds County waiting list.
- A new Medicaid Waiver office at the Canton WTN Job Center was opened in August 2015. The two Madison County teams pictured above are now at the WTN Center, along with the Case Management Director.
- All 22 Case Management teams have been issued tablet computers to conduct assessments in the homes of potential clients. These allow the teams to submit necessary documentation to the Division of Medicaid in a more efficient, electronic manner.

For more information, please contact Teresa Shoto, Case Management Director, at 601-855-5914 or tsuroell@cmpdd.org



Front row: LaShonda Grant, RN & Katie Evans, LSW.
Back row: Rebecca Middleton, RN & Darlene Morton, LSW.

Hazard Mitigation Planning Update

The Federal Emergency Management Agency (FEMA) defines mitigation as, "the effort to reduce loss of life and property by lessening the impact of disasters. Mitigation is taking action now, before the next disaster, to reduce human and financial consequences later (analyzing risk, reducing risk, insuring against risk)."

Predicting where the next disaster will occur, and how severe its impact will be on a community is difficult. Natural disasters can occur at anytime and anyplace, and their human and financial consequences can be significant. Mitigation planning is intended to assist communities in determining their risks to natural disasters and develop an action plan to address the known risks by lessening the impact of natural disasters when they do in place. Over the next year, CMPDD will be working with several local jurisdictions to update their existing Hazard Mitigation Plans including the municipalities of Brandon, Flora, Florence, Georgetown, Jackson, Pelahatchie, Sartoria, Wesson, and Yazoo City and the counties of Copiah, Madison, Rankin, and Yazoo.

For more information concerning the mitigation planning process underway or to find out how you can be involved in the process contact Lesley Colleder at 601-981-1511 or visit the mitigation page on the District's website at www.cmpdd.org/mitigation-planning.



District Offers Classes on "A Matter of Balance" Program

As concerns regarding the safety and well-being of the older adult population increase, the need for training and specialized programs to address these issues are also on the rise. In an effort to address these needs, a "Fear of Falling: A Matter of Balance Program" was developed at Boston University in 1995 and was later recognized in 2006 by the American Society on Aging for their Innovation and Quality in Healthcare and Aging award. Subsequently, "A Matter of Balance Lay Leader Model" was later developed by a grant from the Administration on Aging. A training class for coaches of "A Matter of Balance" was conducted at CMPDD's main office on December 17-18, 2015.

by Master Trainers Chrissy Wilburn, Licensed Social Worker and Thania Averett, Senior Services Supervisor from Southern Mississippi Planning and Development District. Aging program employees from CMPDD and staff from surrounding Planning and Development Districts participated in the training.

The coursework is specifically designed to teach practical strategies to manage the risks of falling in the home. During this two (2) day intensive training, staff were trained to assist older adults with recognizing and managing fall risks in the home, and setting goals for increasing activity while teaching proper exercise techniques to increase strength, flexibility, and balance. Upon

completion of the training, employees became Certified Coaches and are able to conduct classes once a week for eight (8) weeks to participants at local senior centers or other interested organizations. During the eight (8) week session, individuals learn to view falls as controllable; set goals for increasing activity; make changes to reduce fall risks at home; and learn exercises to increase strength and balance. These classes are open to any person concerned about falls, anyone who has fallen in the past, and anyone who has restricted activities due to fall concerns. For more information or to schedule a training class, please contact CMPDD at 601-981-1516.

Hazard Mitigation Planning Update

The Federal Emergency Management Agency (FEMA) defines mitigation as "the effort to reduce loss of life and property by lessening the impact of disasters. Mitigation is taking action now - before the next disaster - to reduce human and financial consequences later (analyzing risk, reducing risk, insuring against risk)."

Predicting where the next disaster will occur, and how severe its impact will be on a community is difficult. Given the right conditions, natural disasters such as tornadoes and flash floods can occur at anytime and anyplace and their human and financial consequences can be significant. Mitigation planning is intended to assist communities in determining their risks to natural disasters and developing an action plan to address the known risks by lessening the impact of natural disasters when they do take place. Over the next year, CMPDD will be working with several local jurisdictions to update their existing Hazard Mitigation Plans before they expire including: Brandon, Clinton, Florence, Flora, Georgetown, Jackson, Pelahatchie, Ridgeland, Sattara, Vicksburg, Wesson, Yazoo City, and Copiah, Madison, Rankin and Yazoo Counties.

The Disaster Mitigation Act of 2000 requires local jurisdictions to maintain an approved Hazard Mitigation

Plan in order to maintain grant eligibility for certain pre- and post-disaster grant programs available through the MS Emergency Management Agency (MEMA) and FEMA. Furthermore, plans are required to be reviewed and updated every five years to account for any changes that might have occurred that could increase or decrease a community's risk to a particular hazard.

In November, the Multi-Jurisdictional Hazard Mitigation Plan for Copiah County, Georgetown, and Wesson was approved by MEMA and FEMA, and the plan will be considered by each jurisdiction for adoption in the coming weeks. In addition, CMPDD submitted a plan for the City of Brandon to MEMA and FEMA for their review and approval. For more information concerning the mitigation planning process underway or to find out how you can be involved in the process, contact Lesley Callender at 601-981-1511 or visit the District's mitigation website page <http://www.cmpdd.org/mitigation-planning/>.





Hazard Mitigation Planning Update

Over the last few months, CMPDD has prepared Hazard Mitigation Plans for the municipalities of Brandon, Florence, Pelahatchie, and Ridgeland. Mitigation planning is intended to assist communities in determining their risks to natural disasters and developing an action plan to address the known risks by lessening the impact of natural disasters when they do to place. Like any other part of the country, communities in Central Mississippi are vulnerable to many different types of natural hazards. Each hazard can have uniquely different human, economic, and environmental consequences.

The Disaster Mitigation Act of 2000 requires local communities to maintain an approved Hazard Mitigation Plan in order to maintain grant eligibility for certain pre- and post-disaster grant programs. Furthermore, plans are required to be reviewed and updated every five-years to account for any changes that might have occurred that could increase or decrease a community's risk to a particular hazard.

In the coming months, draft Hazard Mitigation Plans will be produced for municipalities of Clinton, Flora, Hazlehurst, Jackson, Richland, Sartoria, Vicksburg, and Yazoo City, and the Counties of Madison, Rankin, and Yazoo. Once complete, each plan will be submitted to the Mississippi Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for review and approval prior to local adoption procedures. The comprehensive planning process utilized in this project involves six (6) basic steps:

1. **Organizing the Planning Process/Building the Planning Team**
 - Engaging local leadership
 - Establishing a Mitigation Council
 - Developing and implementing an outreach strategy
 - Developing a project timeline

2. **Conducting a Community Assessment**
 - Reviewing existing plans and policies
 - Developing community profiles
 - Identifying critical facilities
 - Identifying local capabilities
 - Identifying participation in the National Flood Insurance Program
3. **Conducting a Risk/Vulnerability Assessment**
 - Identifying hazards
 - Developing hazard profiles
 - Identifying community assets
 - Analyzing risks to determine individual vulnerabilities
 - Summarizing overall vulnerabilities
4. **Developing Goals and Objectives**
 - Developing long-term outcomes through goal statements
 - Developing specific objectives for each long-term goal
5. **Developing a Mitigation Strategy**
 - Documenting progress implementing previous actions
 - Identifying an action plan specific to each community for the next 5-years
6. **Plan Review, Approval, and Adoption**
 - Draft plan review
 - Plan amendments if needed
 - Plan adoption

For more information concerning the mitigation planning process underway in Central Mississippi or to find out how you can be involved in the process contact Lesley Callender at 601-981-1511 or visit the District's mitigation website page <http://www.cmpdd.org/mitigation-planning/>.



Hazard Mitigation Planning Update

Over the last few months, CMPDD has prepared and submitted for approval Hazard Mitigation Plans for the Cities of Jackson and Vicksburg, and Yazoo County. The Disaster Mitigation Act of 2000 requires local jurisdictions to maintain an approved Hazard Mitigation Plan in order to maintain grant eligibility for certain pre- and post-disaster grant programs available through the MS Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA). In addition, plans are required to be reviewed and updated every five years to account for any changes that might have occurred that could increase or decrease a community's risk to a particular hazard.

Predicting when the next disaster will occur, and how severe its impact will be on a community is difficult. Given the right conditions, natural disasters such as tornadoes and flash floods can occur at anytime and anywhere. Their human and financial consequences can be significant. Mitigation

planning is intended to assist communities in determining their risks to natural disasters and developing an action plan to address the known risks by lessening the impact of natural disasters when they do take place. In the coming months, CMPDD will be working with several local jurisdictions to update their existing Hazard Mitigation Plans before they expire including: The Cities of Clinton, Flora, Hazlehurst, and Richland and the counties of Madison and Rankin.

Earlier this year, revised Mitigation Plans were developed and approved by the Cities of Brandon, Florence, Georgetown, Ridgeland, Pelahatchie, Weston, and Copah County. For more information concerning the mitigation planning process that is underway or to find out how you can be involved in the process, contact Lesley Cullender at 661-561-1511 or visit the District's mitigation website page at <http://www.cmpdd.org/mitigationplanning>.

CMPDD Submits CDBG Public Facilities Applications

The CDBG Public Facility Program provides grant funds to local units of government for a variety of public improvement projects (e.g., water or sewer facilities, storm drainage, public buildings, street reconstruction, etc.) that benefit low and moderate income families and areas. Special priority is given to water and sanitary sewer projects that eliminate existing health and safety hazards.

Over the past several months, the District has assisted local governments with the preparation of CDBG Public Facility Applications. The District submitted six (6) applications to the Mississippi Development Authority for review and they are listed below.

Community Name	Project Description	CDBG Funds	Matching Funds
Village of Beauregard	Unserved Sewer	\$449,251.80	N/A
Town of Braxton	Water System Improvements	450,000.00	\$705,071.86
City of Canton	Water System Improvements	600,000.00	600,000.00
Village of Eden	Unserved Sewer	450,000.00	N/A
Town of Edwards	Unserved Sewer and Sewer Improvements	450,000.00	N/A
Village of Sartartia	New Well	450,000.00	N/A



The City of Flora has begun work on the Lashley Road CDBG Public Facility street project, which will provide sanitary sewer to be unserved areas. In addition to the \$500,000 in CDBG funds, the City provides over \$200,000 in matching funds. Funding for this local elected official from the City of Rankin and Hattiesburg. CMPDD Board and Emergency Committee member.

Review and Commenting Opportunities

Finally, the public was given the opportunity to review copies of the plan and to provide comments on Madison County’s plan during two (2) separate public review opportunities. The first opportunity took place during the draft stage of the plan, and the second opportunity took place just prior to formal adoption of the plan. Notices of these public review and comment opportunities were posted at various community buildings. Copies of the plan were also made available to the public at various locations listed in Table 2.2 during each comment and review period. Comments received during both public review and comment periods are listed in Table 2.3. All comments received during the two (2) separate public review opportunities were review by the Mitigation Council members after each review opportunity. Any relevant comments received were incorporated by the Mitigation Council into the final document as appropriate.

Table 2.2 Public Review Opportunities

Location	Dates Available	
	<i>Draft Review</i>	<i>Final Review</i>
Madison County Emergency Management 1633 W. Peace Street Canton, MS	September 19, 2016 – September 23, 2016	To be determined

Public Notice: posted at various community buildings

**DRAFT MADISON COUNTY
HAZARD MITIGATION PLAN
AVAILABLE FOR REVIEW**

Madison County has been working to update Madison County's Hazard Mitigation Plan. The purpose of this plan is to identify natural hazards that affect each community and identify actions each community can take to eliminate or reduce the risks identified.

Members of the community are encouraged to provide comments on the contents of this plan by reviewing a draft copy of the plan. Public copies of the plan can be reviewed starting Monday, September 19, 2016, and will be available for review through Friday, September 23, 2016 during normal business hours at the following location:

- Madison County Emergency Management: 1633 West Peace Street Canton, MS

Public Notice: posted at various community buildings

Table 2.3 Review Comments

Draft Review Comments

To be provided once the review is complete.

Final Review Comments

To be provided once the review is complete.

Plan Changes

Madison County's latest Hazard Mitigation Plan was adopted in 2011. The plan titled *Madison County Hazard Mitigation Plan Update* pertains to just the unincorporated limits of Madison County. Basic changes between this plan and previously developed plans include:

- Development of a revised plan format based on FEMA planning guidance;
- Incorporation of a detailed risk and vulnerability assessment;
- Identification of clearly defined community assets;
- Incorporation of a detailed analysis of the NFIP participating communities;
- Updated and detailed analysis of Planning, Regulatory, Administrative, Fiscal, and Political Capacities; and
- A revised plan based on current priorities and capabilities.

While the overall goal of this plan has not changed since the plan was last updated in 2011, this plan has been updated to reflect current priorities based upon local capabilities and financial resources. Priority changes include:

- Development of more clear and concise mitigation goals and objectives;
- Development of a mitigation strategy more accurately linked to local capabilities and available financial resources; and
- Development of a mitigation strategy based upon a more detailed risk assessment.

Previous Hazard Mitigation Plans for Madison County include:

- **Madison County Hazard Mitigation Plan Update 2011-2016**
- **Madison County Hazard Mitigation Plan 2005 – 2010**

Community Profile

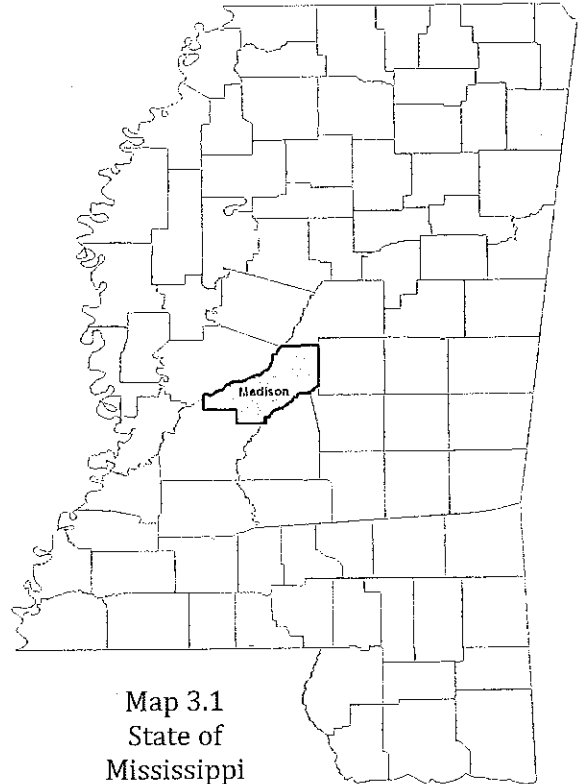
In this Section of the plan, profile information is presented and analyzed to develop an understanding of the components that comprise Madison County. This profile describes general information pertaining to Madison County's physical setting, population and demographics, general building stock, and land uses in order to develop an understanding of Madison County's characteristics.

