MEMA District 9

Regional Hazard Mitigation Plan
2024

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SECTION 1 INTRODUCTION

This section provides a general introduction to the Mississippi Emergency Management Agency (MEMA) District 9 Regional Hazard Mitigation Plan. It consists of the following five subsections:

1.1 Background
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BACKGROUND

Natural hazards, such as hurricanes, floods, and tornadoes, are a part of the world around us. Their occurrence is natural and inevitable, and there is little we can do to control their force and intensity. We must consider these hazards to be legitimate and significant threats to human life, safety, and property.

The MEMA District 9 Region is located in southern Mississippi on the Gulf Coast and includes the counties of George, Hancock, Harrison, Jackson, Pearl River, and Stone. This area is vulnerable to a wide range of natural hazards such as floods, drought, hurricanes, severe thunderstorms, and wildfires. It is also vulnerable to human-caused hazards such as hazardous material spills. These hazards threaten the life and safety of residents in the MEMA District 9 Region and have the potential to damage or destroy both public and private property, disrupt the local economy, and impact the overall quality of life of individuals who live, work, and vacation in the MEMA District 9 Region.

While the threat from hazardous events may never be fully eliminated, there is much we can do to lessen their potential impact upon our community and our citizens. By minimizing the impact of hazards upon our built environment, we can prevent such events from resulting in disasters. The concept and practice of reducing risks to people and property from known hazards is generally referred to as hazard mitigation.

FEMA Definition of Hazard Mitigation:
"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards."

Hazard mitigation techniques include both structural measures (such as strengthening or protecting buildings and infrastructure from the destructive forces of potential hazards) and non-structural measures (such as the adoption of sound land use policies and the creation of public awareness programs). It is widely accepted that the most effective mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made. A comprehensive mitigation approach addresses hazard vulnerabilities that exist today and in the foreseeable future. Therefore, it is essential that projected patterns of future development are evaluated and considered in terms of how that growth will increase or decrease a community's overall hazard vulnerability.

A key component in the formulation of a comprehensive approach to hazard mitigation is to develop, adopt, and update a local hazard mitigation plan. A hazard mitigation plan establishes the broad community vision and guiding principles for reducing hazard risk, and further proposes specific mitigation actions to eliminate or reduce identified vulnerabilities.

Each of the six counties participating in the development of the MEMA District 9 Hazard Mitigation Plan has an existing hazard mitigation plan that has evolved over the years, as described in Section 2: Planning Process. Additionally, many of the individual communities within the six counties also have an existing hazard mitigation plan. This regional plan draws from each of the county and municipal plans and documents the region's sustained efforts to incorporate hazard mitigation principles and practices into routine government activities and functions. At its core, the Plan recommends specific actions to minimize hazard vulnerability and protect residents from losses to those hazards that pose the greatest risk.

These mitigation actions go beyond simply recommending structural solutions to reduce existing vulnerability, such as elevation, retrofitting, and acquisition projects. Local policies on community growth and development, incentives for natural resource protection, and public awareness and outreach activities are examples of other actions considered to reduce the MEMA District 9 Region's vulnerability to identified hazards. The Plan remains a living document, with implementation and evaluation procedures established to help achieve meaningful objectives and successful outcomes over time.

The Disaster Mitigation Act and the Flood Insurance Reform Act

In an effort to reduce the Nation's mounting natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) in order to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of DMA 2000 emphasizes the need for state, local, and Tribal government entities to closely coordinate on mitigation planning activities and makes the development of a hazard mitigation plan a specific eligibility requirement for any local or Tribal government applying for federal mitigation grant funds. In short, if a jurisdiction is not covered by an approved mitigation plan, it will not be eligible for mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation (PDM) program, both of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally-approved hazard mitigation plan thereby become pre- positioned and more apt to receive available mitigation funds before and after the next disaster strikes.

Additionally, the Flood Insurance Reform Act of 2004 (P.L. 108-264) created two new grant programs, Severe Repetitive Loss (SRL) and Repetitive Flood Claim (RFC), and modified the existing Flood Mitigation Assistance (FMA) program. One of the requirements of this Act is that a FEMA-approved Hazard Mitigation Plan is now required if communities wish to be eligible for these FEMA mitigation programs. However, these programs have since been folded into a single Flood Mitigation Assistance (FMA) program.

This change was brought on by new, major federal flood insurance legislation that was passed in 2012 under the Biggert-Waters Flood Insurance Reform Act (P.L. 112-141) and the subsequent Homeowner

Flood Insurance Affordability Act in 2014 which revised Biggert-Waters. These acts made several changes to the way the National Flood Insurance Program is to be run, including raises in rates to reflect true flood risk and changes in how Flood Insurance Rate Map (FIRM) updates impact policyholders. These acts further emphasize Congress' focus on mitigating vulnerable structures.

The MEMA District 9 Regional Hazard Mitigation Plan has been prepared in coordination with FEMA Region IV and the Mississippi Emergency Management Agency (MEMA) to ensure that the Plan meets all applicable FEMA and state requirements for hazard mitigation plans. A Local Mitigation Plan Review Tool, found in Appendix C, provides a summary of federal and state minimum standards and notes the location where each requirement is met within the Plan.

PURPOSE

The purpose of the MEMA District 9 Regional Hazard Mitigation Plan update is to:

Update the existing MEMA District 9 hazard mitigation plan that includes George, Hancock, Harrison, Jackson, Pearl River and Stone Counties and the participating jurisdictions within each county.
Complete update of existing plans to demonstrate progress and reflect current conditions
Increase public awareness and education about the plan and planning process
Maintain grant eligibility for participating jurisdictions
Maintain compliance with state and federal legislative requirements for local hazard mitigation plans

SCOPE

The focus of the MEMA District 9 Regional Hazard Mitigation Plan is on those hazards determined to be "high" or "moderate" risks to the MEMA District 9 Region, as determined through a detailed hazard risk assessment. Other hazards that pose a "low" or "negligible" risk will also be evaluated, but they may not be fully addressed until they are determined to be of high or moderate risk. This enables the participating jurisdictions to prioritize mitigation actions based on those hazards which are understood to present the greatest risk to lives and property.

The geographic scope (i.e., the planning area) for the Plan includes 6 counties and 16 incorporated jurisdictions. Table 1.1 lists the participating areas.

Table 1: : PARTICIPATING JURISDICTIONS IN THE MEMA DISTRICT 9 REGIONAL HAZARD MITIGATION PLAN

George County		Jackson County	
Lucedale		Gautier	Ocean Springs
Hancock County		Moss Point	Pascagoula
Bay St. Louis	Waveland	Pearl River County	
Diamondhead		Picayune	Poplarville
Harrison County		Stone County	
Biloxi	Long Beach	Wiggins	
D'Iberville	Pass Christian		
Gulfport			

AUTHORITY

The MEMA District 9 Regional Hazard Mitigation Plan has been developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans and has been adopted by each participating county and local jurisdiction in accordance with standard local procedures. Copies of the adoption resolutions for each participating jurisdiction are provided in Appendix A. The Plan shall be routinely monitored and revised to maintain compliance with the following provisions, rules, and legislation:

Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390)
FEMA's Final Rule published in the Federal Register, at 44 CFR Part 201 (201.6 for local mitigation planning requirements

and 201.7 for Tribal planning requirements)
Flood Insurance Reform Act of 2004 (P.L. 108-264), Biggert-Waters Flood Insurance Reform Act of 2012 (P.L. 112-141) and the Homeowner Flood Insurance Affordability Act

SUMMARY OF PLAN CONTENTS

The contents of this Plan are designed and organized to be as reader-friendly and functional as possible. While significant background information is included on the processes used and studies completed (i.e., risk assessment, capability assessment), this information is separated from the more meaningful planning outcomes or actions (i.e., mitigation strategy, mitigation action plan).

Section 2, Planning Process, provides a complete narrative description of the process used to prepare the Plan. This includes the identification of participants on the hazard mitigation council and describes how the public and other stakeholders were involved. It also includes a detailed summary for each of the key meetings held, along with any associated outcomes.

The Community Profile, located in Section 3, provides a general overview of the MEMA District 9 Region, including prevalent geographic, demographic, and economic characteristics. In addition, building characteristics and land use patterns are discussed. This baseline information provides a snapshot of the planning area and helps local officials recognize those social, environmental, and economic factors that ultimately play a role in determining the region's vulnerability to hazards.

The Risk Assessment is presented in three sections: Section 4, Hazard Identification; Section 5, Hazard Profiles; and Section 6, Vulnerability Assessment. Together, these sections serve to identify, analyze, and assess hazards that pose a threat to the MEMA District 9 Region. The risk assessment also attempts to define any hazard risks that may uniquely or exclusively affect specific areas of the MEMA District 9 Region.

The Risk Assessment begins by identifying hazards that threaten the MEMA District 9 Region. Next, detailed profiles are established for each hazard, building on available historical data from past hazard occurrences, spatial extent, and probability of future occurrence. This section culminates in a hazard risk ranking based on conclusions regarding the frequency of occurrence, spatial extent, and potential impact highlighted in each of the hazard profiles. In the vulnerability assessment, FEMA's HAZUS®MH loss estimation methodology is used to evaluate known hazard risks by their relative long-term cost in expected damages. In essence, the information generated through the risk assessment serves a critical function as the MEMA District 9 Region seeks to determine the most appropriate mitigation actions to pursue and implement—enabling it to prioritize and focus its efforts on those hazards of greatest concern and those structures or planning areas facing the greatest risk(s).

The Capability Assessment, found in Section 7, provides a comprehensive examination of the MEMA District 9 Region's capacity to implement meaningful mitigation strategies and identifies opportunities to increase and enhance that capacity. Specific capabilities addressed in this section include planning and regulatory capability, staff and organizational (administrative) capability, technical capability, fiscal capability, and political capability. Information was obtained through the use of a detailed survey questionnaire and an inventory and analysis of existing plans, ordinances, and relevant documents. The purpose of this assessment is to identify any existing gaps, weaknesses, or conflicts in programs or activities that may hinder mitigation efforts and to identify those activities that should be built upon in establishing a successful and sustainable local hazard mitigation program.

The Community Profile, Risk Assessment, and Capability Assessment collectively serve as a basis for determining the goals for the MEMA District 9 Regional Hazard Mitigation Plan, each contributing to the development, adoption, and implementation of a meaningful and manageable Mitigation Strategy that is based on accurate background information.

The Mitigation Strategy, found in Section 8, consists of broad goal statements as well as an analysis of hazard mitigation techniques for the jurisdictions participating in the MEMA District 9 Regional Hazard Mitigation Plan to consider in reducing hazard vulnerabilities. The strategy provides the foundation for a detailed Mitigation Action Plan, found in Section 9, which links specific mitigation actions for each county and municipal department or agency to locally-assigned implementation mechanisms and target completion dates. Together, these sections are designed to make the Plan both strategic, through the identification of long-term goals, and functional, through the identification of immediate and short-term actions that will guide day-to-day decision-making and project implementation.

In addition to the identification and prioritization of possible mitigation projects, emphasis is placed on the use of program and policy alternatives to help make the MEMA District 9 Region less vulnerable to the damaging forces of hazards while improving the economic, social, and environmental health of the community. The concept of multi-objective planning was emphasized throughout the planning process, particularly in identifying ways to link, where possible, hazard mitigation policies and programs with complimentary community goals related to disaster recovery, housing, economic development, recreational opportunities, transportation improvements, environmental quality, land development, and public health and safety.

Plan Maintenance, found in Section 10, includes the measures that the jurisdictions participating in the MEMA District 9 Regional plan will take to ensure the Plan's continuous long-term implementation. The procedures also include the manner in which the Plan will be regularly evaluated and updated to remain a current and meaningful planning document.

County-specific Annexes have been created for each of the counties participating in this plan. Each Annex contains information relevant to the county and the participating municipal jurisdictions in the county. Information included in each county-level Annex includes Community Profile, Risk Assessment and Capability Assessment information. The Mitigation Actions identified for that county and its municipal jurisdictions are also included in the county's Annex. This allows each county and jurisdiction to quickly locate the information contained in the plan that is most relevant for them.

SECTION 2 PLANNING PROCESS

This section describes the planning process undertaken by the Mississippi Emergency Management Agency (MEMA) District 9 counties and jurisdictions in the development of its 2023 Regional Hazard Mitigation Plan. It consists of the following eight subsections:

2.1 Overview of Hazard Mitigation Planning
2.2 History of Hazard Mitigation Planning in the MEMA District 9 Region
2.3 Preparing the 2023Plan.
2.4 The MEMA District 9 Regional Hazard Mitigation Council
2.5 Community Meetings and Workshops
2.6 Involving the Public
2.7 Involving the Stakeholders
2.8 Documentation of Plan Progress

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

OVERVIEW OF HAZARD MITIGATION PLANNING

Local hazard mitigation planning is the process of organizing community resources, identifying and assessing hazard risks, and determining how to best minimize or manage those risks. This process culminates in a hazard mitigation plan that identifies specific mitigation actions, each designed to achieve both short-term planning objectives and a long-term community vision.

To ensure the functionality of a hazard mitigation plan, responsibility is assigned for each proposed mitigation action to a specific individual, department, or agency along with a schedule or target completion date for its implementation (see Section 10: Plan Maintenance). Plan maintenance procedures are established for the routine monitoring of implementation progress, as well as the evaluation and enhancement of the mitigation plan itself. These plan maintenance procedures ensure that the Plan remains a current, dynamic, and effective planning document over time that becomes integrated into the routine local decision-making process.

Communities that participate in hazard mitigation planning have the potential to accomplish many benefits, including:

Saving lives and property
Saving money
Speeding up recovery following disasters
Reducing future vulnerability through wise development and post-disaster recovery and reconstruction
Expediting the receipt of pre-disaster and post-disaster grant funding
Demonstrating a firm commitment to improving community health and safety

Typically, communities that participate in mitigation planning are described as having the potential to produce long-term and recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that the investments made before a hazard event will significantly reduce the demand for post-disaster assistance by lessening the need for emergency response, repair, recovery, and reconstruction. Furthermore, mitigation practices will enable local residents, businesses, and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

The benefits of mitigation planning go beyond solely reducing hazard vulnerability. Mitigation measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, maintaining environmental health, and enhancing recreational opportunities. Thus, it is vitally important that any local mitigation planning process be integrated with other concurrent local planning efforts, and any proposed mitigation strategies must take into account other existing community goals or initiatives that will help complement or hinder their future implementation.

HISTORY OF HAZARD MITIGATION PLANNING IN THE MEMA DISTRICT 9 REGION

Each of the counties and jurisdictions participating in this Plan has a previously adopted hazard mitigation plan. The FEMA approval dates for each of these plans, along with a list of the participating municipalities for each plan, are listed below:

- George County – George County Hazard Mitigation Plan (2013), MEMA District 9 HMP (2017)
- Lucedale, MEMA District 9 HMP (2017)
- Hancock County- Hancock County Hazard Mitigation Plan (2013), MEMA District 9 HMP (2017)
- Diamondhead, MEMA District 9 HMP (2017)
- City of Bay St. Louis- Bay St. Louis Hazard Mitigation Plan (2011), MEMA District 9 HMP (2017)
- City of Waveland- Waveland Hazard Mitigation Plan (2013), MEMA District 9 HMP (2017)
- Harrison County – Harrison County Hazard Mitigation Plan (2014), MEMA District 9 HMP (2017)
- City of Biloxi- Biloxi Hazard Mitigation Plan (2013), MEMA District 9 HMP (2017)
- City of D'Iberville- D'Iberville Hazard Mitigation Plan (2011), MEMA District 9 HMP (2017)
- City of Gulfport- Gulfport Hazard Mitigation Plan (2014), MEMA District 9 HMP (2017)
- City of Long Beach- Long Beach Hazard Mitigation Plan (2013), MEMA District 9 HMP (2017)
- City of Pass Christian- Pass Christian Hazard Mitigation Plan (2011), MEMA District 9 HMP (2017)
- Jackson County- Jackson County Hazard Mitigation Plan (2012), MEMA District 9 HMP (2017)
- Gautier, MEMA District 9 HMP (2017)
- City of Moss Point – Moss Point Hazard Mitigation Plan (2013), MEMA District 9 HMP (2017)
- City of Ocean Springs– Ocean Springs Hazard Mitigation Plan (2011), MEMA District 9 HMP (2017)
- City of Pascagoula – Pascagoula Hazard Mitigation Plan (2014), MEMA District 9 HMP (2017)
- Pearl River County – Pearl River County Hazard Mitigation Plan (2011), MEMA District 9 HMP (2017)
- Picayune, MEMA District 9 HMP (2017)
- Poplarville, MEMA District 9 HMP (2017)
- Stone County - Stone County Hazard Mitigation Plan (2011), MEMA District 9 HMP (2017)
- Wiggins, MEMA District 9 HMP (2017)

For this plan, all of the aforementioned jurisdictions have joined to form a regional plan. No new jurisdictions have joined the process and all of the jurisdictions that participated in previous planning efforts have participated in the development of this regional plan.

PREPARING THE 2023 PLAN

Local hazard mitigation plans are required to be updated every five years to remain eligible for federal mitigation funding. To simplify planning efforts for the jurisdictions in the MEMA District 9 Region, MEMA officials worked with each county and municipality to ask them to join together to create the MEMA District 9 Regional Hazard Mitigation

Plan. This allows resources to be shared amongst the participating jurisdictions and eases the administrative duties of all of the participants by combining the existing plans into one regional plan.

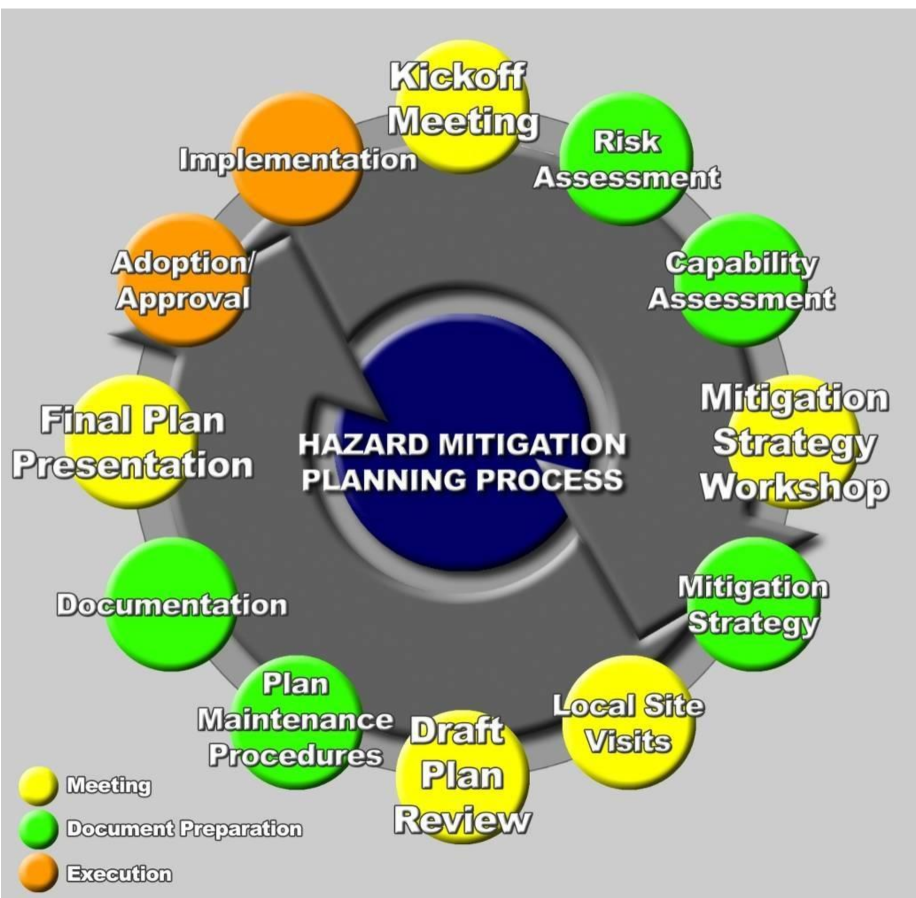
To prepare the 2023 MEMA District 9 Regional Hazard Mitigation Plan, MEMA hired Integrated Solutions Consulting (ISC) as an outside consultant to provide professional mitigation planning services.

Per the contractual scope of work, the ISC team followed the mitigation planning process recommended by FEMA in the Local Multi-Hazard Mitigation Planning Guidance1. The Local Mitigation Plan Review Tool, found in Appendix C, provides a summary of FEMA's current minimum standards of acceptability for compliance with DMA 2000 and notes the location where each requirement is met within this Plan. These standards are based upon FEMA's Final Rule as published in the Federal Register in Part 201 of the Code of Federal Regulations (CFR). The Hazard Mitigation Council used FEMA's Local Mitigation Plan Review Guide (October 2011) for reference as they completed the Plan.

The process used to prepare this Plan included twelve major steps that were completed over the course of approximately ten months beginning in June 2022. Each of these planning steps (illustrated in Figure 2.1) resulted in critical work products and outcomes that collectively make up the Plan. Specific plan sections are further described in Section 1: Introduction.

Over the past several years, each participating jurisdiction has been actively working to implement their existing plans. This is documented in the Mitigation Action Plan through the implementation status updates for each of the Mitigation Actions. The Capability Assessment also documents changes and improvements in the capabilities of each participating jurisdiction to implement the Mitigation Strategy.

Figure 1: MITIGATION PLANNING PROCESS FOR THE MEMA DISTRICT 9 REGION



As is further detailed below, the planning process was conducted through Hazard Mitigation Council meetings comprised primarily of local government staff from each of the participating jurisdictions and advisory stakeholders.

THE MEMA DISTRICT 9 REGIONAL HAZARD MITIGATION COUNCIL

In order to guide the development of this Plan, the counties in MEMA District 9 (George, Hancock, Harrison, Jackson, Pearl River, and Stone) and representatives from their participating municipal jurisdictions created the MEMA District 9 Regional Hazard Mitigation Council (RHMC). The RHMC represents a community-based planning team made up of representatives from various county departments and municipalities and other key stakeholders identified to serve as critical partners in the planning process.

Beginning in June 2022 the RHMC members engaged in regular discussions as well as local planning workshops to discuss and complete tasks associated with preparing the Plan. This working group coordinated all aspects of plan preparation and provided valuable input to the process. In addition to regular meetings, committee members routinely communicated and were kept informed through an e- mail distribution list.

Specifically, the tasks assigned to the RHMC members included:

- Participating in RHMC meetings and workshops
- Providing best available data as required for the Risk Assessment portion of the Plan
- Helping review the local Capability Assessment information and providing copies of any mitigation or hazard-related documents for review and incorporation into the Plan
- Supporting the development of the Mitigation Strategy, including the design and adoption of regional goal statements
- Helping design and propose appropriate mitigation actions for their department/agency for incorporation into the Mitigation Action Plan
- Reviewing and providing timely comments on all study findings and draft plan deliverables
- Supporting the adoption of the 2017 MEMA District 9 Hazard Mitigation Plan

Table 2.1 lists the members of the RHMC who were responsible for participating in the development of the Plan.

Table 2: MEMBERS OF THE MEMA DISTRICT 9 REGIONAL HAZARD MITIGATION COUNCIL

NAME	TITLE	DEPARTMENT/ AGENCY	COMMUNITY/AGENCY/ COMPANY
Brian Henderson*	Director	EMA	George County
Mike Williams*	Director	EMA	Stone County
Calvin Williams	Mitigation Planner	MEMA	MEMA
Chad Brownlow*	Coordinator	EMA	Jackson County
Michael Silverman	City Manager	City of Biloxi	Biloxi
Robert Jones	Fire Chief	Fire Department	Gautier
Wayne Miller	Director	Public Works	Gulfport
Michelle Crowley	EMA	EMA and Fire Services	Pass Christian

NAME	TITLE	DEPARTMENT/ AGENCY	COMMUNITY/AGENCY/ COMPANY
Matt Stratton	Director	EMA	Harrison County
Mike Gundlach	Floodplain Manager	Building Department	Long Beach
Hilliard Fountain	Building Director	City of Diberville	Diberville
Brian Adams	Director	EMA	Hancock County
Shawn Wise*	Director	EMA	Pearl River County
Danielle Jones	Administrative Assitant	City of Pascagoula	Pascagoula
Kelly Henderson	Floodplain Manager	Board of Supervisors	Harrison County
Jason Davis	Assistant Fire Chief	City of Biloxi Fire	Biloxi
Louise Smith	Mayor	City of Polarville	Poplarville
Rickey Ladner	Building Inspector	City of Bay St Louis	Bay St Louis
Frank Hill	Bureau Director Mitigation Plans	MEMA	MEMA
Brian Fulton	County Adminstrator	Adminstration	Jackson County
Mark Savasta	Director	Community Development	Pass Christian
Billy Knight	Mayor	Administration	Moss Point
Derek McCoy	Chief	Ocean Springs Fire	Ocean Springs
Scott Ankerson	Director	Planning	Gautier
Theresa Hydrick	Administrator	Administration	Harrison County
Mike Smith	Mayor	Administration	Waveland
Michael Reso	City Manager	Administration	DIamondhead
Lawrence Obst	Building Official	Administration	Picayune
Louis Moran	Biloxi Police	Police Department	Biloxi
Luke Brenner	EMA	Jackson County EMA	Jackson County
Cathy Wright	EMA	Jackson County EMA	Jackson County
Rob Dambrino	EMA	EMA	Harrison County
Ted Barze	Building Inspector	Engineering	Picayune

*Served as the county's main point of contact

Some of the Regional Hazard Mitigation Council Members listed above were designated to represent more than one jurisdiction at in-person meetings. Specifically:

- Brian Henderson represented George County and Lucedale.
- Mike Williams represented Stone County and Wiggins.

This authorized representation is documented in signed letters that were provided to MEMA from each of these municipalities that designated these persons as their representatives. Copies of these letters can be obtained by contacting MEMA.

Each of the municipalities also participated in the planning process through county-level meetings and calls with their respective county's emergency management agency director, who discussed the risk assessment with them and helped them update their mitigation actions accordingly.

Additional participation and input from other identified stakeholders and the general public was sought by the MEMA District 9 counties during the planning process through phone calls and the distribution of e-mails, advertisements, and public notices aimed at informing people of the development of the Hazard Mitigation Plan (public and stakeholder involvement is further discussed later in this section). It should be noted that many neighboring communities were offered the opportunity to participate in the planning process through phone conversations and in-person discussions. Among those invited to participate were representatives from Emergency Management offices in several of the counties that surround the MEMA District 9 Region including Lamar, Forrest, Perry, and Greene Counties. During these discussions, no major comments or suggestions were received concerning the plan.

Stakeholders Invited to Participate in the Planning Process	
Local/Tribal Administrator/Manager's Office	State Adjutant General's Office
Budget/Finance Office	National Guard
Building Code Enforcement Office City/County	Board of Education
Attorney's Office Economic Development Office	Building Code Office
Emergency Preparedness Office Fire and Rescue	Climatologist
Department Hospital Management	Earthquake Program Manager
Local Emergency Planning Committee Planning and Zoning Office	Economic Development Office
Police/Sheriff's Department	Emergency Management Office/State Hazard Mitigation Officer
Public Works Department Sanitation Department	Environmental Protection Office
School Board Transportation Department	Fire Marshal's Office
Special Districts and Authorities Airport and Seaport Authorities	Geologist
Business Improvement District(s)	Homeland Security Coordinator's Office
Fire Control District	Housing Office
Flood Control District Redevelopment Agencies	Hurricane Program Manager
Regional/Metropolitan Planning Organization(s)	Insurance Commissioner's Office
School District(s)	National Flood Insurance Program Coordinator
Transit/Transportation Agencies	Natural Resources Office
Architectural/Engineering/Planning Firms Citizen Corps	Public Health Office
Colleges/Universities Land Developers	Public Information Office
Major Employers/Businesses Professional	Tourism Department
Associations Retired Professionals	Non-Governmental Organizations (NGOs)
American Red Cross	Chamber of Commerce
Community/Faith-Based Organizations	Environmental Organizations
Homeowners Associations	Neighborhood Organizations
Private Development Agencies	Utility Companies

2.4.1 Multi-Jurisdictional Participation

The MEMA District 9 Hazard Mitigation Plan includes six counties and sixteen incorporated municipalities. To satisfy multi-jurisdictional participation requirements, each county and its participating jurisdictions were required to perform the following tasks:

Participate in mitigation planning workshops or designate a representative to do so
Identify completed/new mitigation projects, if applicable

Develop and adopt (or update) their local Mitigation Action Plan

Each jurisdiction participated in the planning process and has developed a local Mitigation Action Plan unique to their jurisdiction. Each jurisdiction will adopt their Mitigation Action Plan separately. This provides the means for jurisdictions to monitor and update their Plan on a regular basis.

COMMUNITY MEETINGS AND WORKSHOPS

The preparation of this Plan required a series of meetings and workshops for facilitating discussion, gaining consensus and initiating data collection efforts with local government staff, community officials, and other identified stakeholders. More importantly, the meetings and workshops prompted continuous input and feedback from relevant participants throughout the drafting stages of the Plan. The following is a summary of the key meetings and community workshops held during the development of the plan update. In many cases, routine discussions and additional meetings were held by local staff to accomplish planning tasks specific to their department or agency, such as the approval of specific mitigation actions for their department or agency to undertake and include in the Mitigation Action Plan.

Project Kickoff Meeting June 30, 2022 (Virtual) Zoom
The project kickoff meeting was facilitated by Integrated Solutions Consulting and MEMA personnel. The meeting consisted of Introductions of planning team members, Hazard Mitigation Planning overview, 2022 Plan Update Process, Roles and Expectations, Public & Stakeholder Involvement, Project Timeline, Data Requests and Next Steps.

The initial review of existing hazards was discussed along with an overview of the anticipated changes in the District Hazard Mitigation Plan.

MEMA D9 Steering Committee Meeting #2 July 28, 2022 (Virtual) Zoom
Meeting #2 was facilitated by Integrated Solutions Consulting along with MEMA personnel. The meeting consisted of introductions, hazard mitigation planning recap, community profile discussion, mitigation goals and adding objectives, hazard identification, explaining Impacts, risk assessment discussion, hazard mapping and vulnerabilities community survey incorporation, steering committee hazards assessment survey and next steps in the planning process.

MEMA D9 Steering Committee Meeting #3 February 14, 2023 (Virtual) Microsoft TEAMS Meeting
Meeting #3 was facilitated by Integrated Solutions Consulting along with MEMA personnel. The meeting consisted of introductions, planning process recap, HMP status update, community survey status, mitigation goals recap and the upcoming jurisdictional workshops.

MEMA D9 Steering Committee Meeting #4 Jurisdictional Workshops
The jurisdictional workshops were held in two sessions to allow each participating jurisdiction the opportunity to attend. During the workshops, the planning team members provided feedback and qualitative hazard rankings, review of existing mitigation actions and developed new mitigation actions/projects.

INVOLVING THE PUBLIC

44 CFR Requirement
44 CFR Part 201.6(b)(1): The planning process shall include an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

An important component of the mitigation planning process involves public participation. Individual citizen and community-based input provides the entire Council with a greater understanding of local concerns and increases the likelihood of successfully implementing mitigation actions by developing community “buy-in” from those directly affected by the decisions of public officials. As citizens become more involved in decisions that affect their safety, they are more likely to gain a greater appreciation of the hazards present in their community and take the steps necessary to reduce their impact. Public awareness is a key component of any community's overall mitigation strategy aimed at making a home, neighborhood, school, business or entire city safer from the potential effects of hazards.

Public involvement in the development of the MEMA District 9 Hazard Mitigation Plan was sought using two methods: (1) public survey instruments (web-based), and (2) copies of draft Plan deliverables were made available for public review on county websites and at government offices. The Public was provided two opportunities to be involved in the actual plan development at two distinct periods during the planning process: (1) during the drafting stage of the Plan; and (2) upon completion of a final draft Plan, but prior to official plan approval and adoption. A public participation survey (discussed in greater detail in Section 2.6.1) was made available during the planning process at various locations throughout the MEMA District 9 Region on the internet.