Location

Madison County is located in central Mississippi, just ten miles north of the state capital and within the Jackson Metropolitan Statistical Area. The county, which includes the cities of Canton, Madison, Ridgeland, and Flora boasts the highest per capita income in Mississippi and is one of the fastest growing counties in Mississippi.

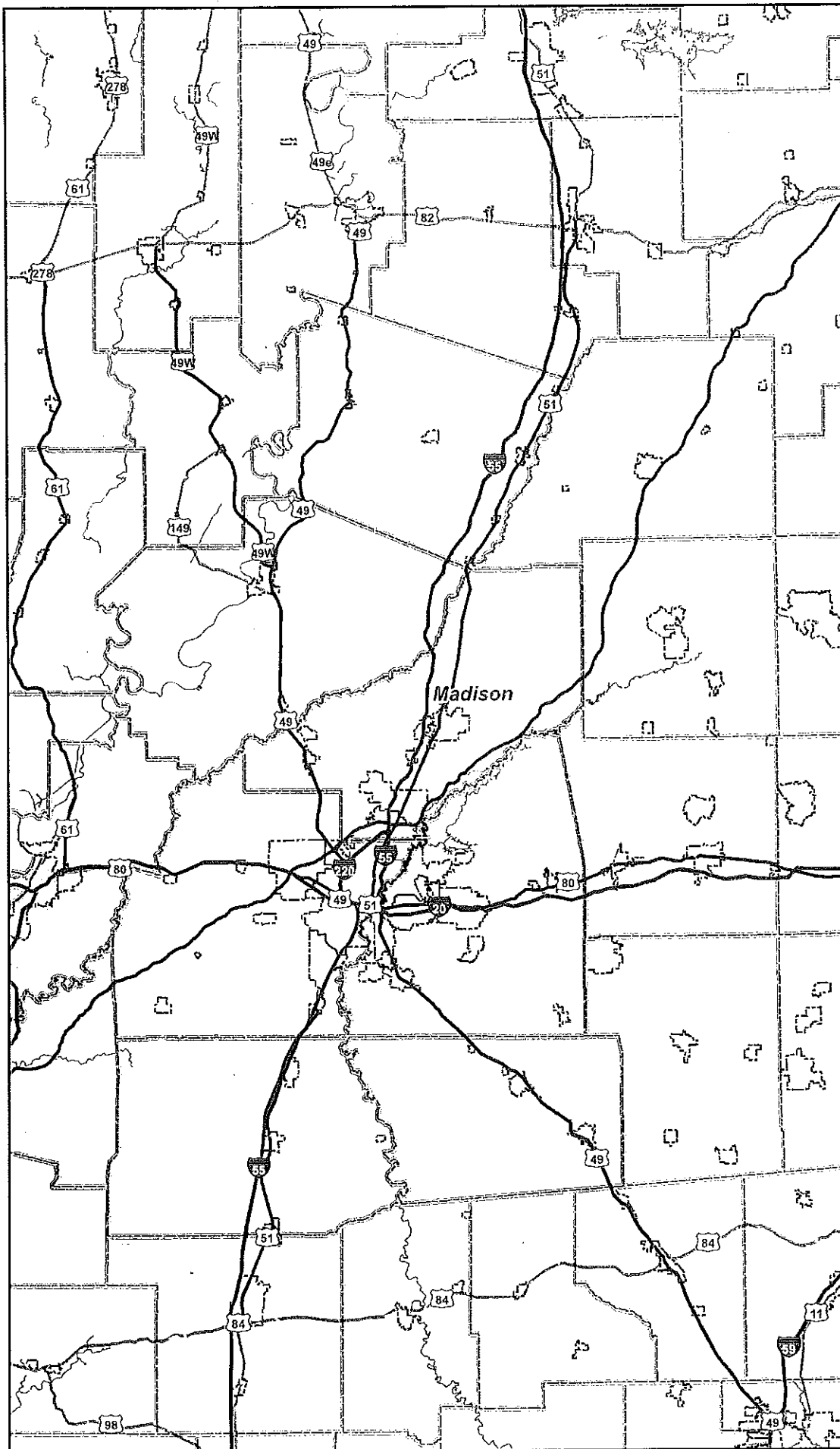
Transportation Network

Madison County has a well-developed transportation network. Major north/south corridors include Interstate 55 and Highways 49, 463 and 51. Major East/West Corridors include Highway 22, 16, and 43. Traffic volumes in 2014 averaged 47,000 vehicles per day in Madison County between the south Nissan interchange and Gluckstadt Road. In comparison, the average daily traffic volume on Highway 49 between the Flora City Limits and Highway 22 in Madison County includes 11,000 vehicles per day. Map 3.2 shows the location of major transportation corridors in Madison County and the designated evaluation routes within the county.



Map 3.1
State of
Mississippi

Evacuation & Transportation Data for Madison County, MS



Emergency Evacuation Routes

Route Classification

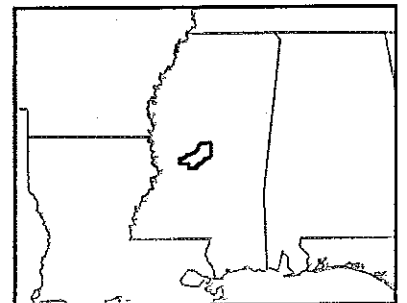
- Primary Evacuation Routes
- Alternate Evacuation Routes
- Interstates
- Major Highways
- Major Local Roads
- Municipalities
- County Boundaries



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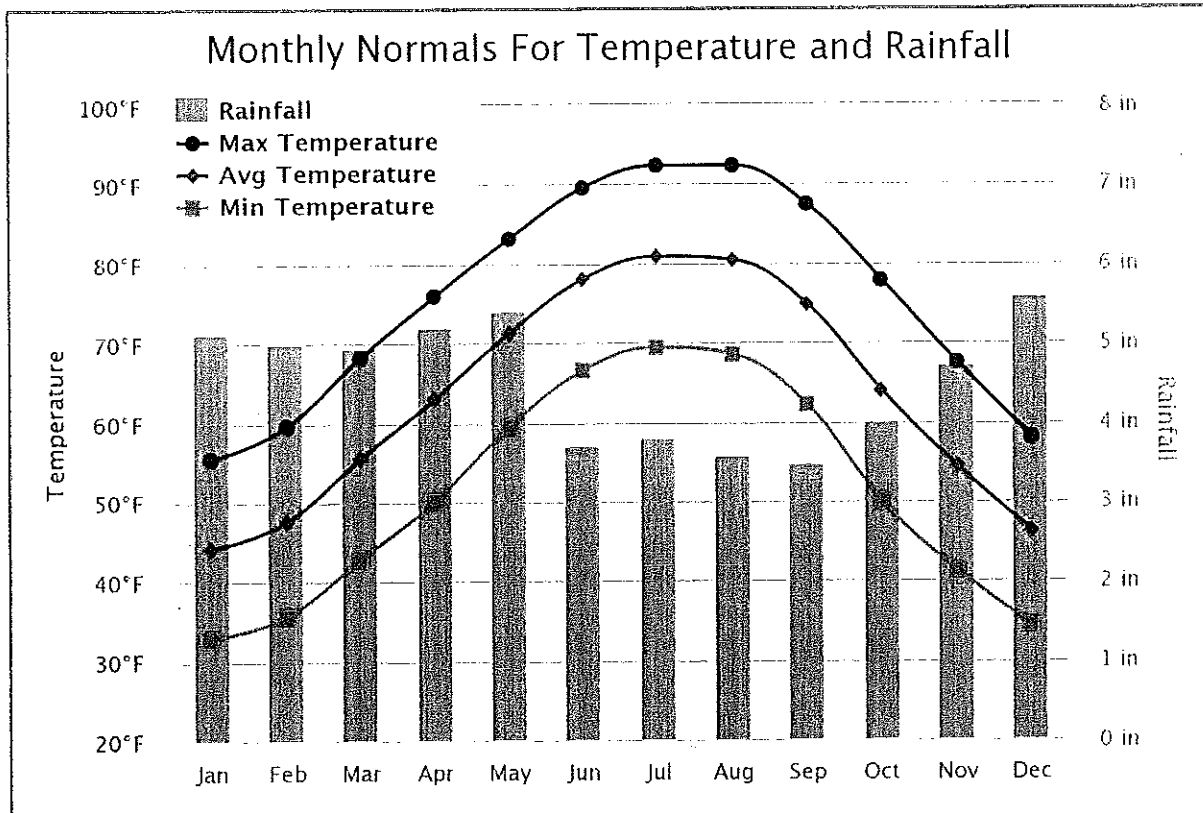


Climate

Madison County is located in the humid subtropical climate region, which is characterized by temperate winters; long hot summers; and rainfall that is fairly evenly distributed throughout the year. Temperatures average about 92 degrees in July and about 53 degrees in January. On average, the warmest month is July and the coolest month is January. Prevailing southerly winds provide moisture for high humidity and potential discomfort from May through September. Locally violent and destructive thunderstorms are a threat on an average of about 60 days each year. Normal precipitation averages from 3.4 to 5.6 inches per month throughout the area annually. Traceable amounts of sleet and snowfall are also typical.

**MS State University
Office of Climatologist**

“Mississippi has a climate characterized by absence of severe cold in winter, but by the presence of extreme heat in summer. The ground rarely freezes and outdoor activities are generally planned year-round. Cold spells are usually of short duration and the growing season is long. Rainfall is plentiful, but so are dry spells and sunshine.”



Source: Southern Regional Climate Center

People

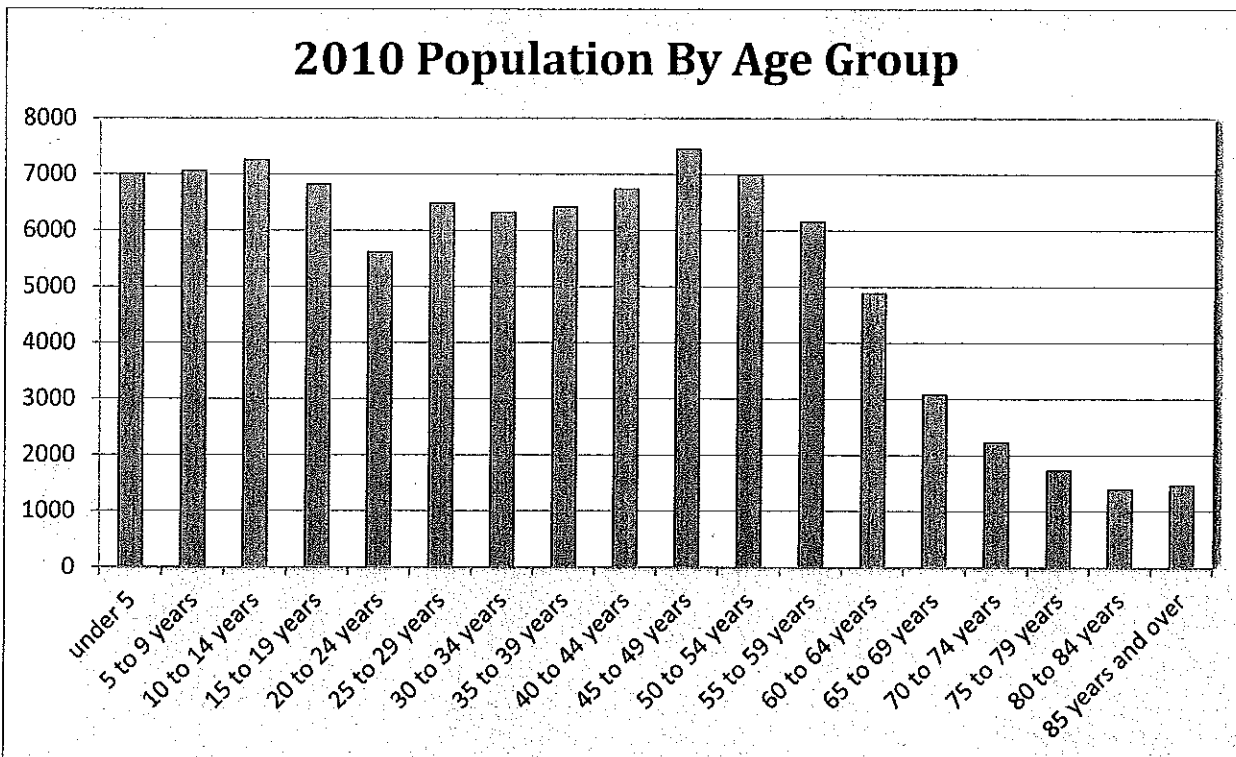
According to the 2010 U.S. Census, Madison County had a population of 95,203 people. The Disaster Mitigation Act of 2000 requires Mitigation plans to consider socially vulnerable populations as part of the planning process. These populations can be more susceptible to hazard events, based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their home. Table 3.1 presents the population statistics for Madison County.

Table 3.1: Population

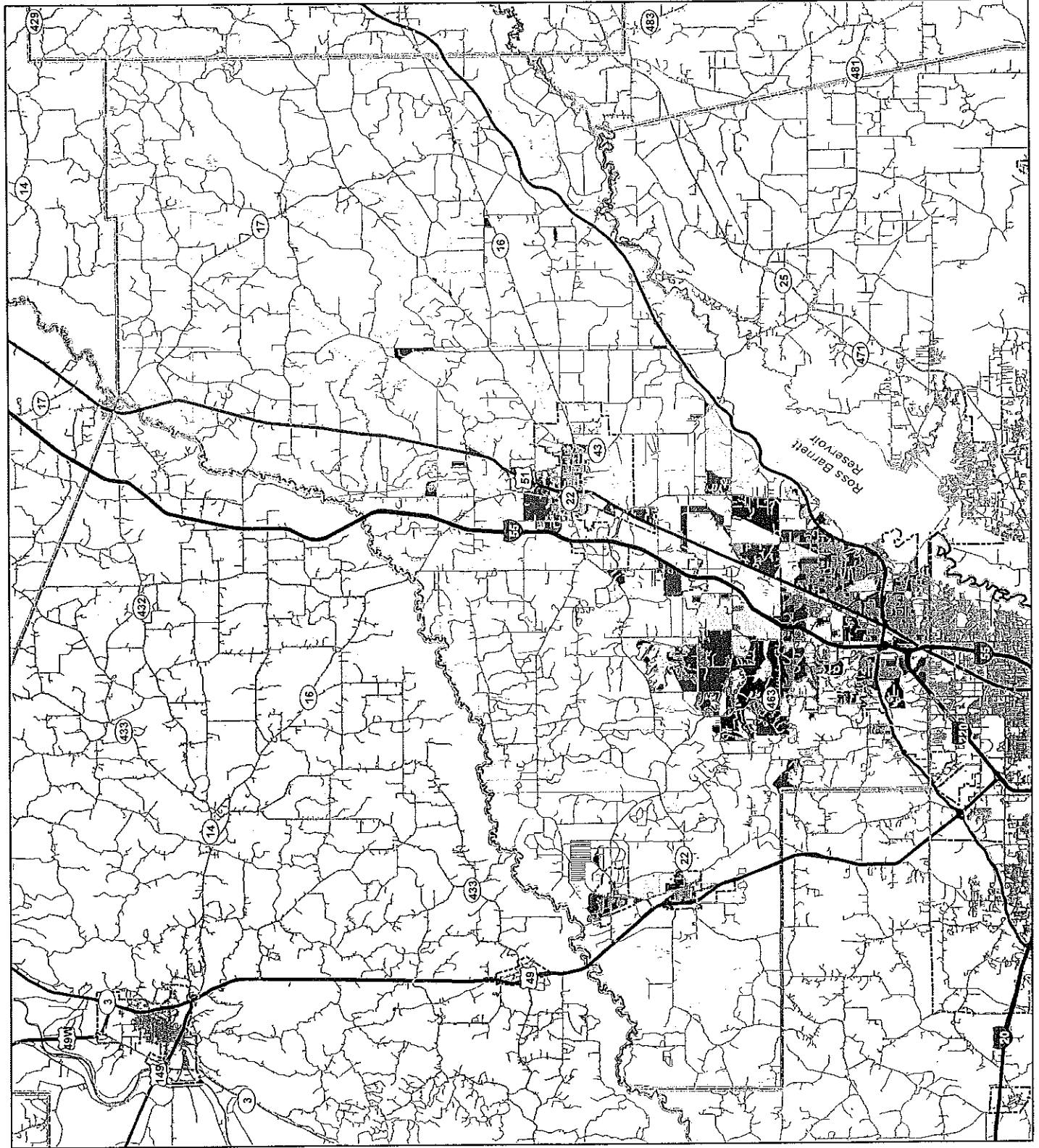
Jurisdictions	2010 U.S. Census			American Community Survey		
	Total Population	Pop. 65+	% Pop. 65+	Pop. Below Poverty Level	% Below Poverty	2015 Pop. Estimate
Madison County	95,203	9,917	10.4%	12,734	13.1%	103,465

Source: U.S. Census Bureau

It is evident in the population analysis for Madison County that the largest population segment are those aged 45 to 49. In comparison, only 10.4% of the residents are 65 years or older, and 13.1% of the total population is below the poverty level. Map 3.3 shows the distribution of the general population density (persons per square mile) by Census block based on 2010 Census data.



Distribution of General Population for Madison County, MS



U.S. Census 2010
PopPerSqMile

< 100

101 - 200

201 - 300

301 - 400

> 400

Municipalities

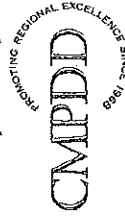
Interstates

Major Highways

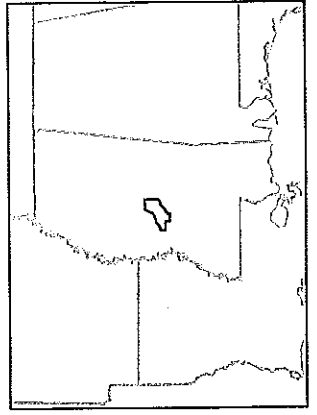
Major Local Roads

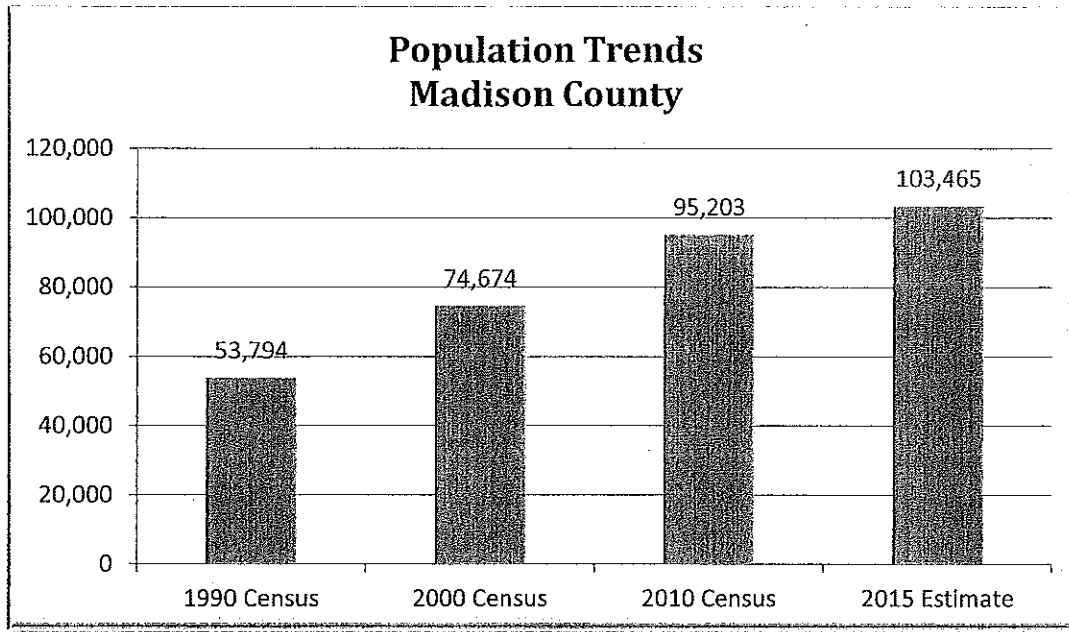


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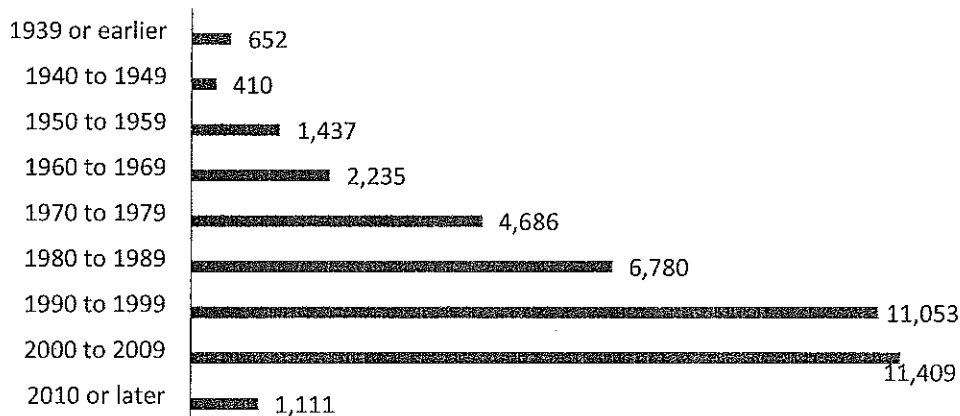




General Building Stock

The 2010-2014 American Community Survey identified 39,773 housing units in Madison County. The vast majority of housing structures were built after 1990 with the largest percent of housing units built between 2000 and 2009 (28.7%). The housing stock consist of mostly 1-unit detached housing structures (73%) while 5.9% of the housing stock includes mobile homes.

Madison County Housing Year Structures Built



Economy

The U.S. Census Bureau 2010-2014 American Community Survey also provides household income data for Madison County. According to the American Community Survey, 40% of households in Madison County have a household income of less than \$50,000 per year, while 60% of the households have an income over \$50,000 per year.

TABLE 3.2 Household Income

Household Income	Estimate	Percent
Less than \$10,000	2,497	6.8%
\$10,000 to \$14,999	1,665	4.5%
\$15,000 to \$24,999	3,103	8.5%
\$25,000 to \$34,999	2,894	7.9%
\$35,000 to \$49,999	4,544	12.4%
\$50,000 to \$74,999	6,740	18.4%
\$75,000 to \$99,999	4,504	12.3%
\$100,000 to \$149,999	5,543	15.1%
\$150,000 to \$199,999	2,008	5.5%
\$200,000 or more	3,201	8.7%

Source: American Community Survey

The U.S. Census Bureau's County Business Pattern data identified 2,972 business establishments employing over 46,000 people in Madison County. The retail trade and manufacturing sectors employ the largest number of employees in the county. Table 3.3 provides the 2014 Business Patterns for Madison County.

TABLE 3.3 Business Patterns 2014

Industry	Number of Establishments	Number of Employees
Agriculture, forestry, fishing and hunting	6	--
Mining, quarrying, and gas extraction	16	158
Utilities	9	109
Construction	210	1,877
Manufacturing	58	6,764
Wholesale Trade	168	2,247
Retail Trade	514	7,022
Transportation and warehousing	40	820
Information	74	2,745
Finance and Insurance	333	3,137
Real estate and rental and leasing	140	946
Professional, scientific and technical services	382	3,448
Management of companies and enterprises	30	735
Administrative and support and waste management and remediation services	135	2,678
Educational Services	40	1,675
Health care and social assistance	266	3,773
Art, entertainment and recreation	43	502
Accommodation and food services	255	5,144
Other Services (except public administration)	244	2,711
Not Classified	9	--
TOTALS	2,972	46,526

Source: U.S. Census Bureau

Land Uses

Land use regulatory authority in Mississippi is vested in each local jurisdiction. According to state law, zoning and other land use regulations must be based upon a Comprehensive Plan. A Comprehensive Plan must include a minimum of four components in order to comply with state regulations. These components include long-range goals and objectives, a land use plan, a transportation plan, and a community facilities plan. The county completed an update to its Comprehensive Plan in 2012. Existing land use patterns identified in the plan consist of fifteen (15) main land use categories. A review of the county’s development patterns indicated development patterns have maintain consistency with previous development patterns, and no increased risk to the county due to development has been identified. Map 3.4 provides an overview of development patterns in Madison County.

TABLE 3.4 Summary of Madison County’s Existing Land Uses

Land Use Category
Agricultural and Vacant Land
Residential Estate
Low Density Residential
Moderate Density Residential
High Density Residential
Garden Residential, Patio Homes
Manufactured Home Residential
Mixed Site-Built and Manufactured Home
Office Commercial
General Commercial
Major Thoroughfare Commercial
Light Industrial
Heavy Industrial
Parks and Open Space
Public/Quasi-Public

Source: Existing Land Use Survey

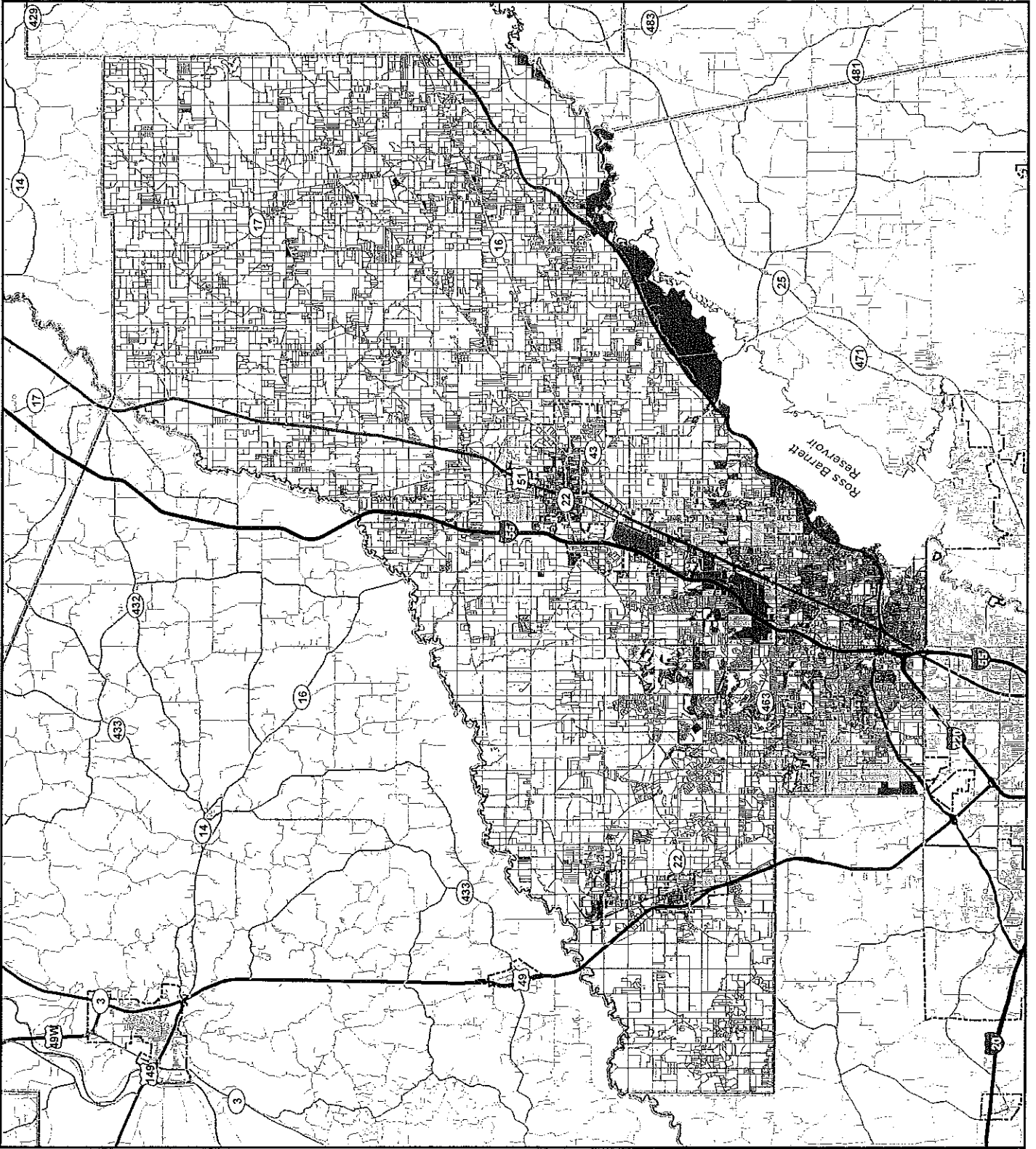
Future development planned within Madison County for any significant residential, commercial, or infrastructure projects within the next 5 years are provided in the table below.