Additionally, each of the participating jurisdictions will hold public meetings before the final plan is officially adopted by the local governing bodies. These meetings will occur at different times once FEMA has granted conditional approval of the Plan. Adoption resolutions will be included in Appendix A.

2.6.1 Public Participation Survey

The MEMA District 9 Region was successful in getting citizens to provide input to the mitigation planning process through the use of the Public Participation Survey. The Public Participation Survey was designed to capture data and information from residents of the Region that might not be able to participate through other means in the mitigation planning process, such as attending a public meeting at a specific time and location.

As mentioned above, hard copies of the Public Participation Survey were distributed to the RHMC to be made available for residents to complete at local public offices. A link to an electronic version of the survey was also posted at various locations on the internet.

A total of 48 survey responses were received, which provided valuable input for the RHMC to consider in the development of the plan update. Selected survey results are presented below.

- 99 percent of survey respondents had been impacted by a disaster from minor to catastrophic damages
- For hazards to be mitigated, respondents ranked Hurricane/Tropical Storm as the highest threat to their neighborhood (88 percent), followed by Severe Thunderstorm/High Wind (58 percent), Flood (52 percent), and Storm Surge (46percent).

Public survey results up through the date of the RHMC meeting on February 13th, were presented at that meeting. A copy of the survey and a detailed summary of the survey results are provided in Appendix B and Appendix D, respectively.

INVOLVING THE STAKEHOLDERS

44 CFR Requirement
44 CFR Part 201.6(b)(2): The planning process shall include an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other non-profit interests to be involved in the planning process.

At the beginning of the planning process for the development of this plan, the project consultant worked with MEMA mitigation staff, the MEMA District 9 Area Coordinator, and each of the six County Emergency Management leads to initiate outreach to stakeholders to be involved in the planning process. The project consultant sent out a list of recommended stakeholders provided from FEMA Publication 386-1 titled **Getting Started: Building Support for Mitigation Planning**. The list of recommended stakeholders is found in Appendix C of that publication (Worksheet #1: Build the Planning Team) and has been included in **Appendix B** of this plan to demonstrate the wide range of stakeholders that were considered to participate in the development of this plan. Each of the six County Emergency Management leads used that list for reference as they invited stakeholders from their counties to participate in the planning process.

Additionally, the project consultant and the County EM leads contacted Mississippi Forestry Commission, Mississippi Department of Environmental Quality, representatives from each of the county-level school districts, and relevant representatives from higher education (universities, community colleges, etc.) to ask them to participate in the planning process and provide data that was used in the development of this plan.

In addition to the efforts described above, the participating jurisdictions in the MEMA District 9 plan went above and beyond the minimum requirements for stakeholder outreach by designing and distributing the Public Participation Survey described earlier in this section. In addition to collecting public input for the plan, the survey was generated to allow those stakeholders that could not attend Regional Hazard Mitigation Council meetings the opportunity to provide input to the plan and the planning process. All survey results were shared with the Regional Hazard Mitigation Council and represented input from citizens, local officials, businesses, academia, and other private interests in the Region.

DOCUMENTATION OF PLAN PROGRESS

Progress in hazard mitigation planning for the participating jurisdictions in the MEMA District 9 Region is documented in this plan update. Since hazard mitigation planning efforts officially began in the participating counties with the development of the initial Hazard Mitigation Plans in the late 1990's/early 2000s, many mitigation actions have been completed and implemented in the participating jurisdictions. These actions will help reduce the overall risk to natural hazards for the people and property in the Region. The actions that have been completed are documented in the Mitigation Action Plan found in Section 9.

In addition, community capability continues to improve with the implementation of new plans, policies, and programs that help to promote hazard mitigation at the local level. The current state of local capabilities for the participating jurisdictions is captured in Section 7: Capability Assessment. The participating jurisdictions continue to demonstrate their commitment to hazard mitigation and hazard mitigation planning and have proven this by reconvening the Hazard Mitigation Council to update the Plan and by continuing to involve the public in the hazard mitigation planning process.

SECTION 3 COMMUNITY PROFILE

This section of the Plan provides a general overview of the Mississippi Emergency Management Agency (MEMA) District 9 Region. It consists of the following four subsections:

- 3.1 Geography and the Environment
- 3.2 Population and Demographics
- 3.3 Housing, Infrastructure, and Land Use
- 3.4 Employment and Industry

The county-specific annexes provide more detailed community profile information about each county.

GEOGRAPHY AND THE ENVIRONMENT

The MEMA District 9 Region was named based on the Mississippi Emergency Management Agency districts lines and is one of nine MEMA regions throughout the state. The region comprises the Mississippi Gulf Coast. It is bounded by the Mississippi/Alabama State Line to the east, the Mississippi/Louisiana State Line to the west, and the Gulf of Mexico to the south. The MEMA District 9 Region includes the counties of George, Hancock, Harrison, Jackson, Pearl River, and Stone. An orientation map is provided as **Figure 3.1.**

MEMA District 9 is situated in the East Gulf Coastal Plain. It is made up of the gently rolling Pine Belt, also known as the "Piney Woods," and the coastal area called the Coastal Meadows or Terrace. The region has generally low topographic elevations and extensive tracts of marshy land. There are many rivers, creeks, bayous, and other natural drainage networks in the region which empty into the Gulf of Mexico.

The total area of each of the participating counties is presented in **Table 3.1.**

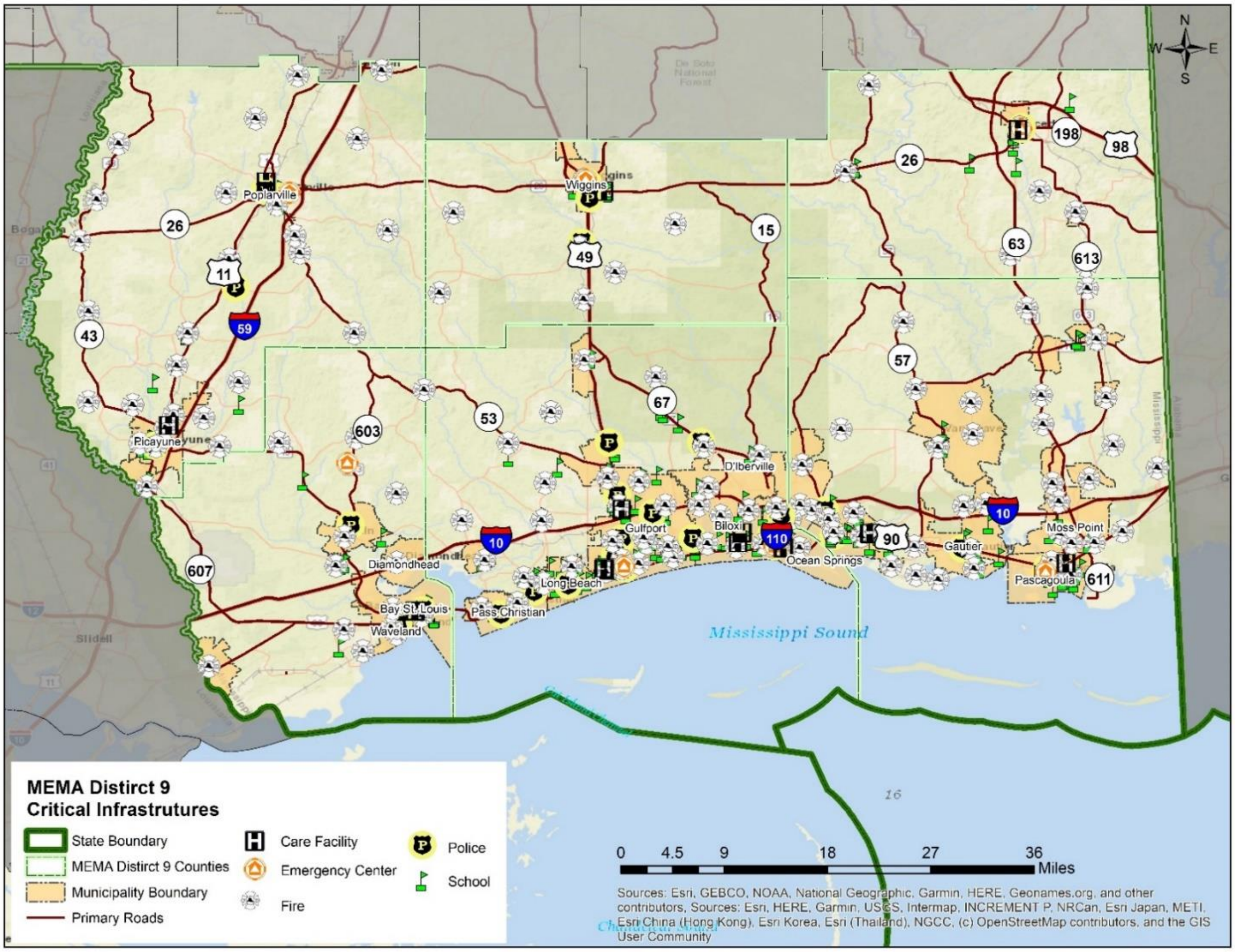
Table 3TOTAL AREA OF PARTICIPATING COUNTIES

County	Land Area (sq. mi.)	Water Area (sq. mi.)	Total Area (sq. mi.)
George County	478.71	4.94	483.65
Hancock County	473.75	78.75	552.50
Harrison County	573.99	402.18	976.17
Jackson County	722.75	320.64	1,043.40
Pearl River County	810.86	8.05	818.91
Stone County	445.48	2.59	448.08

Source: United States Census Bureau, 2020 Census

The MEMA District 9 Region enjoys four distinct seasons but the climate in the region is generally hot and humid compared to the rest of the United States given its latitude and location along the Gulf Coast. Precipitation is generally highest in winter months when the temperatures are moderately lower, but the likelihood of precipitation remains relatively constant throughout the year. Snowfall is rare but does occur. Summers in the region can become fairly hot with average highs in the nineties and lows in the seventies. The region is also often susceptible to turbulent weather when warm, wet air from the Gulf of Mexico is pushed up into the region to mix with cooler air coming down from across the continent which can result in severe weather conditions. This is particularly true in the spring when seasons are changing and diverse weather patterns interact. The region is also subject to hurricanes and tropical storms from June to October.

Figure 2 MEMA DISTRICT 9 REGION ORIENTATION MAP



POPULATION AND DEMOGRAPHICS

Pearl River County is the largest participating county by land area but Harrison County has the largest population within the MEMA District 9 Region. Between 2000 and 2020, all participating jurisdictions experienced population growth. Stone County had the largest population growth at 30.6 percent while Harrison County experienced a decline of -1.3 percent. Population counts from the U.S. Census Bureau for, 2000, 2010, 2020 for each of the participating counties and jurisdictions are presented in **Table 4**.

Table 4 POPULATION COUNTS FOR PARTICIPATING COUNTIES

Source: United States Census Bureau, 1990, 2000, 2010 Census

Jurisdiction	2000 Census Population	2010 Census Population	2020 Census Population	% Change 2000-2020
George County	19,144	22,578	24,762	-
Hancock County	42,967	43,929	46,055	5%
Harrison County	189,601	187,105	209,396	12%

Jackson County	131,420	139,668	143,987	3%
Pearl River County	48,621	55,834	56,503	1%
Stone County	13,622	17,786	18,644	5%

Source: United States Census Bureau, , 2000, 2010, 2020 Census

Table 5 DEMOGRAPHICS OF PARTICIPATING COUNTIES

Jurisdiction	White, Percent (2020)	White alone, not Hispanic or Latino, percent (2020)	Black or African American, Percent (2020)	American Indian or Alaska Native, Percent (2020)	Asian, Percent (2020)	Native Hawaiian or Other Pacific Islander, Percent - 2020	Two or More Races, percent (2020)	Persons of Hispanic Origin, Percent (2010)*
George County	89.1%	86.4%	8.0%	0.5%	0.7%	Z	1.6%	3.1%
Hancock County	87.2%	84.0%	8.7%	0.7%	1.0%	0.1%	2.4%	3.9%
Harrison County	67.3%	62.6%	26.3%	0.5%	2.9%	0.1%	2.9%	5.7%
Jackson County	73.2%	67.0%	21.6%	0.5%	2.3%	0.1%	2.3%	7.2%
Pearl River County	84.5%	81.6%	12.2%	0.0%	0.4%	0.1%	2.0%	3.5%
Stone County	78.3%	76.4%	19.0%	0.6%	0.5%	0.1%	1.6%	2.4%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau, 2020 Census

HOUSING, INFRASTRUCTURE, AND LAND USE

HOUSING

According to the 2010 U.S. Census, there are 207,547 housing units in the MEMA District 9 Region, the majority of which are single family or mobile homes. Housing information for the six participating counties is presented in **Table 3.4.** As shown in the table, the region has a low percentage of seasonal housing units but Hancock County has a higher percentage compared to the rest of the region.

TABLE 3.4 Table 6 : HOUSING CHARACTERISTICS OF PARTICIPATING COUNTIES

Source: United States Census Bureau, 2000 and 2010 Census, 2011-2015 American Community Survey 5-Year Estimates

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Housing Units (2020)	Median Home Value (Occupied

				Homes) (2017-2021)
George County	7,513	9,330	10,320	$135,400
Hancock County	21,072	21,840	21,494	$168,500
Harrison County	79,636	85,181	80,097	$162,400
Jackson County	51,678	60,067	53,878	$146,500
Pearl River County	20,610	23,968	21,321	$144,100
Stone County	5,343	7,161	6,304	$150,500

Source: United States Census Bureau, 2000, 2010, 2020 Census

INFRASTRUCTURE

TRANSPORTATION

There are several major thoroughfares that traverse the MEMA District 9 Region. Interstate 10 runs east to west through Jackson, Harrison, and Hancock Counties, connecting the region to neighboring Alabama and Louisiana. Interstate 59 runs northeast to southwest through Pearl River County, U.S. 49 runs north to south through Stone and Harrison Counties, and U.S. 98 runs northwest to southwest through George County, all linking the region to central Mississippi.

The Gulfport-Biloxi International Airport, located in Harrison County, serves the region. This airport is served by three major airlines with direct flights to Atlanta, Charlotte, Dallas/Ft. Worth, and Houston as well as connections to hundreds of locations in the U.S. and worldwide. There are also several small general aviation airports within the MEMA District 9 Region, including one in nearly every county.

In terms of other transportation services, Port Bienville, Port of Gulfport, and Port of Pascagoula operate within the region, connecting it to national and global markets. Several Class-I Major and Class-III Local railways also serve the region.

UTILITIES

Electric power in the MEMA District 9 Region is mainly provided by municipal and electric power associations. Mississippi Power Company also provides power to small areas in each county across the region.

There are several private and municipal natural gas suppliers that serve the MEMA District 9 Region. These include CenterPoint Energy Resources and the cities of Waveland, Pascagoula, and Picayune.

Water and sewer service is provided by a number of different sources including many of the participating cities and counties, but unincorporated areas often rely on septic systems and wells in the MEMA District 9 Region.

COMMUNITY FACILITIES

There are a number of public buildings and community facilities located throughout the MEMA District 9 Region.

According to the data collected for the vulnerability assessment (Section 6.4.1), there are 21 communications facilities, 10 emergency operations centers (EOCs), 130 fire stations, 27 medical facilities, 37 police stations, 101 power/gas facilities, 53 private/non-profit facilities, 170 public facilities,
175 schools, 20 shelters, 109 special populations facilities, 44 transportation facilities, and 128 water/wastewater facilities located within the study area.

There are 14 hospitals and medical centers located in the MEMA District 9 Region. These include George Regional Hospital – Lucedale in George County; Hancock Medical Center – Bay St. Louis in Hancock County; VA Gulf Coast Veterans Health Care System – Biloxi, Merit Health Biloxi – Biloxi, U.S. Air Force Medical Center Keesler – Biloxi, Garden Park Medical Center – Gulfport, Memorial Hospital – Gulfport, and Select Specialty – Gulfport Hospital in Harrison County; Singing River Hospital – Pascagoula and Ocean Springs Hospital – Ocean Springs in Jackson County; Crosby Memorial Hospital – Picayune, Highland Community Hospital – Picayune, and Pearl River County Hospital – Poplarville in Pearl River County; and Stone County Hospital – Wiggins in Stone County. There are also several additional medical care facilities located throughout the region as outlined in the vulnerability assessment (Section 6.4.1).

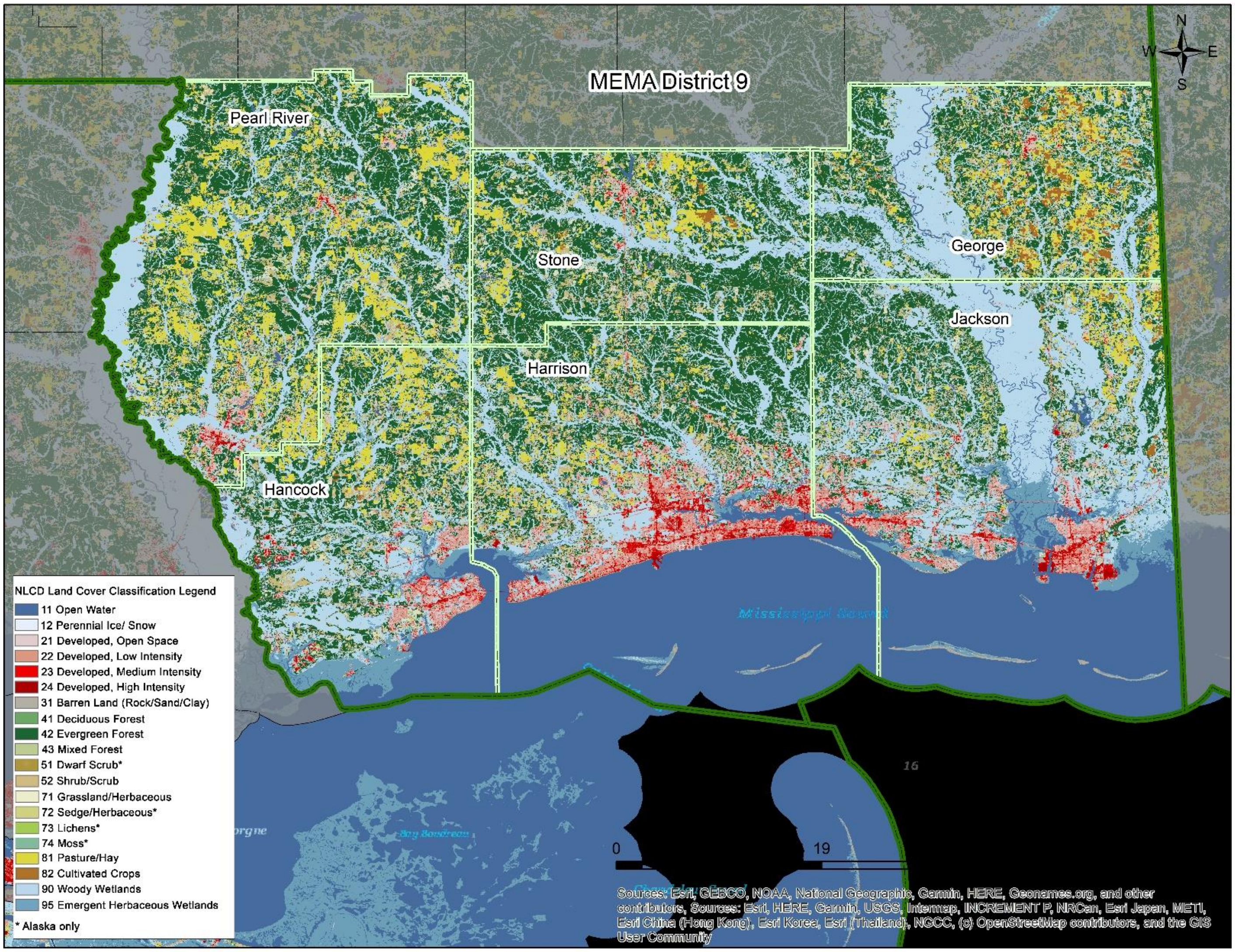
The MEMA District 9 Region contains numerous local, state, and national parks and recreation areas, including the Gulf Islands National Seashore, Mississippi Gulf Coast National Heritage Area, DeSoto National Forest, Buccaneer State Park, and Shepard State Park. Golf courses and resorts, recreational and sports fishing, gamming and casinos, and sand beaches are abundant in the region. These facilities and recreational opportunities attract millions of visitors each year.

LAND USE

Many areas of the MEMA District 9 Region are undeveloped or sparsely developed. As shown in Figure 3.1 above, there are several small incorporated municipalities located throughout the study area, with a few larger clusters along the coast. Coastal land use patterns radiate from city centers and commercial land uses are located in central business districts and highway strips, with surrounding housing that becomes progressively large in lot size and floor area with distance from the central business districts. Residential and non-residential densities are generally low, and concentrated mix of uses are infrequent, creating an auto-oriented land use pattern along the coast. Upland land use patterns differ markedly from the coastal plain. There are only a few municipalities and unincorporated rural centers. There is a mix of protected lands, such as the DeSoto National Forest and several National Wildlife Refuges. Private lands are used for exurban housing, agriculture, and forestry. Consistent with its rural character, densities are very low and uses are not mixed, making motor vehicles the only viable mode for virtually all travel.

Local land use and associated regulations are further discussed in Section 7: Capability Assessment.

Figure 3: Land Classification



EMPLOYMENT AND INDUSTRY

Like other areas of the Gulf Coast, the MEMA District 9 Region's economy is dominated by industries related to manufacturing, energy, petrochemicals, fishing, agriculture, and tourism. There have been efforts to diversify the local economies in recent years, especially following Hurricane Katrina when many residents were temporarily without work. The region has chosen to leverage recovery efforts for greater regional economic renewal.

According to the 2019 American Community Survey (ACS), George County had an average annual employment of 9,658 workers and an average unemployment rate of 6.9 percent (compared to 4.2 percent for the state). In 2019, the average annual median household income in George County was $47,292 compared to $45,081 in the state of Mississippi.

According to the 2019 American Community Survey (ACS), Hancock County had an average annual employment of 21,495 workers and an average unemployment rate of 4.5 percent (compared to 4.2 percent for the state In 2019, the average annual median household income in Hancock County was $48,119 compared to $45,081 in the state of Mississippi.

According to the 2019 American Community Survey (ACS), Harrison County had an average annual employment of 100,196 workers and an average unemployment rate of 5.5 percent (compared to 4.2 percent for the state). In 2019, the average annual median household income in Harrison County was $47,894 compared to $45,081 in the state of Mississippi.

According to the 2019 American Community Survey (ACS), Jackson County had an average annual employment of 67,894 workers and an average unemployment rate of 4.7 percent (compared to 4.2 percent for the state). In 2019, the average annual median household income in Jackson County was $51,657 compared to $45,081 in the state of Mississippi.

According to the 2019 American Community Survey (ACS), Pearl River County had an average annual employment of 23,674 workers and an average unemployment rate of 4.4 percent (compared to 4.2 percent for the state In 2019, the average annual median household income in Pearl River County was $46,901 compared to $45,081 in the state of Mississippi.

According to the 2019 American Community Survey (ACS), Stone County had an average annual employment of 8,229 workers and an average unemployment rate of 1.9 percent (compared to 4.2 percent for the state). In 2019, the average annual median household income in Stone County was $45,483 compared to $45,081 in the state of Mississippi.

SECTION 4 HAZARD IDENTIFICATION

This section describes how the Regional Hazard Mitigation Council identified the hazard to be included this plan. It consists of the following five subsections:

- 4.1 Overview
- 4.2 Description of Full Range of Hazards
- 4.3 Disaster Declarations
- 4.4 Hazard Evaluation
- 4.5 Hazard Identification Results

44 CFR Requirement
44 CFR Part 201.6(c)(2)(i): The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

OVERVIEW

The MEMA District 9 Region is vulnerable to a wide range of natural and human-caused hazards that threaten life and property. Current FEMA regulations and guidance under the Disaster Mitigation Act of 2000 (DMA 2000) require, at a minimum, an evaluation of a full range of natural hazards. An evaluation of human-caused (i.e., terrorism) and technological hazards (i.e., hazardous materials incident) is encouraged, though not required, for plan approval. The MEMA District 9 Region has included both types of hazards, but it should be noted that this list may not be all-inclusive (especially concerning human-caused and technological hazards) and will be revisited with each plan update.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, the participating jurisdictions in the MEMA District 9 Regional Hazard Mitigation Plan have identified a number of hazards that are to be addressed in this Regional Hazard Mitigation Plan. These hazards were identified through an extensive process that utilized input from the MEMA District 9 Region Hazard Mitigation Council members, research of past disaster declarations in the participating counties, and review of the Mississippi State Hazard Mitigation Plan (2018).[1] Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources.

Table 4.1 lists the full range of hazards initially identified for inclusion in the Plan and provides a brief description for each. This table includes 25 individual hazards. Some of these hazards are considered to be interrelated or cascading (one hazard event may cause another, i.e. – hurricanes cause flooding), but for preliminary hazard identification purposes these individual hazards are broken out separately.

Table 4.2 lists the disaster declarations that have impacted the MEMA District 9 Region.

[1] A complete list of disaster declarations for the MEMA District 9 Region can be found below in Section 4.3.

Table 4.3 documents the evaluation process used for determining which of the initially identified hazards are considered significant enough to warrant further evaluation in the risk assessment. For each hazard considered, the table indicates whether or not the hazard was identified as a significant hazard to be further assessed, how this determination was made, and why this determination was made. The table works to summarize not only those hazards that were identified (and why) but also those that were not identified (and why not). Hazard events not identified for inclusion at this time may be addressed during future evaluations and updates of the risk assessment if deemed necessary by the MEMA District 9 RHMC during the plan update process.

Lastly, **Table 4.4** provides a summary of the hazard identification and evaluation process noting that 18 of the 25 initially identified hazards are considered significant enough for further evaluation through this Plan's risk assessment (marked with a "").

DESCRIPTION OF FULL RANGE OF HAZARDS

In this section, hazards are classified into groups including flood-related hazards, fire-related hazards, geologic hazards, wind-related hazards, and other hazards (a catch-all category of hazards that typically includes human-caused and technological hazards). As noted above, several sources were consulted to determine a list of hazards to be considered by MEMA District 9. These include the MEMA District 9 RHMC members, research of past disaster declarations in the participating counties, review of FEMA's Multi-Hazard Identification and Risk Assessment (1997) and review of the State of Mississippi Hazard Mitigation Plan (2019).[2] Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources.

Table 7 DESCRIPTIONS OF THE FULL RANGE OF INITIALLY IDENTIFIED HAZARDS

Hazard	Description
FLOOD-RELATED HAZARDS	
Dam and Levee Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam. Dam failure can result from natural events, human-induced events, or a combination of the two. The most common cause of dam failure is prolonged rainfall that produces flooding. Failures due to other natural events such as hurricanes, earthquakes, or landslides are significant because there is generally little or no advance warning.
Erosion	Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.

[2] A complete list of disaster declarations for the MEMA District 9 Region can be found below in Section 4.3.

Flood	The accumulation of water within a water body which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream ocean, lake, or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, or shallow flooding (where shallow flooding refers to sheet flow, ponding, and urban drainage).
Storm Surge	A storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from four to five feet in a Category 1 hurricane up to more than 30 feet in a Category 5 storm. Storm surge heights and associated waves are also dependent upon the shape of the offshore continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. Storm surge arrives ahead of a storm's actual landfall and the more intense the hurricane is, the sooner the surge arrives. Storm surge can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate coast. Further, water rise caused by storm surge can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas.
Tsunami	A series of waves generated by an undersea disturbance such as an earthquake. The speed of a tsunami traveling away from its source can range from up to 500 miles per hour in deep water to approximately 20 to 30 miles per hour in shallower areas near coastlines. Tsunamis differ from regular ocean waves in that their currents travel from the water surface all the way down to the sea floor. Wave amplitudes in deep water are typically less than one meter; they are often barely detectable to the human eye. However, as they approach shore, they slow in shallower water, basically causing the waves from behind to effectively "pile up," and wave heights increase dramatically. As opposed to typical waves which crash at the shoreline, tsunamis bring with them a continuously flowing 'wall of water' with the potential to cause devastating damage in coastal areas located immediately along the shore.
FIRE-RELATED HAZARDS	
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. High temperatures, high winds, and low humidity can worsen drought conditions and also make areas more susceptible to wildfire. Human demands and actions have the ability to hasten or mitigate drought- related impacts on local communities.
Lightning	Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes, but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes thunder. On average, 80 people are killed each year by lightning strikes in the United States.

Wildfire	An uncontrolled wildfire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors. Over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.
GEOLOGIC HAZARDS	
Avalanche	A rapid fall or slide of a large mass of snow down a mountainside.
Earthquake	A sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the surface. This movement forces the gradual building and accumulation of energy. Eventually, strain becomes so great that the energy is abruptly released, causing the shaking at the earth's surface which we know as an earthquake. Roughly 90 percent of all earthquakes occur at the boundaries where plates meet, although it is possible for earthquakes to occur entirely within plates. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area.
Expansive Soils	Soils that will exhibit some degree of volume change with variations in moisture conditions. The most important properties affecting degree of volume change in a soil are clay mineralogy and the aqueous environment. Expansive soils will exhibit expansion caused by the intake of water and, conversely, will exhibit contraction when moisture is removed by drying. Generally speaking, they often appear sticky when wet and are characterized by surface cracks when dry. Expansive soils become a problem when structures are built upon them without taking proper design precautions into account with regard to soil type. Cracking in walls and floors can be minor or can be severe enough for the home to be structurally unsafe.
Landslide	The movements of a mass of rock, debris, or earth down a slope when the force of gravity pulling down the slope exceeds the strength of the earth materials that comprise to hold it in place. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high.
Land Subsidence/ Sinkhole	The gradual settling or sudden sinking of the Earth's surface due to the subsurface movement of earth materials. Causes of land subsidence include groundwater pumpage, aquifer system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost. Sinkholes are a natural and common geologic feature in areas with underlying limestone and other rock types that are soluble in natural water. Most limestone is porous, allowing the acidic water of rain to percolate through their strata, dissolving some limestone and carrying it away in solution. Over time, this persistent erosional process can create extensive underground voids and drainage systems in much of the carbonate rocks. Collapse of overlying sediments into the underground cavities produces sinkholes.

Volcano	A mountain that opens downward to a reservoir of molten rock below the surface of the earth. While most mountains are created by forces pushing up the earth from below, volcanoes are different in that they are built up over time by an accumulation of their own eruptive products: lava, ash flows, and airborne ash and dust. Volcanoes erupt when pressure from gases and the molten rock beneath becomes strong enough to cause an explosion.
WIND-RELATED HAZARDS	
Extreme Cold	Extreme cold is generally considered to occur when the temperature is at or below freezing for a period of time. Often these events are associated with winter storms and other winter weather, but extreme cold events can occur on their own. Dangers associated with extreme cold events include frostbite and hypothermia among other impacts to people and these events can often last for several days or weeks in a row.
Extreme Heat	Extreme heat, or a heat wave, may occur when temperatures hover 10 degrees or more above the average high temperature for the region and last for several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a “dome” of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. A heat wave combined with a drought can be very dangerous and have severe economic consequences on a community.
Hailstorm	A hailstorm is any storm that produces hailstones that fall to the ground; usually used when the amount or size of the hail is considered significant. Hail is formed when updrafts in thunderstorms carry raindrops into parts of the atmosphere where the temperatures are below freezing.
Hurricane and Tropical Storm	Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter- clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and with a diameter averaging 10 to 30 miles across. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind- driven waves, and tidal flooding which can be more destructive than cyclone wind. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season, which extends from June through November.
Nor’easter	Similar to hurricanes, nor’easters are ocean storms capable of causing substantial damage to coastal areas in the Eastern United States due to their associated strong winds and heavy surf. Nor'easters are named for the winds that blow in from the northeast and drive the storm up the East Coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast. They are caused by the interaction of the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful. Nor’easters are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and

	creating high surf that causes severe beach erosion and coastal flooding.
Severe Thunderstorm/High Wind	Thunderstorms are caused by air masses of varying temperatures meeting in the atmosphere. Rapidly rising warm moist air fuels the formation of thunderstorms. Thunderstorms may occur singularly, in lines, or in clusters. They can move through an area very quickly or linger for several hours. Thunderstorms may result in hail, tornadoes, or straight-line winds. Windstorms pose a threat to lives, property, and vital utilities primarily due to the effects of flying debris and can down trees and power lines.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size, and duration of the storm.
Winter Weather	Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads, and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
OTHER HAZARDS	
Climate Change/Sea Level Rise	Climate change and sea level rise are hazards that are becoming a larger threat to many communities, especially along the coast. Climate change can have many impacts on a community, including exacerbating sea level rise. Other impacts of climate change include hotter temperatures, more frequent drought, more frequent flooding, and stronger storm events. In many areas, the exact outcomes of climate change will be dependent largely on regional trends and the location of a community. As its name suggests, sea level rise is the rising of the seas above their current levels. Sea level rise can have potentially major impacts by causing inundation of areas not previously inundated with water and exacerbating other hazards such as storm surge. Sea level rise is generally the result of two major causes: thermal expansion of the oceans and loss of land-based ice. Historic records indicate that sea level rise has been an ongoing process over the last several thousand years. However, a major concern is that recent studies show that the rate of sea level rise has been increasing steadily over the past century. This increase in rate will likely have a quicker and potentially more devastating effect on people and property than any sea level rise that has taken place in the past.