TABLE 3.5 Future Development

Project Name	Type of Project	Number of Structures	Location
New Development	Residential	361	Stribling Road and Dewees Road

Source: Local Mitigation Council

Zoning Data for Madison County, MS

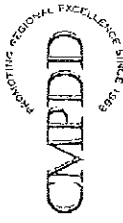


LEGEND

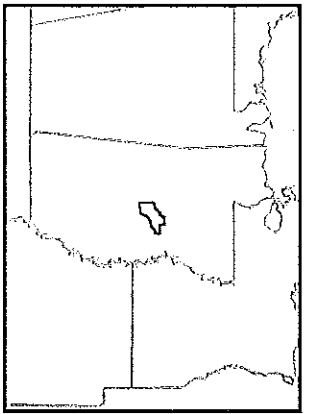
- AI
- R1
- R1A
- R2
- R3
- R5
- MHP
- PUD
- C1
- CLA
- C2
- I2
- SU1
- TIP
- Municipalities
- Water
- Interstates
- Major Highways
- Major Local Roads



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Review and Incorporation of Existing Plans

There are several regulatory and planning mechanisms in place in Madison County at the state, county and municipality level of government which support hazard mitigation planning efforts. These tools include items such as the 2013 State of Mississippi Standard Hazard Mitigation Plan, County Hazard Mitigation Plan, local Floodplain Management Ordinance, Comprehensive Plan, local Emergency Operation Plan, as well as, a Zoning Ordinance. These mechanisms were discussed at Mitigation Council meetings and are described in Section 5. Each of these existing mechanisms enhance the county's ability to implement a comprehensive mitigation strategy. Therefore, existing regulatory and planning mechanisms were reviewed and incorporated into the development of this document as appropriate, including identifying mitigation actions which enhance existing policies. An example of how existing mechanisms were incorporated into this plan includes but is not limited to the following examples:

State of Mississippi Standard Hazard Mitigation Plan

The Mississippi Emergency Management Agency prepared the 2013 Statewide Hazard Mitigation Plan, which was an update to a previously developed plan. This Plan was thoroughly reviewed for the purpose of ensuring consistency with the development of this county plan. For instance, the state incorporated a new methodology to determine the risk level the state faces from each identified hazard. Therefore, for consistency purposes the same methodology was used in the development of this plan, Section 4.

Jurisdictional Hazard Mitigation Plans

The following plans were reviewed for information relevant to the county.

Madison County Hazard Mitigation Plan Update, 2011
District 5 Regional Hazard Mitigation Plan, 2015

Risk Assessment

Madison County is vulnerable to a wide array of natural hazards that threaten the health, safety and welfare of the county’s residents. This section of the plan provides a description of the type, location and extent of all natural hazards that can impact Madison County. Each hazard identified includes a description of the type of hazard, the area that can be affected by the potential hazard, and an analysis of the impact the hazard may have on the area. The assessment conducted in this section is based upon previous occurrences of natural hazards, research material reviewed and a risk assessment completed by the Mitigation Council.

Hazard Identification

To begin the risk assessment process, the Mitigation Council reviewed a number of sources to develop a list of potential hazards affecting Madison County. The potential hazards were identified through a process that considered input from the Mitigation Council, research of previous events, a review of existing Hazard Mitigation Plans, as well as the 2013 State of Mississippi Standard Hazard Mitigation Plan Update, and a range of hazards included in FEMA planning guidance. Through the review process the Mitigation Council identified ten (10) potential natural hazards impacting Madison County. Table 4.1 summarizes the full range of potential hazards examined during the hazard identification process. Some hazards such as coastal erosion were automatically eliminated as a potential hazard due to the geographical location of Madison County. Table 4.2 provides a listing of recent Major Disaster Declarations which have included Madison County.

Table 4.1 Evaluations of Potential Hazards

Potential Hazard	Is this a hazard that may occur in Madison County	How was this determination made?
Dam / Levee Failure	Yes	<ul style="list-style-type: none"> • Review of the State Mitigation Plan revealed there are over 3,000 dams in the state with over 300 of them rated as a high or significant hazard dam. • The Mitigation Council identified over 50 dams within Central Mississippi including some in Madison County following an initial review of the MS Dept. of Environmental Quality (MDEQ) inventory of MS Dams.
Drought	Yes	<ul style="list-style-type: none"> • Review of Existing Mitigation Plan identified drought as a potential risk. • Review of the State Mitigation Plan revealed the state identifies drought as a non-location specific hazard and all areas of Mississippi are vulnerable to drought. • The Mitigation Council identified 25 drought and/or prolonged heat wave days affecting Central Mississippi since 2007 during an initial review of recent weather events from the National Weather Service.
Earthquake	Yes	<ul style="list-style-type: none"> • Review of existing Mitigation Plan identified an earthquake as a potential risk. • Review of the State Mitigation Plan revealed Mississippi is not only at risk to an earthquake originating in Mississippi but to those originating in surrounding states as well. • Identified proximity to the New Madrid Seismic Zone as a concern.

Table 4.1 Continued

Potential Hazard	Is this a hazard that may occur in Madison County	How was this determination made?
Expansive Soils	Yes	<ul style="list-style-type: none"> • Review of existing Mitigation Plan revealed expansive soils as a potential risk. • Review of the State Mitigation Plan revealed expansive soils do not typically cause a statewide impact and is mitigated at the local level. • The Mitigation Council identified potential risk areas by reviewing USGS soil maps that identified abundant clay areas in Central Mississippi having high swelling potential. • The Mitigation Council acknowledged little to no documented history of previous occurrences causing damage is readily available.
Flooding	Yes	<ul style="list-style-type: none"> • Review of existing Mitigation Plan revealed flooding has been identified as a potential risk. • The Mitigation Council identified multiple repetitive loss properties in Central Mississippi.
Tropical Storms	Yes	<ul style="list-style-type: none"> • Review of existing Mitigation Plan identified tropical storms as a potential risk. • According to the State Mitigation Plan, the Gulf Coast of Mississippi is located in a high-hazard area for hurricanes and storm surge. However, hurricane effects have also impacted, with less severity, the medium to low risk counties located further inland, which includes areas in Madison County.
Severe Storms (high wind, hail, and lightning)	Yes	<ul style="list-style-type: none"> • Review of existing Mitigation Plan revealed severe storms as a potential risk. • According to the State Mitigation Plan, severe storms can occur at any time in Mississippi given the right atmospheric conditions. • The Mitigation Council identified an average of 60-70 thunderstorms annually occur in Central Mississippi based on data from the National Weather Service. • Historical records indicate the entire state is vulnerable to severe thunderstorms
Tornado	Yes	<ul style="list-style-type: none"> • Review of existing Mitigation Plan revealed tornadoes as a potential risk. • According to FEMA's map of Wind Zones in the United States, Central Mississippi is located in the highest risk area for tornadoes. • According to the State Mitigation Plan, 426 tornadoes have occurred in Central Mississippi between 1950 and 2012.
Wildfire	Yes	<ul style="list-style-type: none"> • Review of existing Mitigation Plans revealed wildfires as a potential risk. • According to the MS Forestry Commission (MFC), Mississippi averages 3,200 wildfires a year burning more than 55,000 acres. • Review of the State Mitigation Plan revealed 1,024 wildfire incidents have been reported to the MFC in Central Mississippi between 2007 and 2012.

Table 4.1 Continued

Potential Hazard	Is this a hazard that may occur in Madison County	How was this determination made?
Winter Storms	Yes	<ul style="list-style-type: none"> Review of existing Mitigation Plan revealed winter storms as a potential risk. Since 2005 the National Weather Service has recorded 12 winter weather related events in Central Mississippi. According to the State Mitigation Plan, the cost of winter storm events between 1996 and 2013 were more costly to counties in Central Mississippi compared to other areas of the state.
Avalanche	No	<ul style="list-style-type: none"> Recognized by FEMA as a hazard prone to the United States, but poses no threat to Mississippi.
Coastal Erosion	No	<ul style="list-style-type: none"> Recognized as a hazard for coastal areas, but poses no threat to Madison County due to its geographical location
Landslide	No	<ul style="list-style-type: none"> Recognized by FEMA as a hazard prone to the United States, but poses no threat to Mississippi.
Tsunami	No	<ul style="list-style-type: none"> Recognized by FEMA as a hazard, but poses no threat due to Madison County's geographical location
Volcano	No	<ul style="list-style-type: none"> Recognized by FEMA as a hazard prone to the United States, but poses no active threat to Mississippi.

Table 4.2 Major Disaster Declaration Including Madison County

Date	Description
May 12, 2014	Severe Storms, Tornadoes, and Flooding (DR-4175)
August 29, 2012	Hurricane Isaac (DR-4081)
August 29, 2005	Hurricane Katrina (DR-1604)
July 10, 2005	Hurricane Dennis (DR-1594)
April 24, 2003	Severe Storms, Tornadoes, and Flooding (DR-1459)

Natural Hazard Profiles

Hazard profiles look at the impact, historical occurrences, and the probability of future occurrences for each hazard identified through the hazard identification process. Developing a hazard profile for each natural hazard allows the Mitigation Council and other users of this Hazard Mitigation Plan to look at the unique characteristics of each individual hazard and determine which areas in Madison County are vulnerable to a specific hazard.

DAM / LEVEE FAILURE

Description

A Dam is a barrier that impounds water or underground streams. Dams generally serve the primary purpose of retaining water, while other structures such as floodgates or levees are used to manage or prevent water flow into specific areas. Dam failure is the collapse, breach or other failure of a dam structure that results in an uncontrolled release of impounded water causing downstream flooding. Dam failures due to natural events such as prolonged periods of rainfall and flooding can result in overtopping. Human-induced failures may be attributed to improper design, improper maintenance, or negligent operation and typically include inadequate spillway capacity resulting in overtopping, or internal erosion caused by embankment or foundation leakage. The Mississippi Department of Environmental Quality (MDEQ) is responsible for protecting the state's water resources, which includes monitoring the state's 3,000 plus dams.

According to the U.S. Army Corps of Engineers levees are defined as follows:

Levee - a man-made structure, usually an earthen embankment or concrete floodwall, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water to provide reasonable assurance of excluding temporary flooding from the leveed area.

Levee System - one or more levee segments and other features such as floodwalls and pump stations, which are interconnected and necessary to ensure exclusion of the design flood from the associated leveed area.

Leveed Area - the lands from which flood water is excluded by the levee system.

Levees are designed to reduce the risk of flooding. However, no levee system can eliminate all flood risk. A levee is generally designed to control a certain amount of floodwater. If a larger flood occurs than what it is designed to hold, floodwaters will flow over the levee. Flooding also can damage levees, allowing floodwater to flow through an opening or breach.

Location and Extent

According to MDEQ there are multiple dams located throughout Madison County and no levee systems in Madison County. MDEQ ranks dams by hazard classification, which is determined by the potential for loss of life, as well as infrastructure and property damages downstream if a dam failure were to occur.

The three hazard classifications used by the MDEQ’s Dam Safety Division include:

- **High Hazard:** Dam failure may cause loss of life, serious damage to homes, industrial or commercial buildings, important public utilities, main highways or railroads.
- **Significant Hazard:** Dam failure may cause significant damage to main roads, minor railroads, or cause interruption of use or service of relatively important public utilities.
- **Low Hazard:** Dam failure may cause damage to farm buildings (excluding residences), agricultural land, or county or minor roads.

MDEQ has identified 308 dams in Madison County. Map 4.1 depicts the locations of dams in Madison County.

Table 4.3 Dams

Jurisdiction	Number of Dams				Total Dams
	High Hazard	Significant Hazard	Low Hazard	Undetermined Hazard	
Madison County	18	6	92	192	308

Source: MDEQ

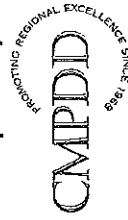
Dam Hazard Data for Madison County, MS

Mississippi Department of
Environmental Quality
Hazard Class:

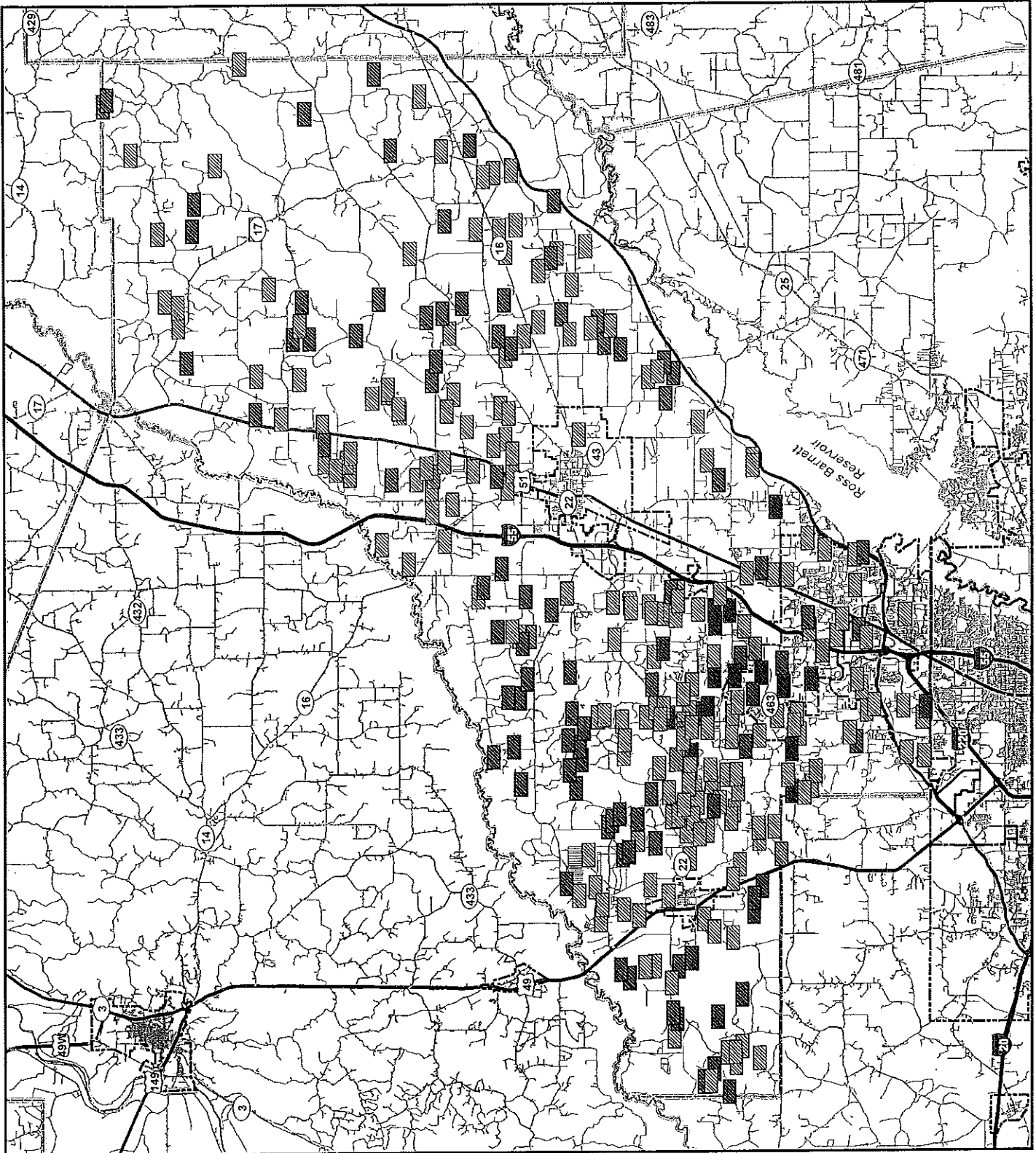
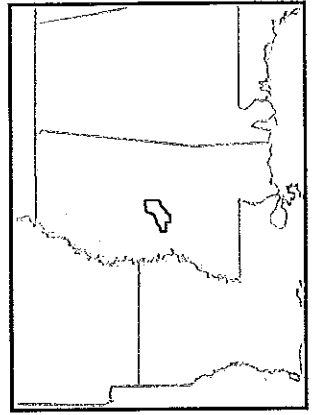
- High Hazard
- Significant Hazard
- Low Hazard
- Unclassified
- Municipalities
- Interstates
- Major Highways
- Major Local Roads



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High Hazard Dams (source: Individual Dam Emergency Action Plans)

1. **Reunion Lake No.1** is a 193-acre lake. It is located approximately 3 miles West of Interstate 55 on the South side of Gluckstadt Road. The normal pool elevation of the Lake is 325 ft. with a storage volume of 1,528 acre-ft. In the event of a dam breach, Reunion Lake No.1 would create a flood discharge of 16,033 cfs, causing flooding for approximately 1.3 miles northeast of the dam. The approximate downstream flood area is 255 acres. The areas primarily impacted would include: 511-516 Cherry Hill Drive; 108-118 Cherry Bluff Drive; 495-502 Cherry Hill Drive; 101-117 Cherry Bluff Drive; 104-102 Kristin Hill Court; 502 to Catlett Road on Gluckstadt Road; and Sharp Road.
2. **Reunion Lake No. 2** is a 168-acre lake. It is located approximately 3 miles west of Interstate 55 on the South side of Gluckstadt Road. The normal pool elevation of the Lake is 325 ft. with a storage volume of 2,598 acre-ft. In the event of a dam breach, Reunion Lake No.2 would create a peak flood discharge of 12,700 cfs, causing flooding for approximately 2 miles east of the dam. The approximate downstream flood area is 460 acres. The areas primarily impacted would include: 285 Bozeman Road; 109, 113,117, and 121 Belle Chase; 110, 112 and 114 Belle Chase; 405, 267, 311 Bozeman Road; 100, 104, 112, 116, 126, 129 Elizabeth Avenue; 108, 116, 118, 120,122, 106, 104, 102, and 100 Ingleside East Drive.
3. **Brookstone Lake Dam** is located off of Mannsdale Road in Madison County. The primary function of the lake is as a recreational facility. The dam was originally constructed in 2000, and modified in 2005 to bring the lake into compliance with current regulations. At its normal pool elevation, Brookstone Lake Dam impounds approximately 27 acre-feet with a surface area of about 6 acres. Areas which might be affected by a failure of Brookstone Lake Dam or by flooding as a result of a large operational release include a portion of Ingleside subdivision. Approximately six (6) homes downstream of the dam have the potential to be affected. Streets to be evacuated include Ingleside Drive, Norfleet Way, and McCallum Court.
4. **Cypress Lake Dam** is located west of Highland Colony Road and south of MS Highway 463. The function of the lake is for recreation and residential development. The dam was re-constructed in 1994. At its normal pool elevation of 385.3 feet, Cypress Lake impounds approximately 136 acre-feet with a surface area of about 27 acres. Lake Circle Drive, Danforth Drive, Derby Drive, and Waters Drive will be affected by failure of Cypress Lake Dam. Furthermore, an estimated 26 residential structures may be impacted as well.
5. **Lake Lorman Dam** is located off of Coker Road in west Madison County. The primary function of the lake is as a recreational facility. The dam was modified in 2007 to bring it into compliance with current regulations. At its normal pool elevation, Lake Lorman Dam impounds approximately 2,770 acre-feet with a surface area of about 163 acres. Outflow from the principal spillway flows into an un-named tributary of Limekiln Creek. The area which might be affected by failure of Lake Lorman Dam or by flooding as a result of large operational releases includes one residential structure downstream of the dam.
6. **Gilmer Lake Dam** is located north of Arrington Subdivision off Church Road. The primary function of the lake is recreation for Willington Subdivision, Part I. The dam was constructed in 2009. At its normal pool elevation of 292 feet, Gilmer Lake Dam impounds approximately 100 acre-feet with a surface area of about 20 acres. Streets within the area

which will be affected include: Church Road (between Kehle Road and 269 Church Road), Calhoun Station Parkway, and Industrial Drive N (between Old Jackson Road and 135 Industrial Drive).

7. **Britton Lake Dam** is located just off of Highway 463 and Stribling Road. The primary function of the lake is for recreation and residential aesthetics. The dam was constructed in 2005. At its normal pool elevation of 286 feet, Britton Lake Dam impounds approximately 188 acre-feet with a surface area of about 31 acres. Streets in the area which will be affected include Stribling Road and Mullherrin Drive as well as portions of Hatheway Lake Residential area.

8. **Johnstone Lake Dam** is located off of Johnstone Drive just north of Gluckstadr Road. The primary function of the lake is for recreation and residential aesthetics. The dam was constructed in 2005. At its normal pool elevation of 312.5 feet, Johnstone Lake Dam impounds approximately 1,300 acre-feet with a surface area of about 104 acres. Streets in the area which will be affected include Stribling Road, Mullherrin Drive, Lippingwell Drive, and Quarles Drive.

9. **Costas Lake** is a private lake constructed in 1950 primarily as a recreational facility. The lake includes an estimated storage of 663 acre-feet. Water levels in the lake are regulated manually with a gate valve on the outlet pipe. Water leaving the outlet flows through a tributary of LaRue Creek. Based upon inundation maps developed as part of the Lake's Emergency Action Plan, portions of Ridgeland as well as developments further downstream in the City of Jackson are in the immediate path of potential floodwaters if a dam failure or a large operational release occurs. Streets in the potential path of inundation include:

Highland Colony Parkway	at Cole Road	Culley Drive	50-300
Cole Road	6300-6400	Chatham Circle	All
West County Line Road	2350-2150	Mimosa Drive	All
Windward Road	All	Crepe Myrtle Drive	All
Woodstock Drive	All	Crepe Myrtle Court	All
Winthrop Circle	All	Barnes Street	100-400
Whitestone Road	6100-6400	Cedars of Lebanon Drive	100-300
Woodacre Road	All	Grafton Street	All
Begonia Court	All	Manhattan Road	5250-5300
Morning Glory Court	All	Barbara Street	300-350
Orchid Court	All	Francis Street	300-350
Floral Drive	All	Serville Drive	All
Northfield Drive	All	Ponce DeLeon Court	All
Quail Lake Drive	6000-6400	D'Iberville Court	All
Wimbledon Court	All	Bienville Court	All
Beasley Road	100-500	Bounds Street	400-500
North Commerce Plaza Drive	All	Woodway Drive	All
Fernwood Drive	100-150	Marquis Street	All
Briarwood Drive	100-200	Grove Loop	All

10. **Burnt Corn WS STR 5 Dam** is located south of Highway 22 in Madison County. The primary function of the lake is flood control/storm water retention for Persimmon-Burnt Corn Drainage District. The dam was constructed in 1963. At its normal pool elevation, Persimmon-Burnt Corn WS Str. #5 has a surface area of about 43.1 acres. Highway 22 as well as five residential structures downstream will be impacted in the event of a dam failure.
11. **Lake Caroline Dam** is located northwest of Gluckstadt in Lake Caroline Subdivision between Stribling Road and Bellevue Drive. The primary function of the lake is for recreation and residential aesthetics. The dam was constructed in the late 1980's. At its normal pool elevation of 2,746 feet, Lake Caroline Dam impounds approximately 5,500 acre-feet of water with a surface area of about 700 acres. Roads downstream of the dam which will be affected include Bellevue Drive, Catlett Road, Stout Road, Highway 22, Stokes Road and Virililia Road.
12. **Chestnut Hill Lake Dam** is located in Madison County. No additional information is available at this time.
13. **Arrington Lake Dam** is located just north of Gluckstadt Road. Arrington Lake Dam height is 12 feet and the maximum storage capacity is 100 acre-feet. No additional information is available at his time.
14. **Deer Haven Dam** is located off of Robinson Springs Road in southwest Madison County. No additional information is available at this time.
15. **Lake Cavalier Dam** is located in southwest Madison County near Lake Cavalier Road. No additional information is available at this time.
16. **Scott Lake Dam** is located northwest of Gluckstadt Road and Dewees Road in Madison County. Scott Lake Dam height is 24 feet and the maximum storage capacity is 557 acre-feet. No additional information is available at this time.
17. **MS 05904 Lake Dam** is located just south of Stribling Road Extension near Stillhouse Creek Drive. The Dam height is 15 feet and the maximum storage capacity is 95 acre-feet. No additional information is available at this time.
18. **MS 05907 Lake Dam** is located at North Old Canton Road and Meadow Hills Drive. No additional information is available at this time.

Previous Occurrences

While dam failures in Mississippi have caused damages in recent years, there is no record of any significant damages, fatalities or injuries associated with a dam failure in Madison County in recent years.

Probability of Future Occurrence

Provided that adequate engineering and maintenance measures are in place, complete failure of a dam or levee in the future is unlikely, meaning they are rare occurrences with an expected occurrence rate of once every 50-years or greater. However, a low possibility will always exist that a future failure may occur simply by their existence. The severity of a dam failure event depends on various aspects related to the size of the dam, the extent of the failure, the velocity of the floodwaters released, and the intensity of the downstream development. State regulations require owners of high hazard and significant hazard dams to have their dams inspected by a registered engineer at recurring intervals. In addition, all high hazard and some significant hazard dams are required by State regulations to have an approved Emergency Action Plan in place.

DROUGHT

Description

Drought is defined by the National Weather Service as a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. Droughts are normally accompanied by heat waves, which are periods of excessive heat often combined with excessive humidity, and can result in human illnesses and even death as a result of exposure to heat. The severity of a drought depends upon the degree of moisture deficiency and the duration of the drought. Human factors such as water demand and water management can greatly change the impact of a drought on a region. There are four types of drought conditions:

Meteorological Drought is defined by a period of substantially diminished precipitation based on the degree of dryness (in comparison to some “normal” or average) and the duration of the dry period. The onset of a drought generally occurs with a meteorological drought.

Hydrological Drought is associated with periods of extended precipitation shortfalls that impact water supply (i.e., stream flow, reservoir and lake levels, and ground water).

Agricultural Drought occurs when there is a deficiency in the water supply that impacts crop production or livestock. Agricultural drought is defined in terms of soil moisture deficiencies relative to water demand of plant life, primarily crops.

Socio-economic Drought occurs when physical water shortages start to affect the health, well-being, and quality of life of people, or when drought starts to affect the supply and demand of an economic products.

Location and Extent

Droughts occur every year in the United States and can extend over long periods of time and large areas, including several States at once. According to the State of Mississippi Standard Mitigation Plan, all areas of Mississippi are vulnerable to drought; therefore, placing all of Madison County in the risk area for drought conditions.

Determining the onset, end, and severity of a drought can be difficult due to multiple indicators that must be examined in order to explain drought conditions. The United States Drought Monitor describes drought conditions based on five key indicators that examine dryness levels. Table 4.4 explains the indicators used to determine the severity of a drought by the U.S. Drought Monitor and the possible impacts that may occur.

Table 4.4 Drought Severity Classifications

Category	Description	Possible Impacts	Ranges				Objective Short and Long-term Drought Indicator Blends (Percentiles)
			Palmer Drought Index	CPC Soil Moisture Model (Percentiles)	USGS Weekly Stream flow (Percentiles)	Standardized Precipitation Index	
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.	-1.0 to -1.9	21-30	21-30	-0.5 to -0.7	21-30
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested	-2.0 to -2.9	11-20	11-20	-0.8 to -1.2	11-20
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed	-3.0 to -3.9	6-10	6-10	-1.3 to -1.5	6-10
	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions	-4.0 to -4.9	3-5	3-5	-1.6 to -1.9	3-5
	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells, creating water emergencies	-5.0 or less	0-2	0-2	-2.0 or less	0-2

Source: U.S. Drought Monitor

Previous Occurrences

According to the National Climatic Data Center, four (4) prolonged drought periods and thirty-six (36) excessive heat days have occurred in Central Mississippi since 2005, as listed in Table 4.5. Most recently a drought occurred in 2015 which was preceded by drought conditions in 2010. Each event lasted several months and resulted in multiple record heat days. Some of the worst drought conditions in Madison County occurred in July 2007 when drought conditions reached a D3, extreme drought rating and significant amounts of crop and property damages were reported.