Hazardous Materials Incident	Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways and on the water. HAZMAT incidents consist of solid, liquid and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind and possibly wildlife as well.
Infectious Disease	Public health threats are often defined by an infectious disease that involves a biological agent/disease that may result in mass casualties or an outbreak of symptoms in those affected. Often emerging diseases are the greatest threat because they are new or varied iterations of existing threats and the population may not have built up a collective immunity to the disease.

DISASTER DECLARATIONS

Disaster declarations provide initial insight into the hazards that may impact the MEMA District 9 Regional planning area. Since 1965, 30 presidential disaster declarations have occurred in the region. This includes 15 events related to hurricanes/tropical storms and all of the remaining related to some combination of severe storms, flooding, and tornadoes with the exception of the COVID-19 Global Pandemic in 2020.

Table 8 MEMA DISTRICT 9 REGION DISASTER DECLARATIONS BY COUNTY

Year	Disaster Number	Description	George	Hancock	Harrison	Jackson	Pearl River	Stone
1965	210	HURRICANE BETSY			X	X	X	
1969	271	HURRICANE CAMILLE	X		X	X	X	X
1971	302	STORMS & TORNADOES						X
1974	430	HEAVY RAINS & FLOODING	X	X	X	X	X	
1979	577	STORMS, TORNADOES, FLOODS		X				
1979	599	HURRICANE FREDERIC	X	X	X	X	X	X
1980	618	STORMS, FLOOD, MUDSLIDES & TORNADOES	X		X	X		
1983	678	SEVERE STORMS, FLOODING & TORNADOES					X	
1985	741	HURRICANE ELENA			X	X	X	X
1990	859	SEVERE STORMS, TORNADOES & FLOODING	X		X	X		
1991	888	SEVERE STORMS, TORNADOES & FLOODING			X			
1991	906	SEVERE STORMS, TORNADOES & FLOODING	X	X	X		X	

Year	Disaster Number	Description	George	Hancock	Harrison	Jackson	Pearl River	Stone
1995	1051	SEVERE STORMS, TORNADOES, FLOODING		X	X	X	X	
1998	1251	HURRICANE GEORGES	X	X	X	X	X	X
2001	1360	SEVERE STORMS AND TORNADOES					X	
2001	1382	TROPICAL STORM ALLISON	X	X	X	X	X	
2002	1436	TROPICAL STORM ISIDORE	X	X	X	X	X	X
2003	1459	SEVERE STORMS, TORNADOES, FLOODS					X	
2004	1550	HURRICANE IVAN	X	X	X	X	X	X
2005	1594	HURRICANE DENNIS	X	X	X	X	X	X
2005	1604	HURRICANE KATRINA	X	X	X	X	X	X
2008	1794	HURRICANE GUSTAV	X	X	X	X	X	X
2009	1837	SEVERE STORMS, FLOODING, AND TORNADOES				X		X
2012	4081	HURRICANE ISAAC	X	X	X	X	X	X
2016	4268	SEVERE STORMS AND FLOODING	X				X	
2018	4350	HURRICANE NATE	X	X	X	X		X
2020	4528	COVID-19 PANDEMIC	X	X	X	X	X	X
2020	4551	SEVERE STORMS, TORNADOES, STRAIGHT-LINE WINDS, AND FLOODING	X					
2021	4576	HURRICANE ZETA	X	X	X	X		X
2022	4626	HURRICANE IDA	X	X	X	X	X	X
TOTAL NUMBER OF DISASTERS:			20	17	22	17	21	16

HAZARD EVALUATION

Table 9 DOCUMENTATION OF THE HAZARD EVALUATION PROCESS

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
FLOOD-RELATED HAZARDS			

Dam and Levee Failure	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of MS Department of Environmental Quality dam inventory	The National Inventory of Dams shows dams are located in every state. Dam/levee failure is identified in the state plan as a limited hazard. Several of the previous MEMA District 9 Region hazard mitigation plans consider dam/levee failure to be a hazard. 7 dams in the region are classified as high-hazard (high hazard is defined where dam failure may cause loss of life or serious damage).

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Erosion	YES	Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans	Coastal erosion was excluded from the State of MS Hazard Mitigation Plan as a hazard, however, it is addressed under the hurricane hazard. Riverine erosion is not addressed in the plan. Coastal erosion is identified as a hazard in a number of the previous MEMA District 9 Region hazard mitigation plans. Erosion is a natural process and continuous process that impacts the region.

Flood	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of NOAA NCEI Storm Events Database Review of historical disaster declarations Review of FEMA DFIRM data Review of FEMA's NFIP Community Status Book and Community Rating System (CRS)	Floods occur in all 50 states and in the U.S. territories. The flood hazard is thoroughly discussed in the state plan. Much of the state is located in the 100-year floodplain. Further, flash floods are a common occurrence during rain storms. Each of the previous MEMA District 9 Region hazard mitigation plans addresses the flood hazard. NCEI reports that MEMA District 9 Region counties have been affected by 168 flood events since 1996. In total, these events caused 1 recorded death and an estimated $12.2 million in property damages. 11 out of 23 disaster declarations were flood-related and an additional 12 were hurricane or tropical storm- related which caused flooding issues. 22 of the 22 MEMA District 9 jurisdictions participate in the NFIP and 15 also participate in the CRS.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Storm Surge	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of NOAA NCEI Storm Events Database	Given the coastal location of the MEMA District 9 Region, storm surge is likely to affect the area. Storm surge is discussed in the state plan under the hurricane hazard and indicates that the costal shoreline counties are subject to storm surge. Several of the previous hazard mitigation plans in the MEMA District 9 Region identify storm surge as a potential hazard.
Tsunami	NO	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of USGS Regional Assessment of Tsunami potential in the Gulf of Mexico Review of FEMA "How- to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks – Identifying Hazards and Estimating Losses)	No record exists of a catastrophic tsunami impacting the Gulf of Mexico coast. Tsunami inundation zone maps are not available for communities located along the U.S. Gulf Coast. The tsunami hazard is excluded from the state plan. There is no historical record of tsunamis in the Gulf of Mexico. None of the previous MEMA District 9 Region hazard mitigation plans consider tsunami to be a problem for the area. FEMA mitigation planning guidance suggests that locations along the U.S. Gulf Coast have a relatively low tsunami risk and need not conduct a tsunami risk assessment at this time.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
FIRE-RELATED HAZARDS			
Drought	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of US Drought Monitor website	Drought is a normal part of virtually all climatic regimes, including areas with high and low average rainfall. Droughts are identified in the State of MS Hazard Mitigation Plan as a limited hazard. Drought is not considered to be major hazards in any of the previous MEMA District 9 Region hazard mitigation plans. There are reports of the most extreme (exceptional) drought in each of the MEMA District 9 Region counties according to the US Drought Monitor.
Lightning	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of NOAA NCEI Storm Events Database	Severe thunderstorm/lightning events were not profiled in the State Hazard Mitigation Plan because they do not typically impact the entire state, invoking a state response. However, severe thunderstorms were identified as a significant concern at the local level. Lighting is addressed directly in many of the previous MEMA District 9 Region hazard mitigation plans and as a sub-hazard in several others. NCEI reports 57 lightning events in the MEMA District 9 Region counties since 1996. These events have resulted in 6 deaths, 7 injuries, and $1.5 million (2016 dollars) in property damage.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Wildfire	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of Southern Wildfire Risk Assessment (SWRA) Data Review of Mississippi Forestry Commission data	Wildfires occur in virtually all parts of the United States. Wildfire hazard risks will increase as low-density development along the urban/wildland interface increases. The State of MS Hazard Mitigation Plan identifies wildfire as a significant hazard and regular occurrence. Each of the previous MEMA District 9 Region hazard mitigation plans addresses wildfire. A review of SWRA data indicates that there are areas of concern in the MEMA District 9 Region. Wildfire hazard risks will increase as low- density development along the urban/wildland interface increases. According to the Mississippi Forestry Commission, the MEMA District 9 Region experiences an average of 464 fires each year which burn a combined 8,297 acres annually.
GEOLOGIC HAZARDS			
Avalanche	NO	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of US Forest Service National Avalanche Center website	The United States avalanche hazard is limited to mountainous western states including Alaska, as well as some areas of low risk in New England. Avalanche was not considered in the State of MS Hazard Mitigation Plan since it poses no threat to the state. Avalanche is not included in any of previous MEMA District 9 Region hazard mitigation plans. There is no risk or history of avalanche events in Mississippi.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Earthquake	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of National Geophysical Data Center USGS Earthquake Hazards Program website	Although the zone of greatest seismic activity in the United States is along the Pacific Coast, eastern and central regions have experienced significant earthquakes. Earthquake events are identified as a limited hazard in the State of MS Hazard Mitigation Plan, and all counties in MS are considered to be susceptible to the effects of earthquakes. Earthquakes have occurred in and around the State of Mississippi in the past. The state is affected by the New Madrid (near Missouri) and White River Fault lines which have generated a magnitude 8.0 earthquake in the last 200 years. Some of the previous MEMA District 9 Region hazard mitigation plans consider earthquake to be a hazard of concern. 7 events are known to have occurred in the region according to the National Geophysical Data Center. The greatest MMI reported was a 5.
Expansive Soils	NO	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of USGS Swelling Clays Map	The effects of expansive soils are most prevalent in parts of the Southern, Central, and Western U.S. Expansive soils are not identified in the state plan, and have not historically been a problem for most areas in Mississippi. Expansive soils are not addressed in any of the previous MEMA District 9 Region hazard mitigation plans. According to USGS, the MEMA District 9 Region is predominately located in an area that is underlain by "generally less than 50%" of its soil as clay having high swelling potential.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Landslide	NO	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of USGS Landslide Incidence and Susceptibility Hazard Map	Landslides occur in every state in the U.S., and they are most common in the coastal ranges of California, the Colorado Plateau, the Rocky Mountains, and the Appalachian Mountains. The State of MS Hazard Mitigation Plan excludes the landslide hazard because there is no extensive history of landslides in Mississippi. None of the previous MEMA District 9 Region hazard mitigation plans consider landslide to be a likely hazard to affect the area. USGS landslide hazard maps indicate "low incidence" (less than 1.5% of the area is involved in landsliding) across the majority of the region.
Land Subsidence/ Sinkhole	NO	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans	Land subsidence affects at least 45 states, including Mississippi. However, because of the broad range of causes and impacts, there has been limited national focus on this hazard. The state plan does not identify land subsidence as a hazard because there is no significant historical record of the hazard in the region. None of the previous MEMA District 9 Region hazard mitigation plans consider land subsidence to be a likely hazard to affect the area.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Volcano	NO	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of USGS Volcano Hazards Program website	More than 65 potentially active volcanoes exist in the United States and most are located in Alaska. The Western states and Hawaii are also potentially affected by volcanic hazards. There are no active volcanoes in Mississippi. The volcano hazard is excluded from the state plan. There is no historical record of this hazard in the region.
WIND-RELATED HAZARDS			
Extreme Cold	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of NOAA NCEI Storm Events Database	Many areas of the United States are susceptible to extreme cold, including Mississippi. Extreme cold is considered to be a hazard in some of the previous MEMA District 9 Region hazard mitigation plans. NCEI reports that the MEMA District 9 Region counties have been affected by 8 extreme cold events since 1996.
Extreme Heat/ Heat Wave	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of NOAA NCEI Storm Events Database	Many areas of the United States are susceptible to heat wave, including Mississippi. Extreme heat was excluded from the plan even though it was recognized that it can create emergencies in state. Extreme heat is considered to be a hazard in some of the previous MEMA District 9 Region hazard mitigation plans. NCEI reports that the MEMA District 9 Region counties have been affected by 8 extreme heat events since 1996.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Hailstorm	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of NOAA NCEI Storm Events Database	Severe thunderstorm/hail events were not profiled in the State Hazard Mitigation Plan because they do not typically impact the entire state, invoking a state response. However, severe thunderstorms were identified as a significant concern at the local level. Hailstorms are addressed in a number of the previous MEMA District 9 Region hazard mitigation plans. NCEI reports 310 hailstorm events in the MEMA District 9 Region counties since 1950.
Hurricane and Tropical Storm	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Analysis of NOAA historical tropical cyclone tracks and National Hurricane Center Website Review of NOAA NCEI Storm Events Database Review of historical presidential disaster declarations	The Atlantic and Gulf regions are most prone to landfall by hurricanes and tropical storms. The State Hazard Mitigation Plan profiles the hurricane hazard and identifies it as a significant hazard, noting its devastating impacts on the state. Each of the previous MEMA District 9 Region hazard mitigation plans addresses hurricanes. NOAA historical records indicate 119 hurricanes and tropical storms have come within 100 miles of the MEMA District 9 Region since 1842. 12 disaster declarations in the MEMA District 9 Region are directly related to hurricane and tropical storm events.

Nor’easter	NO	Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of NOAA NCEI Storm Events Database	Nor’easters are not profiled or discussed in the state plan. Nor’easters are not identified in any of the previous MEMA District 9 Region hazard mitigation plans. NCEI does not report any nor’easter activity for the MEMA District 9 Region counties.
Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Severe Thunderstorm/ High Wind	YES	Review of FEMA’s Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of NOAA NCEI Storm Events Database Review of historical presidential disaster declarations	Over 1,000 thunderstorms are estimated to occur each year or the U.S. mainland, and they are experienced in nearly every region. Severe thunderstorm events were not profiled in the State Hazard Mitigation Plan because they do not typically impact the entire state, invoking a state response. However, severe thunderstorms were identified as a significant concern at the local level. Thunderstorms are addressed in many of the previous MEMA District 9 Region hazard mitigation plans. NCEI reports 704 thunderstorm events in the MEMA District 9 Region counties since 1950. These events have resulted in 2 deaths, 39 injuries, and $11.0 million (2016 dollars) in property damage. 10 disaster declarations in the MEMA District 9 Region are related to severe storm and high wind events.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Tornado	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of NOAA NCEI Storm Events Database Review of historical presidential disaster declarations	From 1991 to 2010, Mississippi experienced 9.2 tornadoes per 10,000 miles, making it the 5th ranked "tornado state" in the U.S. Tornado events are listed in the State of MS Hazard Mitigation Plan as a significant hazard and are referenced as a common disaster. Tornadoes are addressed in all of the previous MEMA District 9 Region hazard mitigation plans. NCEI reports 283 tornado events in MEMA District 9 Region counties since 1950. These events have resulted in 6 recorded deaths, 170 injuries, and $383.5 million (2016 dollars) in property damage with the most severe being an EF3. 11 disaster declarations in the MEMA District 9 Region were related to tornado events.
Winter Weather	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of NOAA NCEI Storm Events Database Review of historical presidential disaster declarations	Winter storms affect every state in the continental U.S. and Alaska. Extreme winter weather is identified in the state plan as a limited hazard. Winter storm events are not considered to be a major hazard in the previous MEMA District 9 Region hazard mitigation plans. NCEI reports that the MEMA District 9 Region counties have been affected by 23 winter weather events since 1996.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
OTHER HAZARDS			
Climate Change/ Sea Level Rise	YES	Review of previous MEMA District 9 Region hazard mitigation plans Review of National Climate Assessment report Review of NOAA sea level rise scenario data	Several of the previous District 9 hazard mitigation plans include climate change and/or sea level rise as a hazard The National Climate Assessment explains that climate change is already beginning to have impacts on communities across the United States. NOAA data shows that coastal communities are especially vulnerable to climate change due to the impacts of sea level rise.
Hazardous Materials Incident/Train Derailment	YES	Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans Review of EPA TRI sites inventory Review of PHMSA HAZMAT Incident Statistics database	Cities, counties, and towns where hazardous materials fabrication, processing, and storage sites are located, and those where hazardous waste treatment, storage, or disposal facilities operate are at risk for hazardous materials events. Hazardous materials incidents are not discussed in the state plan, but it does note that the hazard is addressed in 15% of local plans. Several of the previous MEMA District 9 Region hazard mitigation plans include hazardous materials incident as a hazard. There are 38 TRI sites located in the MEMA District 9 Region. According to the PHMSA, there have been 473 reported hazardous materials incidents in the region.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Infectious Disease	YES	Review of State of MS Hazard Mitigation Plan Review of previous MEMA District 9 Region hazard mitigation plans	Infectious diseases are a worldwide phenomenon and can impact any community. Infectious diseases are included in several of the previous MEMA District 9 Region hazard mitigation plans. The COVID-19 Pandemic 2020 was the main determining factor for keeping Infectious disease as a significant hazard.

HAZARD IDENTIFICATION RESULTS

Table 10: SUMMARY RESULTS OF THE HAZARD IDENTIFICATION AND EVALUATION PROCESS

FLOOD-RELATED HAZARDS	WIND-RELATED HAZARDS
*Dam and Levee Failure	*Extreme Cold
*Erosion	*Extreme Heat/Heat Wave
*Flood	*Hailstorm
*Storm Surge	*Hurricane and Tropical Storm
Tsunami	Nor'easter
FIRE-RELATED HAZARDS	*Severe Thunderstorm/High Wind
*Drought	*Tornado
*Lightning	*Winter Weather
*Wildfire	OTHER HAZARDS
GEOLOGIC HAZARDS	*Climate Change/Sea Level Rise
Avalanche	*Hazardous Materials Incident/Train Derailment
*Earthquake	*Infectious Disease
Expansive Soils	
Landslide	
Land Subsidence/Sinkhole	
Volcano	

* = Hazard considered significant enough for further evaluation in the MEMA District 9 Region hazard risk assessment.

SECTION 5 HAZARD PROFILES

This section includes detailed hazard profiles for each of the hazards identified in the previous section (Hazard Identification) as significant enough for further evaluation in the MEMA District 9 Regional Hazard Mitigation Plan. It contains the following subsections:

- 5.1 Overview
- 5.2 Study Area Flood-Related Hazards
- 5.3 Dam and Levee Failure
- 5.4 Erosion
- 5.5 Flood
- 5.6 Storm Surge Fire-Related Hazards
- 5.7 Drought
- 5.8 Lightning
- 5.9 Wildfire Geologic Hazards
- 5.10 Earthquake Wind-Related Hazards
- 5.11 Extreme Cold
- 5.12 Extreme Heat
- 5.13 Hailstorm
- 5.14 Hurricane and Tropical Storm
- 5.15 Severe Thunderstorm/High Wind
- 5.16 Tornado
- 5.17 Winter Weather Other Hazards
- 5.18 Climate Change/Sea Level Rise
- 5.19 Hazardous Materials Incident/Train Derailment
- 5.20 Infectious Disease
- 5.21 Conclusions on Hazard Risk
- 5.22 Final Determinations

44 CFR Requirement
44 CFR Part 201.6(c)(2)(i): The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events

OVERVIEW

This section includes detailed hazard profiles for each of the hazards identified in the previous section (Hazard Identification) as significant enough for further evaluation in the MEMA District 9 Region hazard risk assessment by creating a hazard profile. Each hazard profile includes a general description of the hazard including its location, extent (or severity), historical occurrences, and probability of future occurrences. Each profile also includes specific items noted by members of the MEMA District 9 Regional Hazard Mitigation Council (RHMC) as it relates to unique historical or anecdotal hazard information for the counties in the MEMA District 9 Region or a participating municipality within them.

The following hazards were identified:

Flood-related Hazards
- Dam and Levee Failure
- Erosion
- Flood
- Storm Surge

Fire-related Hazards
- Drought
- Lightning
- Wildfire

Geologic Hazards
- Earthquake

Wind-related Hazards
- Extreme Cold
- Extreme Heat
- Hailstorm
- Hurricane and Tropical Storm
- Severe Thunderstorm/High Wind
- Tornado
- Winter Weather

Other Hazards
- Climate Change/Sea Level Rise
- Infectious Disease
- Hazardous Materials Incident/Train Derailment

STUDY AREA

The MEMA District 9 Region includes 6 counties and 16 incorporated jurisdictions. Table 5.1 provides a summary table of the participating jurisdictions within each county. In addition, Figure 5.1 provides a base map, for reference, of the

MEMA District 9 Region.

Table 11: PARTICIPATING JURISDICTIONS IN THE MEMA DISTRICT 9 REGIONAL HAZARD MITIGATION PLAN

George County		Jackson County	
Lucedale		Gautier	Ocean Springs
Hancock County		Moss Point	Pascagoula
Bay St. Louis	Waveland	Pearl River County	
Diamondhead		Picayune	Poplarville
Harrison County		Stone County	
Biloxi	Long Beach	Wiggins	
D'Iberville	Pass Christian		
Gulfport			

Figure 4 MEMA DISTRICT 9 BASE MAP

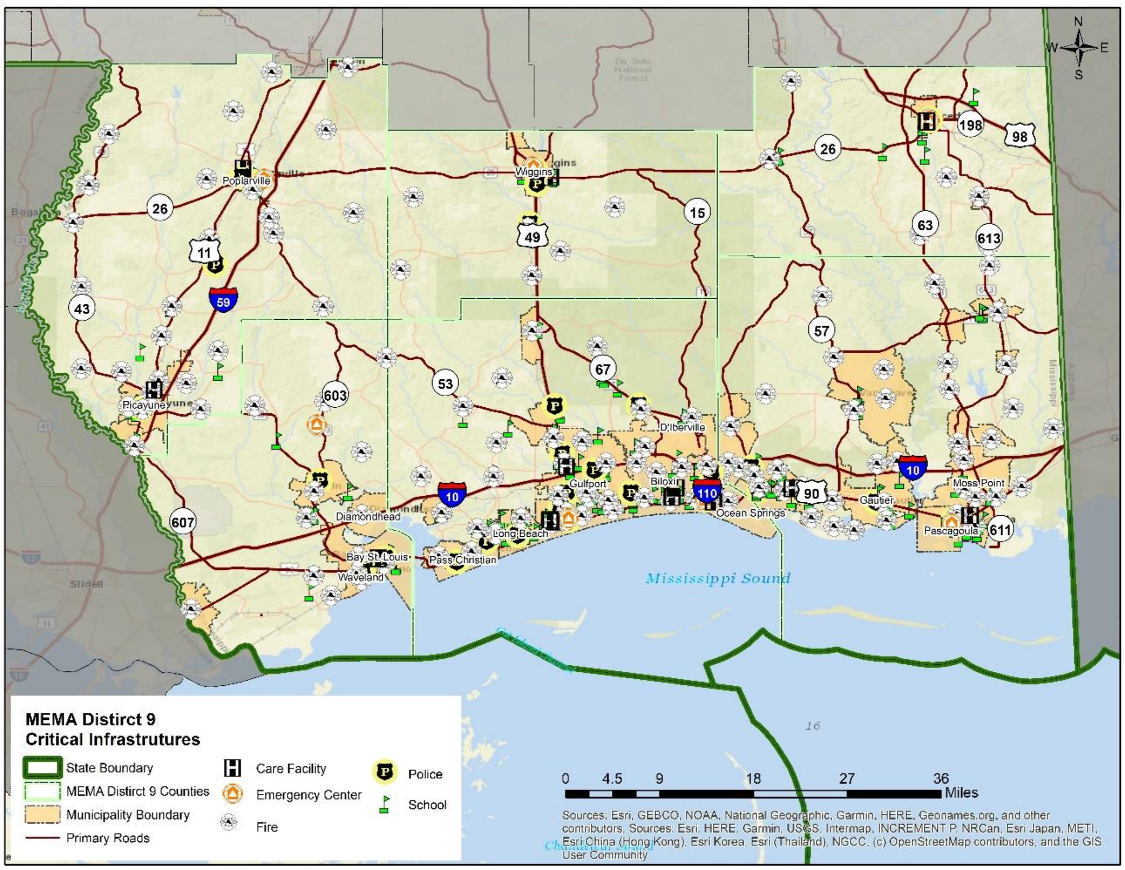


Table 12 lists each significant hazard for the MEMA District 9 Region and identifies whether or not it has been determined to be a specific hazard of concern for the municipal jurisdictions and the unincorporated areas of the counties. This is the based on the best available data and information from the MEMA District 9 Regional Hazard Mitigation Council.

Table 12: SUMMARY OF IDENTIFIED HAZARD EVENTS IN THE MEMA DISTRICT 9 REGION

	Flood-related				Fire-related			Geo-logic	Wind-related							Other		
Jurisdiction	Dam/Levee Failure	Erosion	Flood	Storm Surge	Drought	Lightning	Wildfire	Earthquake	Extreme Cold	Extreme Heat	Hailstorm	Hurricane/Tropical Storm	Severe Thunderstorm/High Wind	Tornado	Winter Weather	Climate Change/Sea Level Rise	Infectious Disease	HAZMAT/Train Derailment
George County																		
Lucedale		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unincorporated Area		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hancock County																		
Bay St. Louis	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Diamondhead	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Waveland	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unincorporated Area	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Harrison County																		
Biloxi	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
D'Iberville	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Gulfport	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Long Beach	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pass Christian	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unincorporated Area	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Jackson County																		
Gautier	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Moss Point	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ocean Springs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pascagoula	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unincorporated Area	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pearl River County																		
Picayune	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poplarville	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unincorporated Area	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Stone County																		
Wiggins	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unincorporated Area	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X

FLOOD-RELATED HAZARDS

DAM AND LEVEE FAILURE

BACKGROUND

Worldwide interest in dam and levee safety has risen significantly in recent years. Aging infrastructure, new hydrologic information, and population growth in floodplain areas downstream from dams and near levees have resulted in an increased emphasis on safety, operation, and maintenance.

There are approximately 80,000 dams in the United States today, the majority of which are privately owned. Other owners include state and local authorities, public utilities, and federal agencies. The benefits of dams are numerous: they provide water for drinking, navigation, and agricultural irrigation. Dams also provide hydroelectric power, create lakes for fishing and recreation, and save lives by preventing or reducing floods.

Though dams have many benefits, they also can pose a risk to communities if not designed, operated, and maintained properly. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and great property damage if development exists downstream. If a levee breaks, scores of properties may become submerged in floodwaters and residents may become trapped by rapidly rising water. The failure of dams and levees has the potential to place large numbers of people and great amounts of property in harm's way

LOCATION AND SPATIAL EXTENT

The Mississippi Department of Environmental Quality provides information on dams including a hazard potential classification. There are three hazard classifications—high, significant, and low—that correspond to qualitative descriptions. **Table 5.3** explains these classifications.

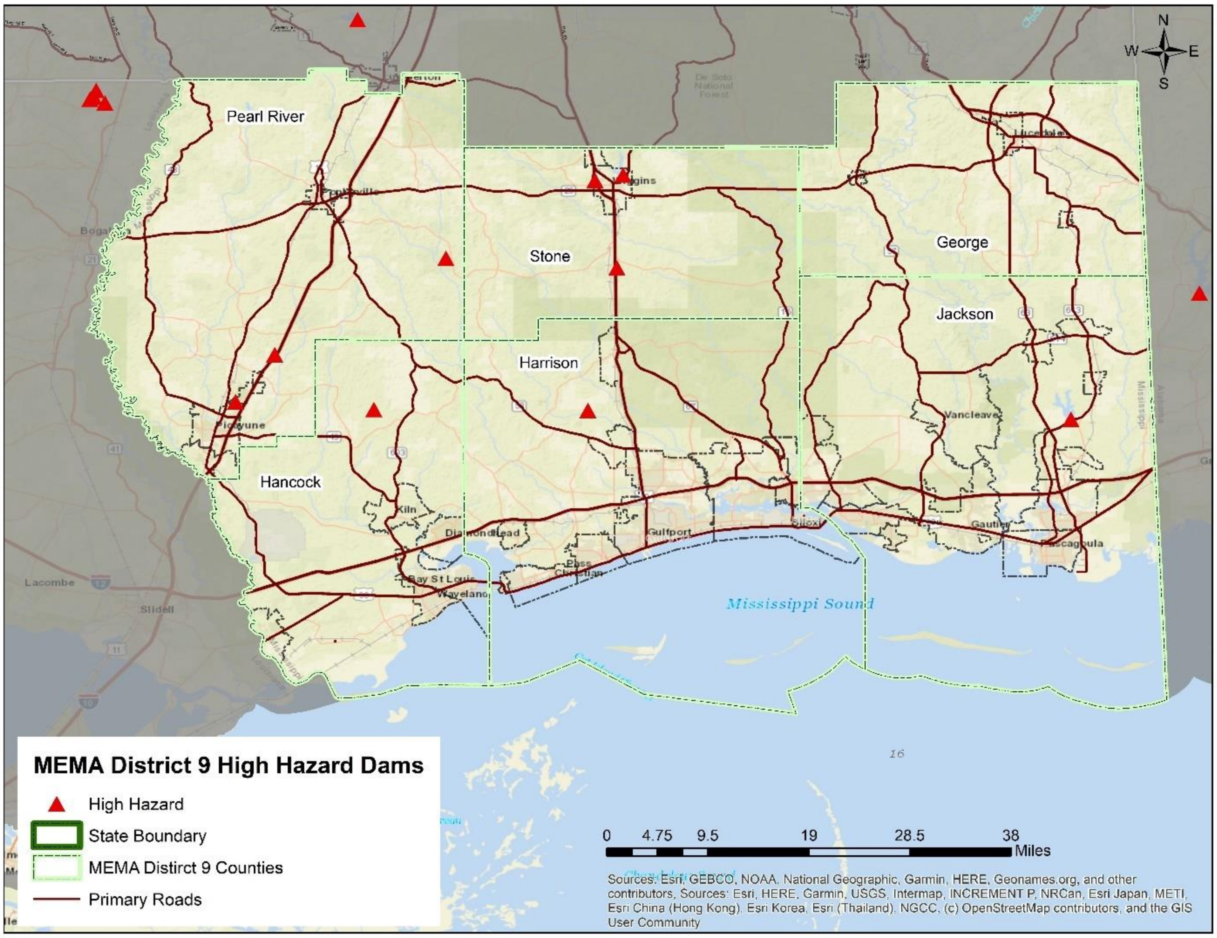
Table 13 MISSISSIPPI DAM HAZARD CLASSIFICATIONS

Hazard Classification	Description
Low	Dam failure may cause damage to farm buildings (excluding residences), agricultural land, or county or minor roads.
Significant	Dam failure may cause significant damage to main roads, minor railroads, or cause interruption of use or service of relatively important public utilities.
High	Dam failure may cause loss of life, serious damage to homes, industrial or commercial buildings, important public utilities, main highways or railroads. Dams constructed in existing or proposed residential, commercial or industrial areas will be classified as high hazard dams, unless the applicant presents clear and convincing evidence to the contrary.

Source: Mississippi Department of Environmental Quality

According to the Mississippi Department of Environmental Quality, there are seven high hazard dams in the MEMA District 9 Region.1 **Figure 5.2** and **Figure 5.3** show the location of each of these high hazard dams as well as mapped dam inundation areas, and **Table 5.4** lists them by name.