TABLE 4.5 Central MS Drought Conditions, January 2005-December 2015

Date	Hazard	Number of Persons		Magnitude	Estimated Property Damage	
		Killed	Injured		Property*	Crop*
07/23-27/2005	Excessive Heat A 5-day "heat wave" occurred in Central MS that produced heat index values near 100 degrees each day with high temperatures ranging from 95 to 99 degrees.	0	0			
08/17-26/2005	Excessive Heat A 10-day "heat wave" occurred across much of the south with high temperatures consistently between 95 and 100 degrees, with 1 or 2 days reaching over 100 degrees.	0	0			
06/01/2006	Drought	0	0	D2	0.0k	0.0k
07/15-19/2006	Excessive Heat A 5-day "heat wave" gripped the region with high temperatures ranging from the upper 90s to around 100 degrees for five days.	0	0		0.0k	76.5k
09/05/2006	Drought	0	0	D0-D2	0.0k	0.0k
10/01/2006	Drought	0	0	D0	0.0k	800.00k
04/25/2007	Drought	0	0	D1	0.0k	0.0k
05/01/2007	Drought	0	0	D2	0.0k	400.0k
06/01/2007	Drought	0	0	D2	0.0k	1.000M
07/01/2007	Drought	0	0	D2-D3	30.00k	0.00k
08/05-16/2007	Excessive Heat A 12-day "heat wave" took hold of the south and brought some of the warmest temperatures since 2000. High relative humidity resulted in heat index values between 105 and 112 degrees. One death did occur, but not in Madison County.	1	0		0.0k	0.0k
07/15/2010	Drought	0	0	D0	0.0k	300.0k
08/01/2010	Drought	0	0	D0	0.0k	500.0k
08/01-04/2010	Excessive Heat A 4-day "heat wave" occurred across the region allowing temperatures to soar in to the triple digits. Across the Jackson, MS forecast area 19 record highs were set, with some heat index readings surpassing 110 degrees. The extreme heat resulted in 3 fatalities across the forecast area, but none in Madison County.	3	0		0.0k	0.0k
09/01/2010	Drought	0	0	D0	0.0k	500.0k
10/01/2010	Drought	0	0	D0	0.0k	500.0k
09/1/2015	Drought	0	0	D3	0.0k	400.00k

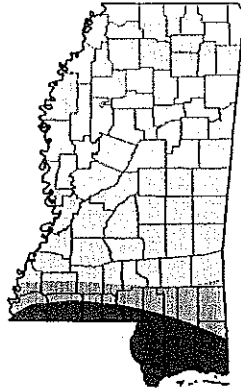
Source: National Climatic Data Center

*includes damage estimated for Central MS

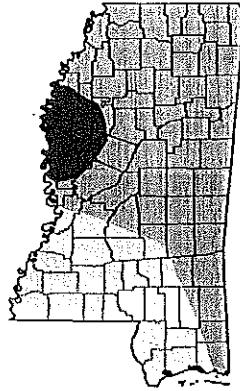
U.S. Drought Monitor Mississippi

-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

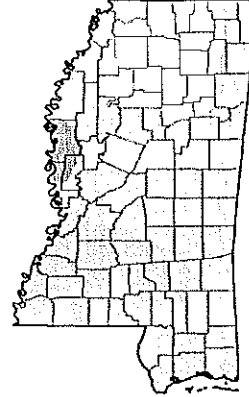
July 4, 2006



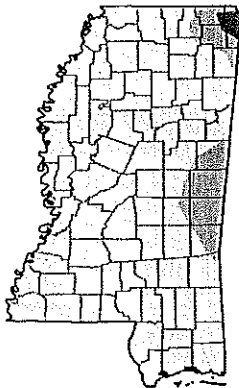
September 5, 2006



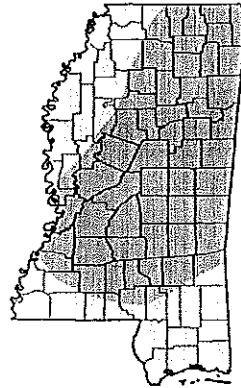
October 3, 2006



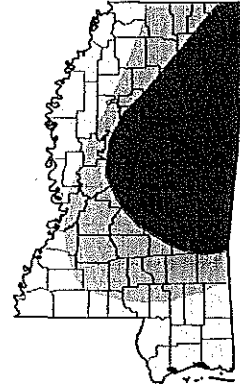
April 3, 2007



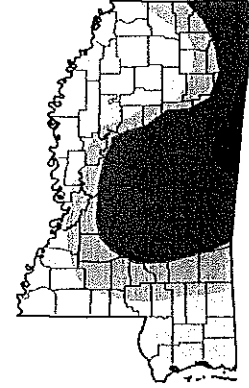
May 1, 2007



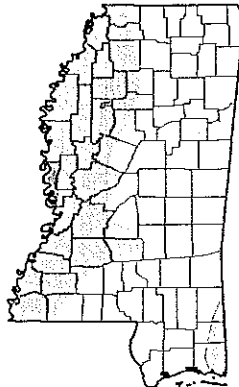
June 5, 2007



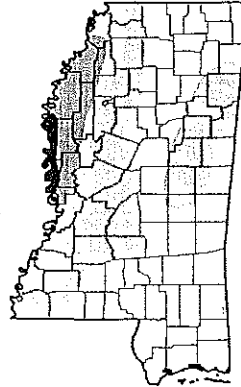
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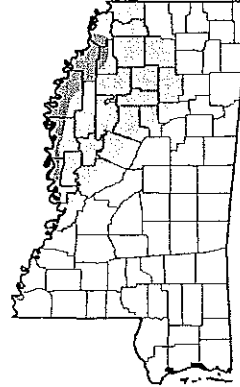
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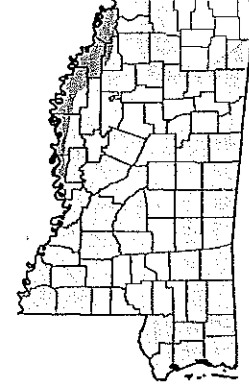
August 3, 2010

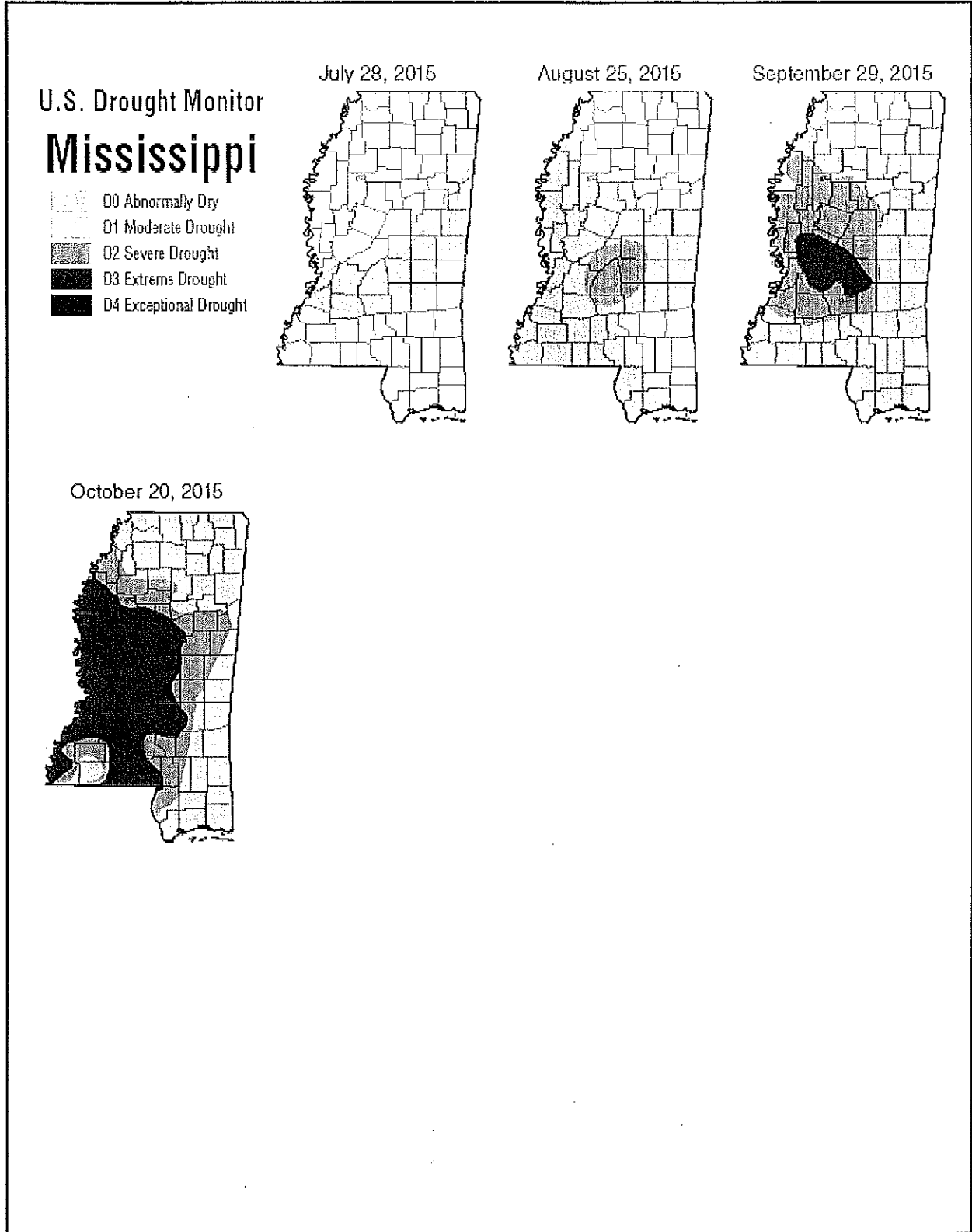


September 7, 2010



October 5, 2010

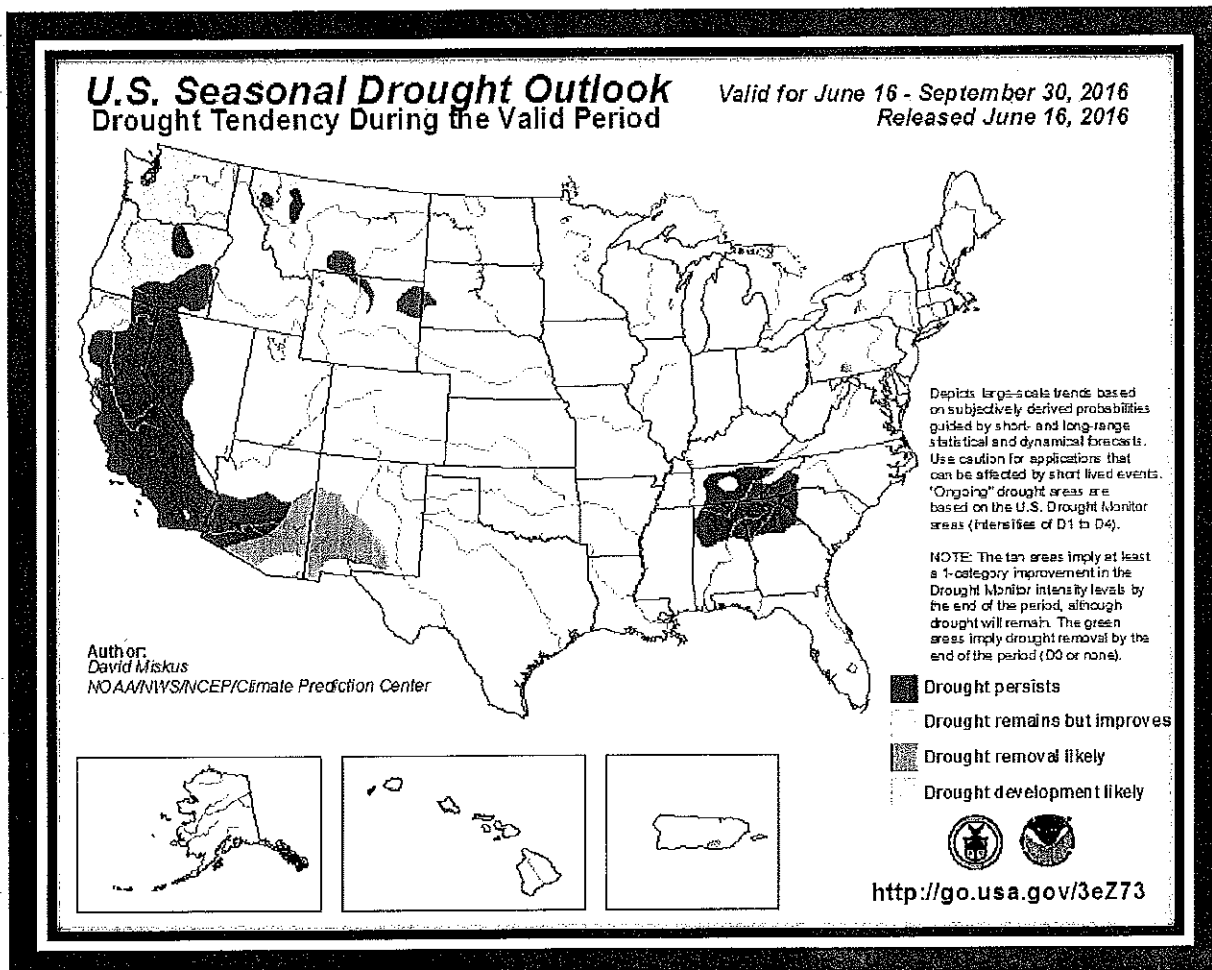




Probability of Future Occurrence

Predicting future drought conditions is difficult due to the number of variables that must be examined and the limited ability to accurately forecast precipitation and temperature months in advance. Historically, abnormalities of precipitation and temperatures have lasted from a time period as short as a few days to several months or even decades. Therefore, scientists can't predict drought conditions a month or more in advance. However, a number of steps are in place nationally to consistently monitor potential drought conditions such as the U.S. Drought Monitor and the National Drought Mitigation Center at the University of Nebraska-Lincoln.

It is anticipated that Madison County will continue to experience direct and indirect impacts of drought and extreme heat periodically, dependent largely upon the amount of deficiency in precipitation over an extended period of time. Currently, the National Weather Service Climate Prediction Center does not identify significant drought concerns for Madison County over the next four-month period.