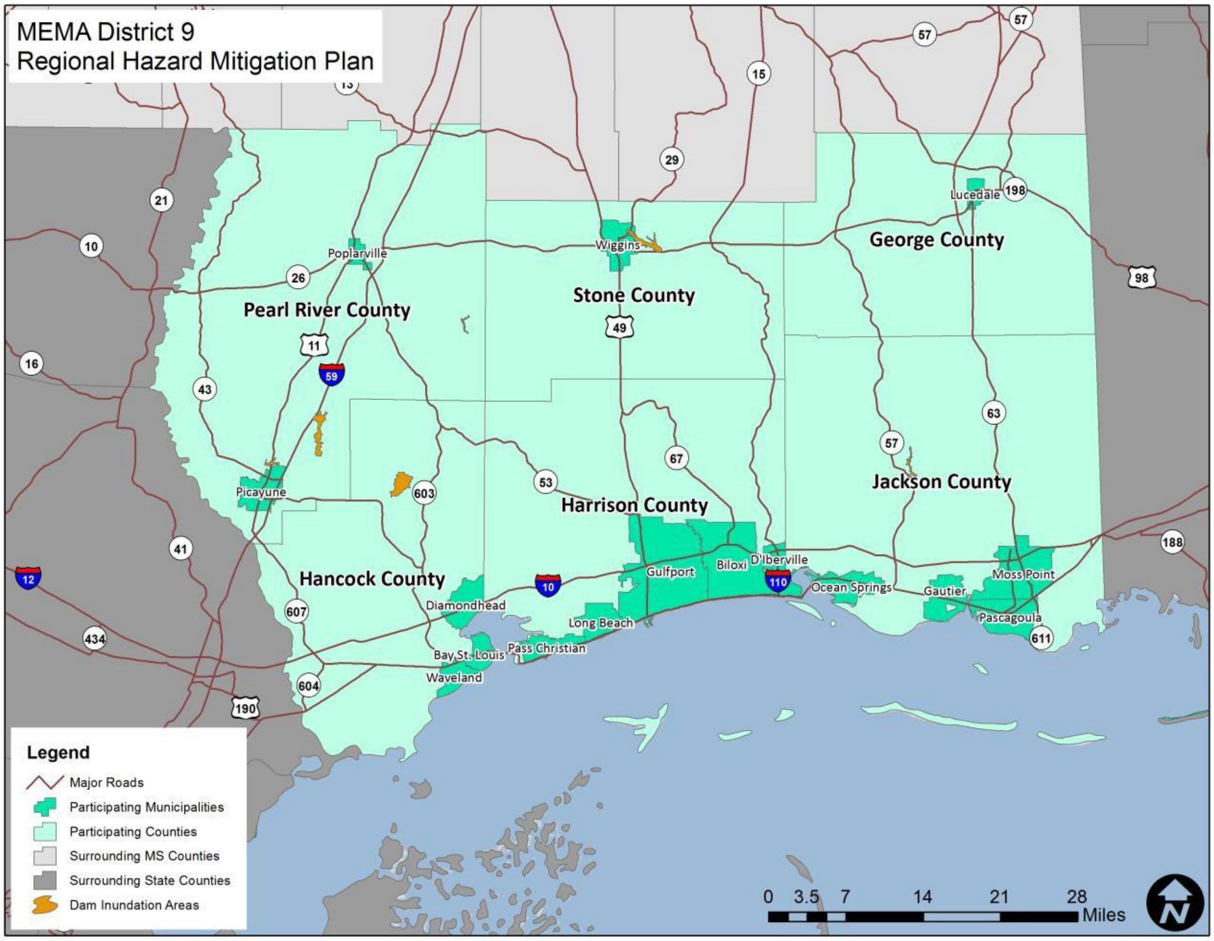
Figure 5 MEMA DISTRICT 9 HIGH HAZARD DAM LOCATIONS



Source: United State Army Corps of Engineers (USACE)

1

Figure 6 MEMA DISTRICT 9 DAM INUNDATION AREAS



Source: Mississippi Department of Environmental Quality

Table 14 MEMA DISTRICT 9 REGION HIGH HAZARD DAMS

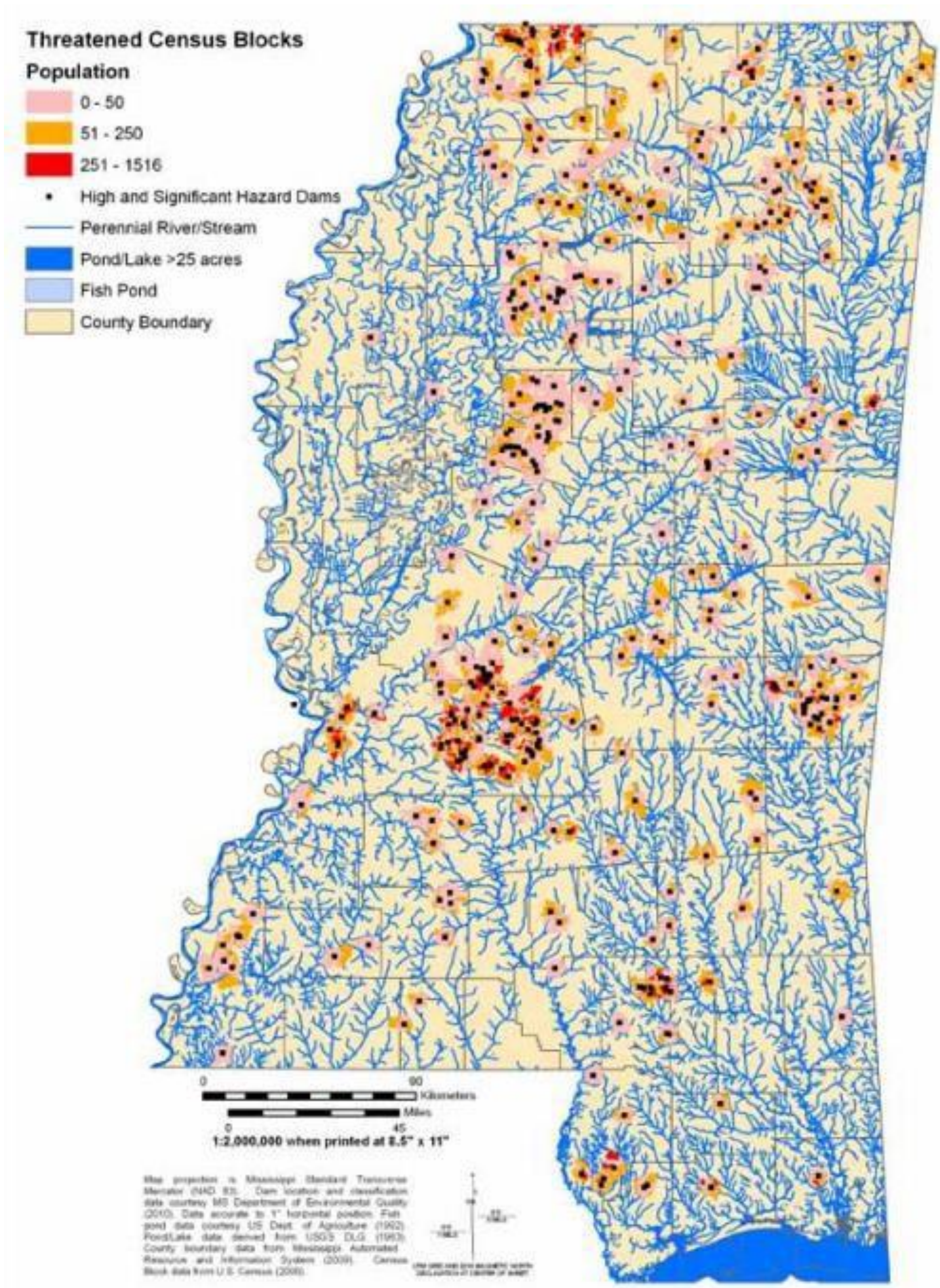
Dam Name	Hazard Potential
George County	
NONE	N/A
Hancock County	
WHITE CYPRESS LAKE DAM	High
Harrison County	
LAKE A TWIN LAKES SUBDIVISION DAM	High
Jackson County	
BLACK CREEK COOLING WATER DAM	High
Pearl River County	
ANCHOR LAKE DAM	High
GO GO ROAD LAKE DAM	High
HIDE-A-WAY LAKE DAM	High

Dam Name	Hazard Potential
Stone County	
FLINT CREEK RESERVOIR DAM	High

Source: Mississippi Department of Environmental Quality

Additionally, the Mississippi State Hazard Mitigation Plan provides some additional statewide information regarding populations that are located within two miles of a high or significant class dam and are potentially threatened by a dam failure. These areas are identified in **Figure 5.4.**

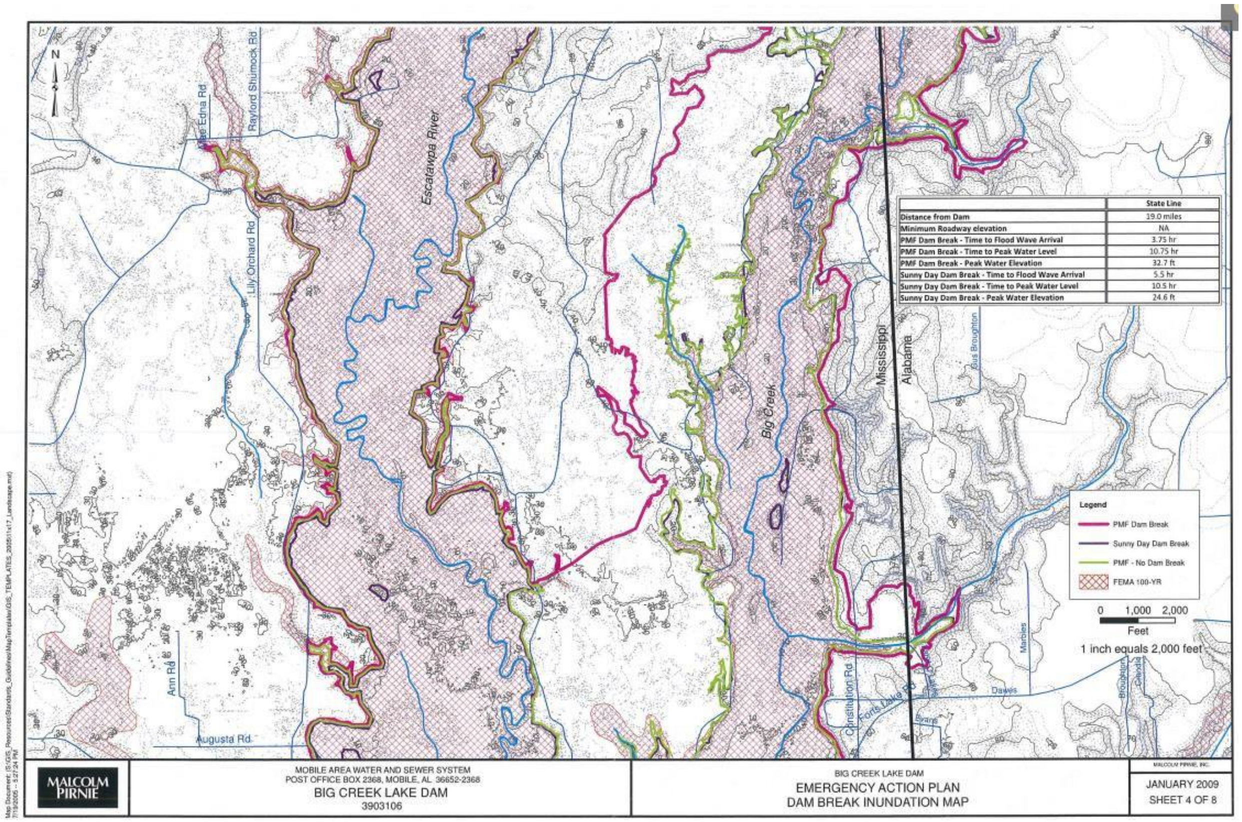
Figure 7 POPULATION LIVING WITHIN TWO MILES AND THREATENED BY A HIGH OR



Source: Mississippi State Hazard Mitigation Plan

Finally, although it is technically outside the State of Mississippi, the Big Creek Lake Dam in Alabama poses a potential risk to some areas in eastern Jackson County and has been identified as the greatest threat in terms of dam failure in the county. The Emergency Action Plan for this dam provides probable maximum flood areas in both Alabama and Mississippi, demonstrating potential areas at risk in several scenarios including dam break, sunny day dam break, and no dam break. Part of this mapping is found in **Figure 5.5**. Additional maps from the Big Creek Lake Dam Emergency Action Plan can be found in the Jackson County Annex of this plan.

Figure 8 BIG CREEK LAKE DAM FAILURE SCENARIOS



Source: Big Creek Lake Dam Emergency Action Plan

<u>HISTORICAL OCCURRENCES</u>

According to the Mississippi State Hazard Mitigation Plan, there have been four dam failures reported in the MEMA District 9 Region, one in Hancock County, one in Harrison County, and two in Pearl River County. No additional breaches were reported for this update process. Although no damage was reported with these events, several breach scenarios in the region could be catastrophic.

Table 15 below provides a brief description of the four reported dam failures.

Table 153 MEMA DISTRICT 9 REGION DAM FAILURES (1982-2022)

Date	County	Structure Name	Cause of Failure
April 1983	Hancock	Boy Scout Camp	Breached
April 1983	Pearl River	Anchor Lake	Breached
October 2002	Harrison	Windy Hills Lake	Piping along primary spillway conduit
April 2004	Pearl River	Dove Lake	Piping

Source: Mississippi State Hazard Mitigation Plan

PROBABILITY OF FUTURE OCCURRENCE

Given the current dam inventory and historic data, a dam breach is possible (between 1 and 10 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events. No further analysis will be completed in Section 6: Vulnerability Assessment as more sophisticated dam breach plans (typically completed by the U.S. Army Corp of Engineers) have been completed for dams of concern in the region.

EROSION

BACKGROUND

Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.

There are two types of soil erosion: wind erosion and water erosion. Wind erosion can cause significant soil loss. Winds blowing across sparsely vegetated or disturbed land can pick up soil particles and carry them through the air, thus displacing them. Water erosion, the hazard of topic here, can occur over land or in streams and channels. Water erosion that takes place over land may result from raindrops, shallow sheets of water flowing off the land, or shallow surface flow, which becomes concentrated in low spots. Stream channel erosion may occur as the volume and velocity of water flow increases enough to cause movement of the streambed and bank soils. Major storms, such hurricanes in coastal areas, may cause significant erosion by combining high winds with heavy surf and storm surge to significantly impact the shoreline.

An area's potential for erosion is determined by four factors: soil characteristics, vegetative cover, topography climate or rainfall, and topography. Soils composed of a large percentage of silt and fine sand are most susceptible to erosion. As the clay and organic content of these soils increases, the potential for erosion decreases. Well-drained and well-graded gravels and gravel-sand mixtures are the least likely to erode. Coarse gravel soils are highly permeable and have a good capacity for absorption, which can prevent or delay the amount of surface runoff. Vegetative cover can be very helpful in controlling erosion by shielding the soil surface from falling rain, absorbing water from the soil, and slowing the velocity of runoff. Runoff is also affected by the topography of the area including size, shape, and slope. The greater the slope length and gradient, the more potential an area has for erosion. Climate can affect the amount of runoff, especially the frequency, intensity, and duration of rainfall and storms. When rainstorms are frequent, intense, or of long duration, erosion risks are high. Seasonal changes in temperature and rainfall amounts define the period of highest erosion risk of the year.