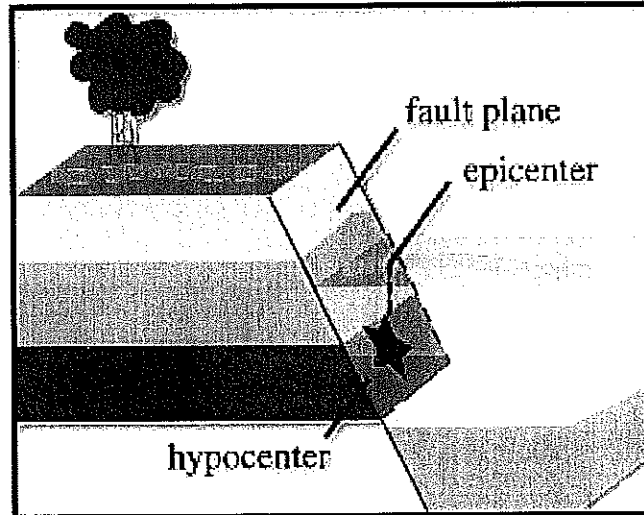


EARTHQUAKE

Description

FEMA describes an earthquake as ground shaking caused by a sudden movement of rock in the Earth's crust. Such movements occur along faults, which are thin zones of crushed rock separating blocks of crust. When one block suddenly slips and moves relative to the other along a fault, the energy released creates vibrations called seismic waves that radiate up through the crust to the Earth's surface, causing the ground to shake.

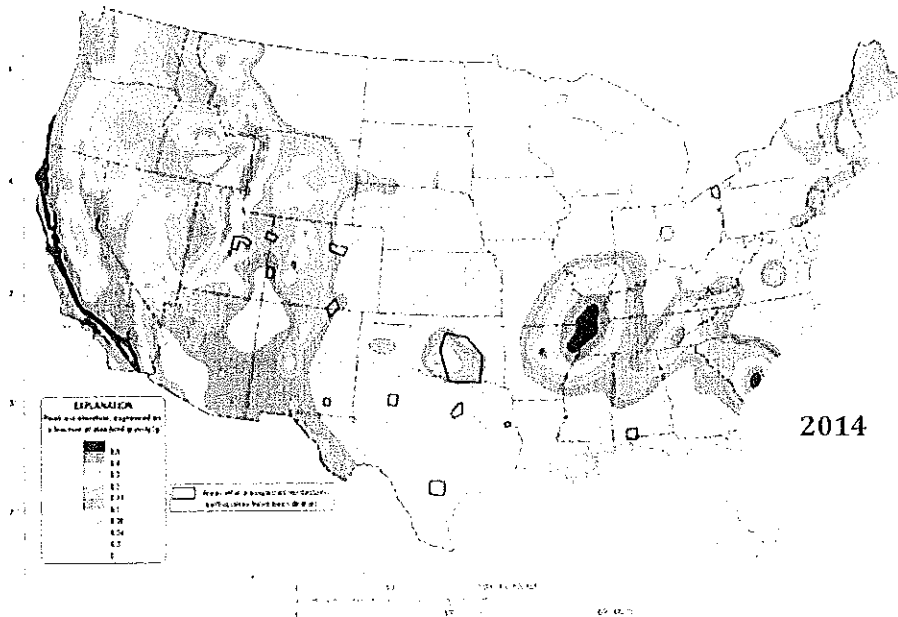
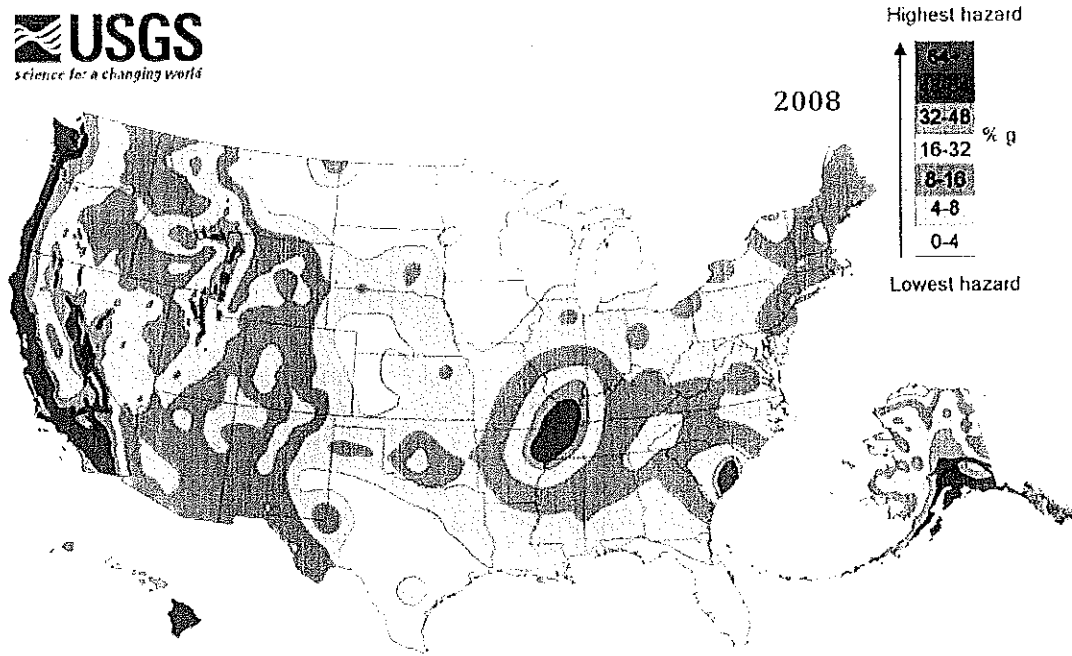
Earthquakes may last only a few seconds or up to several minutes. They can occur at any time of the day or night throughout the year. They are caused by stress that builds up over time as blocks of crust attempt to move but are held in place by friction along a fault. When the pressure to move becomes stronger than the friction holding them together, adjoining blocks of crust can suddenly slip, rupturing the fault and creating an earthquake. The underground point of initial rupture is known as an earthquake's focus or hypocenter, and the point at ground level directly above the hypocenter is known as its epicenter. Generally, the severity of the resulting ground motion increases with the amount of energy released and decreases with distance from the epicenter.



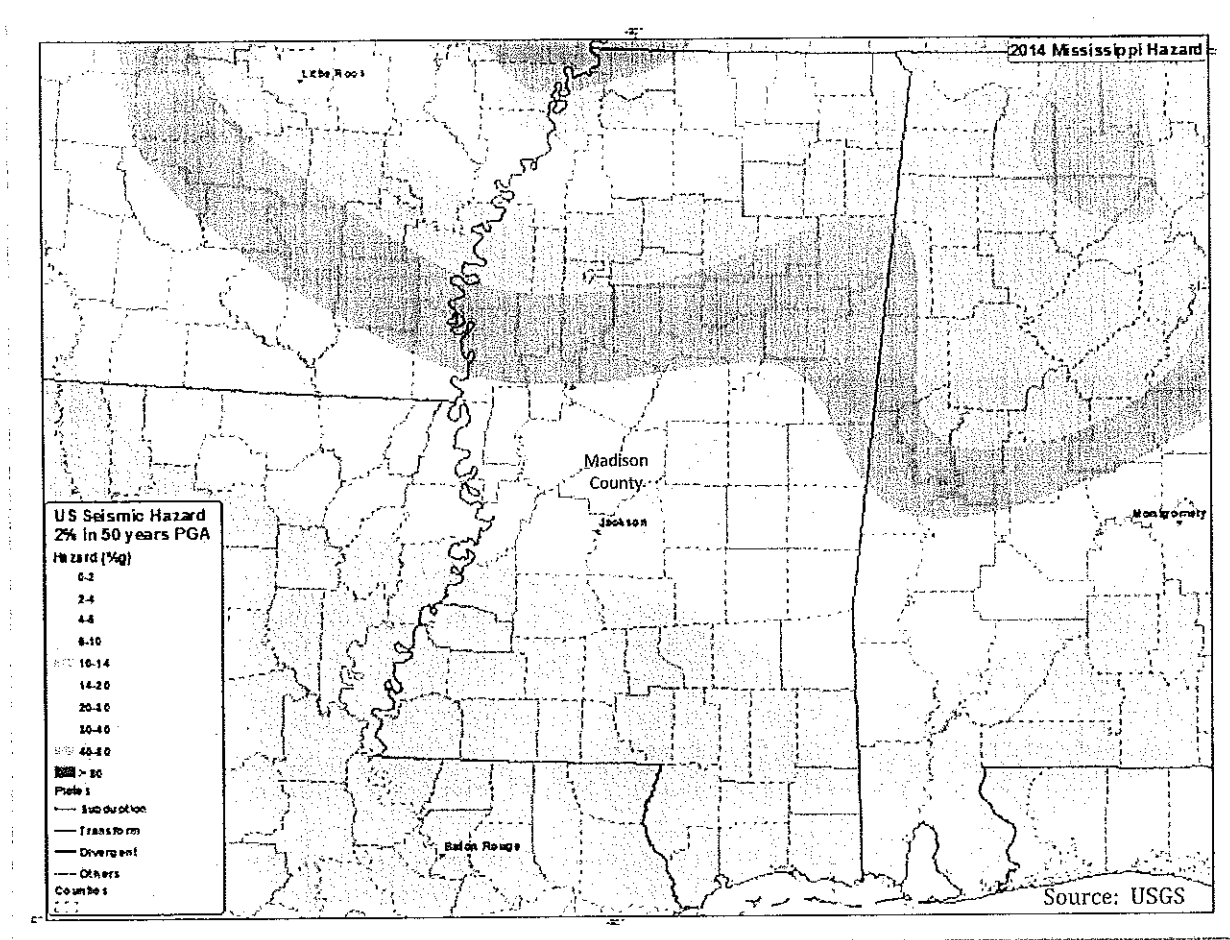
Source: USGS

Location and Extent

According to the United States Geological Survey (USGS), all states have some potential for earthquakes, and 42 of the 50 states have a reasonable chance of experiencing damaging ground shaking from an earthquake in 50 years (the typical lifespan of a building). While Mississippi is not recognized as one of the 16 states with a relatively high likelihood of experiencing damaging ground shaking it is still at risk, due largely to the State's close proximity to the New Madrid Seismic Zone, the southern end of which is 40 miles from the northwest corner of Mississippi. Seismic hazard maps depict the ground shaking that is expected to be exceeded at a selected probability (or chance) over a specific time period. Estimates of this "probabilistic" ground shaking at any location must include the possible shaking from all likely earthquakes and the types of rocks and soil in the region. The USGS updated the National Seismic Hazard Maps in 2014, which succeeds maps previously produced. New seismic, geologic, and geodetic information on earthquake rates and associated ground shaking were incorporated into the revised maps. The 2014 National Seismic Hazard Maps reflect the most current understanding of where future earthquakes will occur, how often they will occur, and how hard the ground will likely shake as a result. Images on the following page, depict the Peak Ground Acceleration with 2% probability of exceeding in 50 years for the 2008 Seismic Hazard Map and the recently released 2014 map for comparison. The revised map continues to place Madison County in the low hazard area.



Two-percent probability of exceedance in 50 years map of peak ground acceleration



A number of different scales have been developed to measure the magnitude and intensity of an earthquake. Magnitude and intensity measure different characteristics of earthquakes. The magnitude of an earthquake measures the energy released at the source of the earthquake usually by analyzing instrumental recordings of an earthquake using defined mathematical formulas. Magnitude scales that have been commonly used include the Richter Magnitude Scale and the Moment Magnitude Scale. Intensity scales measure the strength of shaking produced by the earthquake. Intensity is determined from effects on people, human structures, and the natural environment. The Modified Mercalli Intensity Scale is a common intensity scale used in the United States. The Modified Mercalli Scale is composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, and is designated by roman numerals. The lower numbers of the intensity scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage. Table 4.6 provides a comparison of the magnitude and intensity of an earthquake, and Table 4.7 provides a brief description of the impacts felt at the surface.

Table 4.6 Comparison of Magnitude and Intensity

Magnitude	Modified Mercalli Intensity
1.0-3.0	I
3.0-3.9	II - III
4.0-4.9	IV - V
5.0-5.9	VI - VII
6.0-6.9	VII - IX
7.0 and higher	VIII or Higher

Source: USGS

Table 4.7 Modified Mercalli Intensity Scale Abbreviated Description

I.	Not felt except by a few under especially favorable conditions.
II.	Felt only by a few persons at rest, especially on upper floors of buildings.
III.	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV.	Felt indoors by many, outdoors by a few during the day. At night, some awakened. Dishes, windows, doors disturbed, walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V.	Felt by nearly everyone, many awakened. Some dishes and windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI.	Felt by all, many frightened. Some heavy furniture moved, a few instances of fallen plaster. Damage slight.
VII.	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.
VIII.	Damage slight in specially designed structures, considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls, and heavy furniture overturned.
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.
X.	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI.	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII.	Damage total lines of sight. Objects thrown into the air.

Source: USGS

Previous Occurrences

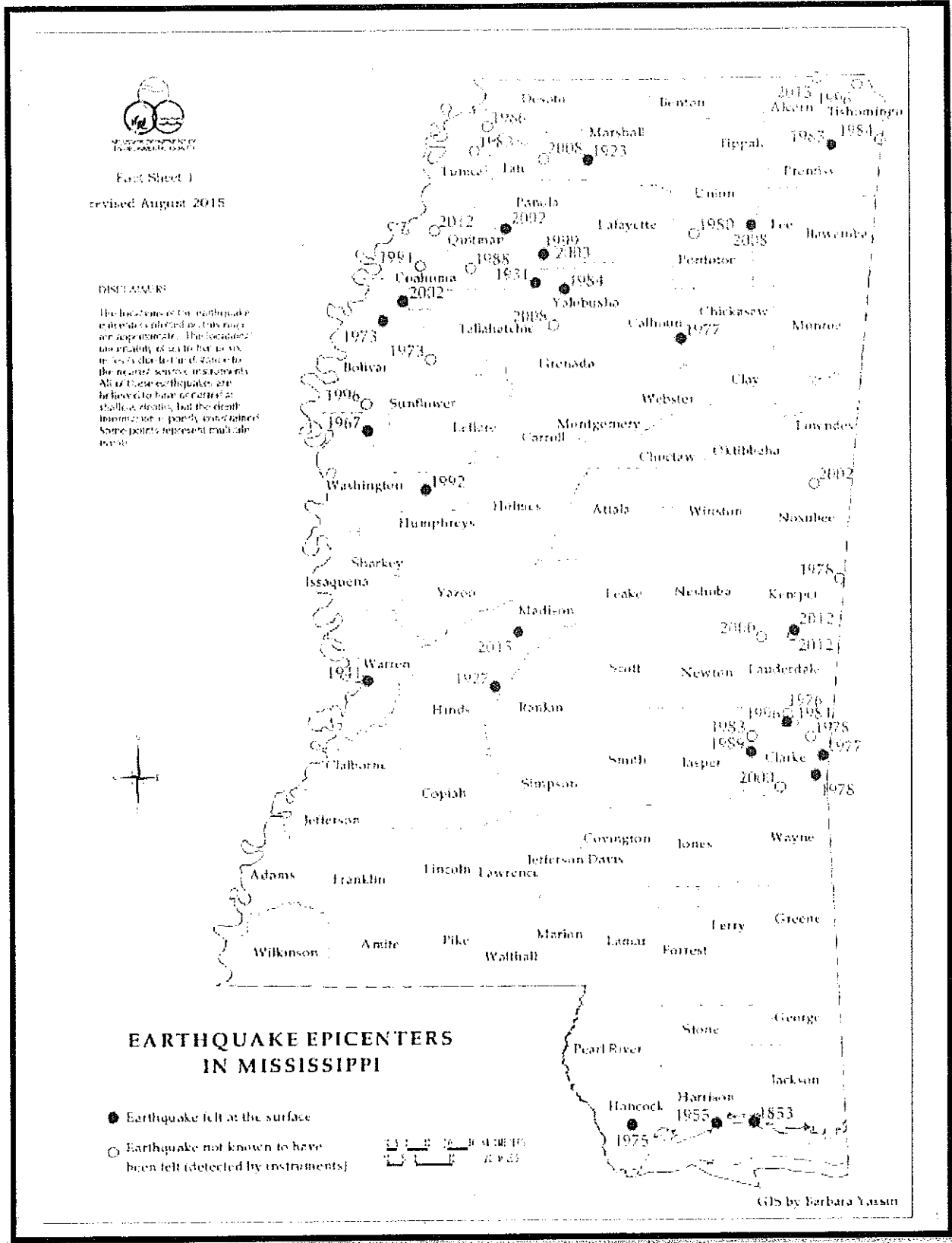
According to the MS Department of Environmental Quality, a small amount of earthquakes of low magnitude have occurred throughout Mississippi over the years, and it is expected that earthquakes of low magnitude will continue to occur.

Some of the most noteworthy earthquakes that have impacted Mississippi have originated in neighboring or distant states. The great New Madrid, Missouri earthquake of 1811-1812 included at least four shocks strong enough to shake northern Mississippi at damaging intensities and was felt as far south as the Gulf Coast, including causing damage within Central Mississippi with the banks of the Mississippi River caving. Mississippi's most recent earthquake activity includes four (4) earthquakes south of Canton in Madison County in 2015.

Table 4.8 Recent Earthquakes

Magnitude	Date	Location
3.2	May 2, 2015	6km SW of Canton
3.0	May 2, 2015	8km SW of Canton
3.2	June 29, 2015	6km SSW of Canton
2.6	August 17, 2015	5 miles north of Madison

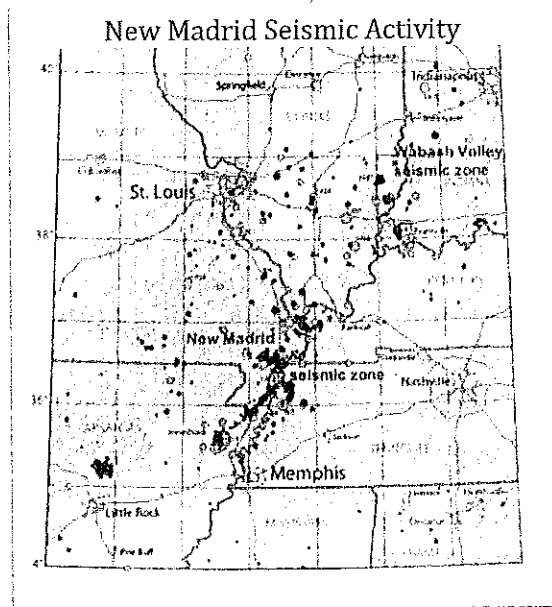
Source: USGS



Probability of Future Occurrence

The greatest risk to Mississippi from earthquakes is from a strong earthquake in the New Madrid Seismic Zone, the southern end of which is 40 miles from the northwest corner of Mississippi. The New Madrid seismic zone is the most active area of the United States east of the Rockies with continuing small and moderate earthquakes recorded regularly. While it is impossible to predict when or where the next earthquake might occur, studying evidence from previous earthquakes, seismologists can estimate the average long-term frequency of large earthquakes and estimate the probability of future earthquakes.

According to the USGS and the Center for Earthquake Research and Information at the University of Memphis, the chance of having an earthquake similar to one of the 1811-1812 sequence in the next 50 years is about 7 to 10 percent, and the chance of having a magnitude 6 or greater earthquake in 50 years is 25 to 40 percent.



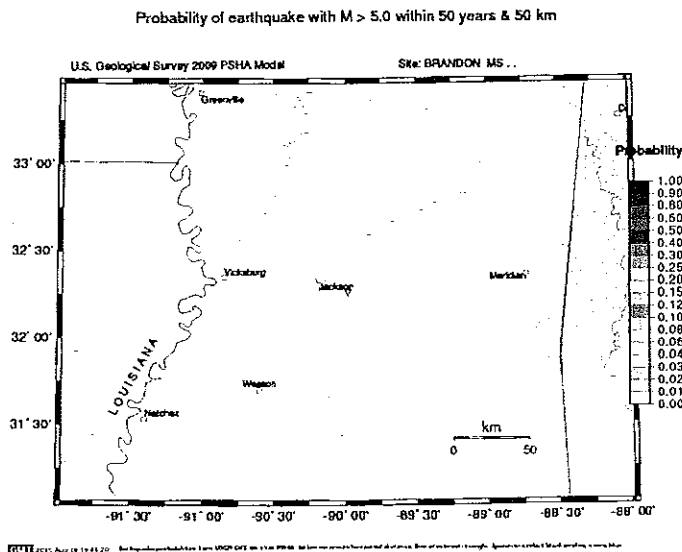
Probability of a repeat of the 1811-1812 earthquakes

Magnitude 7.5-8.0 = 7-10%

Probability of a Magnitude 6.0 or larger = 25-40%

Using USGS earthquake probability mapping tools the image below was produced for Madison County. The USGS mapping tool uses a model to display the probabilities of earthquakes within a 50 km radius. The map produced places Madison County outside of the risk zone.

USGS Earthquake Probability Map



EXPANSIVE SOIL**Description**

Expansive soils or swelling soils, which are commonly known as Yazoo Clay throughout Central Mississippi, are comprised of bedrock that increases in volume as it gets wet and shrinks as it dries out. Soil grains in expansive soils are predominantly clay minerals that have the ability to absorb large quantities of water. As the individual clay minerals absorb water, they repel each other and the soil expands. The amount of soil expansion is inversely proportional to the weight that a structure places on the soil. Therefore, heavy structures generally are less impacted by expansive soils than are lighter structures such as pavements and building slabs.

Location and Extent

The concentration level of expansive soils found across a state or even a community can vary significantly. According to soil maps produced by USGS, Central Mississippi is covered in high concentration areas of expansive soils. The expansive clay areas are concentrated in a northwest-southeast trending belt across nearly three-fourths the width of Central Mississippi. The surface outcrop belt ranges from 6 to 30 miles wide and covers portions of eleven counties: Yazoo, Holmes, Hinds, Madison, Rankin, Smith, Scott, Newton, Jasper, Clarke, and Wayne. Map 4.2 depicts the soil types in Mississippi. The Yazoo Clay area in Mississippi is formally identified by USGS as the Jackson Group. Madison County is largely comprised of six (6) soil types: Loess, Cockfield, Forest Hill/Red Bluff, Vicksburg/Chickasawhay, Cook Mountain, and the highly expansive Jackson Group:

Occurrence of expansive soil hazards are expected to be limited throughout Madison County. Impacts to life, health and safety are minimal for expansive soils. According to FEMA, the anticipated types of structural damage to buildings include: sticking doors; uneven floors, and cracked foundations, floors, walls, ceilings and windows. An accepted measure for determining the swelling potential of soil is the Expansion Index which provides an indication of swelling potential of a compacted soil. Generally, building codes require special design consideration be employed if the Expansion Index is 20 or greater.

Expansion Index					
Very Low	0-20	Medium	51 to 90	Very High	>130
Low	21-50	High	91 to 130		

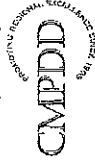
USDA Soil Survey Data for Madison County, MS

U.S. Depart. of Agriculture NRCS Data
Soil Survey Geographic Formations

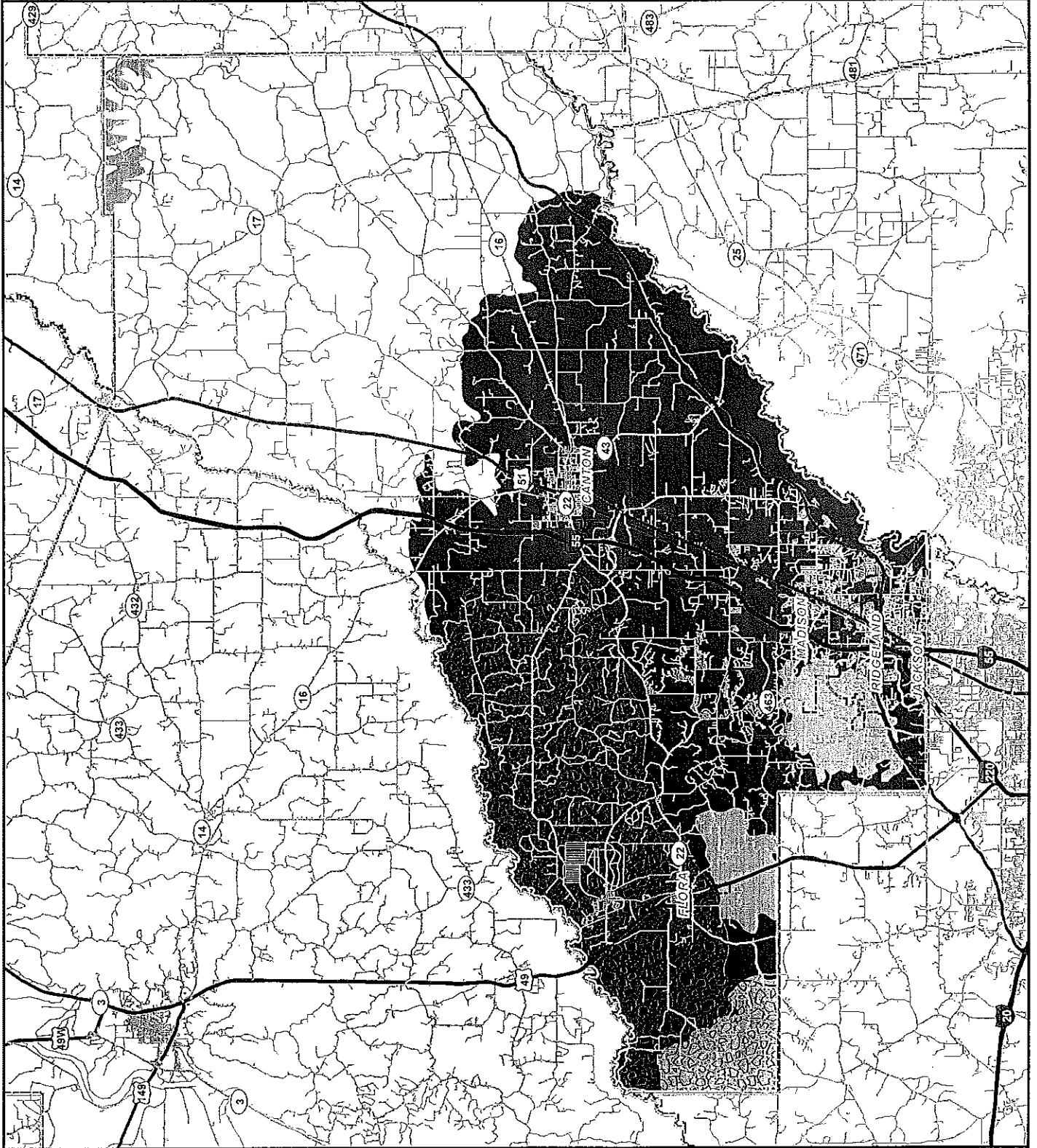
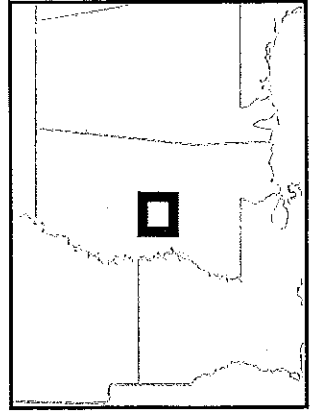
- MS River Alluvium
- Coastal Deposits
- Citronelle
- Pascagoula/Hattiesburg
- Catahoula
- Vicksburg/Chickasawhay
- Forest Hill/Red Bluff
- Jackson Group
- Cockfield
- Cook Mountain
- Kosciusko
- Zlipha/Winona
- Tallahatta
- Wilcox
- Bashi/Mid Nanafalia
- Nabeola
- Potters Creek
- Clayton
- Prairie Bluff/Owl Creek
- Ripley
- McNairy Sand
- Demopolis Chalk
- Arcola Limestone
- Mooreville Chalk
- Coffee Sand
- Tombigbee Sand
- Entaw
- Tuscaloosa
- Chester Group
- Mernac Osage Kinderhook
- Chattanooga Shale
- Loess
- Municipalities
- Interstates
- Major Highways
- Major Local Roads



Prepared by



Central Mississippi
Planning & Development District



Previous Occurrences

While Madison County experiences problems with expansive soils from time to time such as waterline breaks, heaving of roadways, and foundation problems with residential and commercial structures, detailed damage information related to expansive soils is not available at this time to accurately document previous occurrences.

Probability of Future Occurrence

Damages due to the shrinking and swelling of expansive soil, while not largely documented, do occur annually within Madison County in isolated areas. Therefore, future occurrences are highly likely meaning multiple annual occurrences are expected. However, using smart construction techniques such as testing soil prior to construction and excavating expansive clay and backfilling with a non-sensitive material are all effective ways to mitigate future risks. It is also important to consider soil treatment and landscaping techniques that will keep soil moisture contents constant or nearly constant since problems with expansive soil occur with fluctuations in soil moisture.