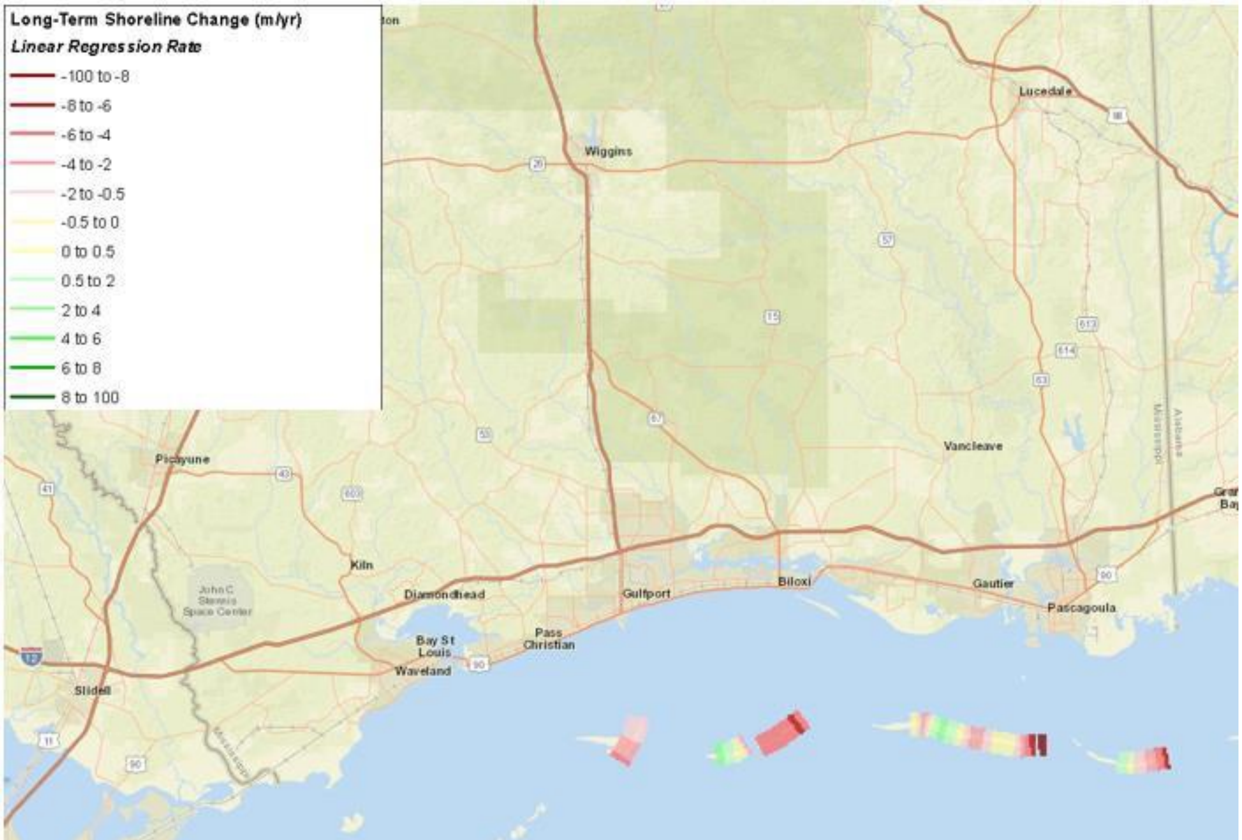
During the past 20 years, the importance of erosion control has gained the increased attention of the public. Implementation of erosion control measures consistent with sound agricultural and construction operations is needed to minimize the adverse effects associated with harmful chemicals run-off due to wind or water events. The increase in government regulatory programs and public concern has resulted in a wide range of erosion control products, techniques, and analytical methodologies in the United States. The preferred method of erosion control in recent years has been the restoration of vegetation.

LOCATION AND SPATIAL EXTENT

For the most part, major erosion in the MEMA District 9 Region is typically caused by coastal tides, ocean currents, and storm events. Although the region also experiences riverine erosion in many of its inland areas, these are of somewhat less concern than coastal erosion areas which historically have had larger impacts. Unlike inland areas, where the soil has greater organic matter content, coastal soils are mainly composed of fine grained particles such as sand. This makes coastal soils much more susceptible to erosion. Although some areas of the MEMA District 9 Region coast are protected and natural erosion processes are allowed to take place for the most part, many areas near where development has occurred are especially susceptible.

At this time, there is limited data available on localized areas of erosion. Most of the information collected by the United States Geological Survey (USGS) is focused on the barrier islands that are just off the coast of the mainland. The long-term shoreline change for the barrier islands as calculated by the USGS can be found in Figure 5.6 It should be noted that many areas of the coast are protected through the use of structural techniques. Also, a great deal of renourishment activities are carried out along the mainland coastal communities.

Figure 9 LONG-TERM SHORELINE CHANGE (M/YR) IN THE MEMA DISTRICT 9 REGION



Source: United States Geological Survey

HISTORICAL OCCURRENCES

Several sources were vetted to identify areas of erosion in the MEMA District 9 Region. This includes searching local newspapers, interviewing local officials, and reviewing previous hazard mitigation plans. Because dramatic, short-term erosion tends to take place after major storm events such as hurricanes, flooding, or storm surge, the erosion events often correspond directly with those events. Conversely, with long-term erosion, it is difficult to identify a specific historic occurrence because these events are by nature occurring at all times over a long period at a very gradual rate. Therefore, long-term historic erosion events cannot be confined to a specific timeframe or occurrence.

PROBABILITY OF FUTURE OCCURRENCES

Erosion remains a natural, dynamic, and continuous process for the MEMA District 9 Region, and it will continue to occur. The annual probability level assigned for erosion is likely (between 10 and 100 percent annually). However, due to the measures taken to combat its effects at a very localized level, no further analysis will be done in Section 6: Vulnerability Assessment.

FLOOD

BACKGROUND

Flooding is the most frequent and costly natural hazard in the United States and is a hazard that has caused more than 10,000 deaths since 1900. Nearly 90 percent of presidential disaster declarations result from natural events where flooding was a major component.

Floods generally result from excessive precipitation and can be classified under two categories: general floods, precipitation over a given river basin for a long period of time along with storm-induced wave action, and flash floods, the product of heavy localized precipitation in a short time period over a given location. The severity of a flooding event is typically determined by a combination of several major factors, including stream and river basin topography and physiography, precipitation and weather patterns, recent soil moisture conditions, and the degree of vegetative clearing and impervious surface.

General floods are usually long-term events that may last for several days. The primary types of general flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, and other large coastal storms. Urban flooding occurs where manmade development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff.

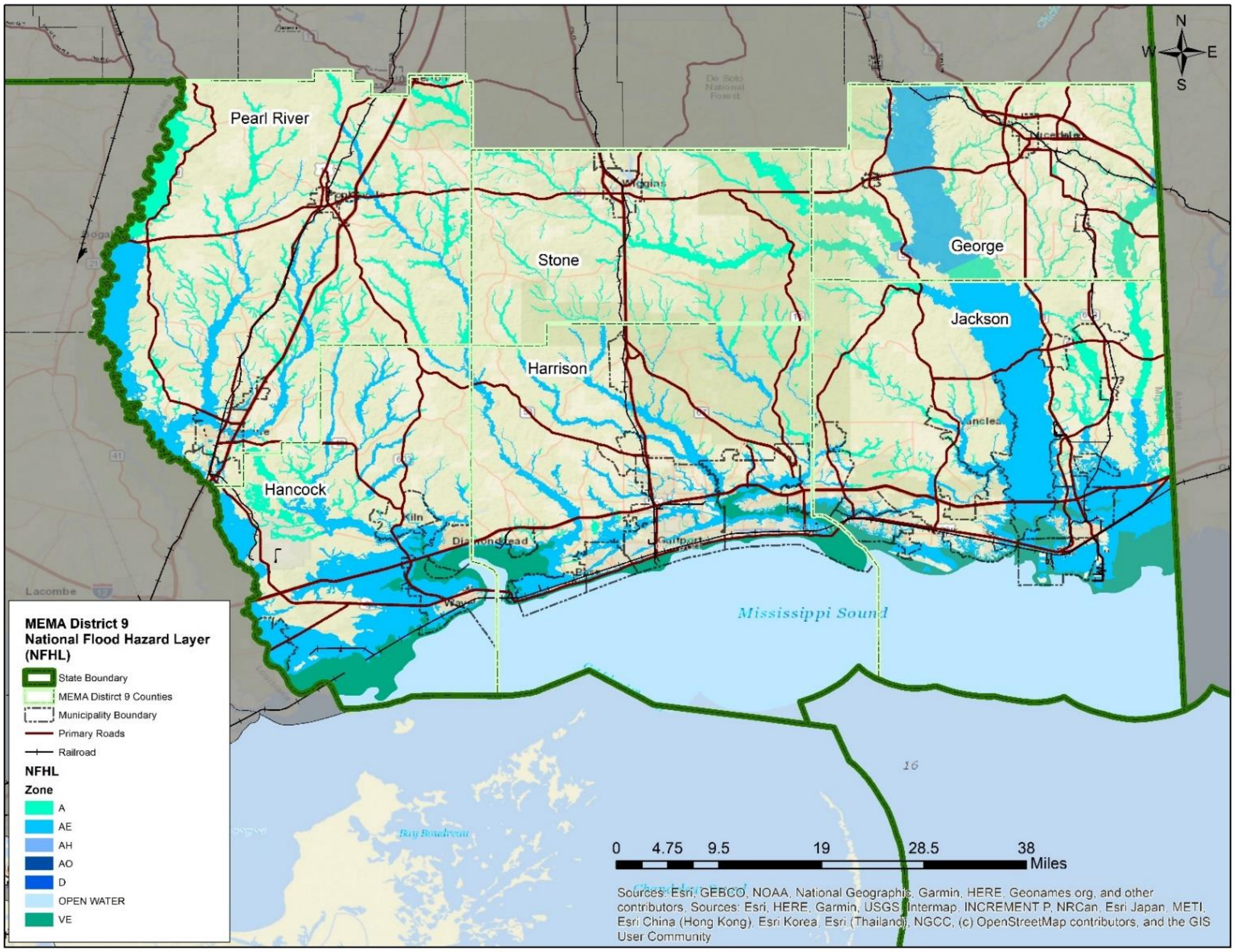
Flash flooding is another type of flooding that can be associated with urban flooding. It is common in urbanized areas where much of the ground is covered by impervious surfaces. Most flash flooding occurs along mountain streams and is caused by slow-moving thunderstorms in a local area or by heavy rains associated with hurricanes and tropical storms. However, flash-flooding events may also occur from a dam or levee failure within minutes or hours of heavy amounts of rainfall, or from a sudden release of water held by retention basin or other stormwater control facility.

The periodic flooding of lands adjacent to rivers, streams, and shorelines (land known as floodplain) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 100-year flood and the 100-year floodplain by the 1,000-year flood. Flood frequencies such as the 100-year flood are determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1- percent annual chance of occurring in any given year, and the 500-year flood has a 0.2-percent annual chance of occurring in any given year.

LOCATION AND SPATIAL EXTENT

There are areas in the MEMA District 9 Region that are susceptible to flood events. Special flood hazard areas in the region were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM). This includes Zone A (1-percent annual chance floodplain), Zone AE (1- percent annual chance floodplain with elevations), Zone VE (1-percent annual chance floodplain with additional hazards due to storm-induced velocity wave action), Zone X500 (0.2-percent annual chance floodplain), and Zone D (undetermined risk area). Figure 10 illustrates the location and extent of currently mapped special flood hazard areas for the region based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data. Flood extent varies throughout the region based on a variety of factors. A major determining factor involves the amount of rainfall received over a given time period, extreme instances within the region include rainfall amounts of up to 8-12'' of rain over a 24-hr period.

Figure 10 SPECIAL FLOOD HAZARD AREAS IN THE MEMA DISTRICT 9 REGION



Source: Federal Emergency Management Agency

Additional, more detailed county-level and jurisdiction-level maps can be found in the annexes.

HISTORICAL OCCURRENCES

Floods were at least partially responsible for 11 disaster declarations in the MEMA District 9 Region between 1974 and 2022. Information from the National Center for Environmental Information was used to ascertain additional historical flood events. The National Center for Environmental Information reported a total of 223 events throughout the MEMA District 9 Region since 1996. These events accounted for nearly $16 million in property damage and four fatalities throughout the region. A summary of these events is presented in **Table 16.** Specific information on flood events for each county, including date, type of flooding, and deaths and injuries, can be found in the county-specific annexes.

Table 16 SUMMARY OF FLOOD OCCURRENCES IN THE MEMA DISTRICT 9 REGION

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
George County	31	3/7	$2,343,618	$97,859
Lucedale	6	0/0	$5,000	$208
Unincorporated Area	25	0/0	$2,343,618	$97,651
Hancock County	33	0/0	$1,246,578	$49,864

Bay St. Louis	4	0/0	$0	$0
Diamondhead	1	0/0	$0	$0
Waveland	4	0/0	$150,064	$6,003
Unincorporated Area	24	0/0	$1,096,514	$43,861
Harrison County	74	1/0	$3,593,464	$138,210
Biloxi	11	0/0	$155,389	$5,977
D'Iberville	4	0/0	$30,339	$1,167
Gulfport	7	0/0	$0	$0
Long Beach	9	1/0	$1,366,517	$52,558
Pass Christian	3	0/0	$0	$0
Unincorporated Area	40	0/0	$2,041,219	$78,508
Jackson County	32	0/0	$4,101,089	$170,879
Gautier	1	0/0	$0	$0
Moss Point	2	0/0	$1,325,787	$55,241
Ocean Springs	3	0/0	$0	$0
Pascagoula	6	0/0	$128,387	$5,350
Unincorporated Area	20	0/0	$2,6416,915	$110,288
Pearl River County	20	0/0	$4,462,923	$178,517
Picayune	2	0/0	$31,876	$1,275
Poplarville	2	0/0	$100,000	$4,000
Unincorporated Area	18	0/0	$4,331,047	$173,242
Stone County	33	0/0	$246,318	$10,263
Wiggins	11	0/0	$13,987	$583
Unincorporated Area	22	0/0	$232,331	$9,680
MEMA DISTRICT 9 REGIONAL TOTAL	223	4/7	$15,993,990	$645,592

Source: National Center for Environnemental Information

HISTORICAL SUMMARY OF INSURED FLOOD LOSSES

According to FEMA flood insurance policy records as of October 2016, there have been 30,820 flood losses reported in the MEMA District 9 Region through the National Flood Insurance Program (NFIP) since 1978, totaling over $2.7 billion in claims payments. A summary of these figures for each MEMA District 9 county is provided in Table 5.7. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in the MEMA District 9 Region were either uninsured, denied claims payment, or not reported.

Table 17 SUMMARY OF INSURED FLOOD LOSSES IN MEMA DISTRICT 9 REGION

Location	Number of Policies	Flood Losses	Claims Payments
George County	122	43	$396,792
Lucedale	10	1	$385,792
Unincorporated Area	112	42	$11,000
Hancock County	8,314	8,558	$737,425,476
Bay St. Louis	2,240	1,244	$148,880,718
Diamondhead	14	0	$0
Waveland	1,795	1,385	$183,867,798
Unincorporated Area	4,265	5,929	$404,676,960
Harrison County	18,361	12,677	$1,278,139,139
Biloxi	5,206	2,293	$253,008,756
D'Iberville	515	27	$1,939,357
Gulfport	5,267	3,078	$285,499,409
Long Beach	2,640	1,505	$152,511,425
Pass Christian	2,093	2,550	$323,619,220
Unincorporated Area	2,640	3,224	$261,560,972
Jackson County	16,417	8,963	$699,279,682
Gautier	1,724	681	$59,663,535
Moss Point	1,131	886	$28,225,055
Ocean Springs	2,622	823	$86,224,366
Pascagoula	4,944	2,763	$221,292,452
Unincorporated Area	5,996	3,810	$303,874,274
Pearl River County	989	568	$13,484,478
Picayune	255	194	$3,579,193
Poplarville	2	0	$0
Unincorporated Area	732	374	$9,905,285
Stone County	36	11	$115,205
Wiggins	5	0	$0
Unincorporated Area	31	11	$115,205
MEMA DISTRICT 9 REGIONAL TOTAL	44,239	30,820	$2,728,840,772

Source: National Flood Insurance Program

REPETITIVE LOSS PROPERTIES

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 140,000 repetitive loss properties nationwide.

According to the Mississippi Emergency Management Agency, there are 3,693 non-mitigated repetitive loss properties located in the MEMA District 9 Region, which accounted for 9,993 losses and over $497.2 million in claims payments under the NFIP. The average claim amount for these properties is $49,756. Of the 3,693 properties, 3,310 are single family, 47 are 2-4 family, 55 are condominiums, 43 are other residential, 190 are non-residential, and 25 are unknown. Without mitigation, these properties will likely continue to experience flood losses. Table 5.8 presents a summary of these figures for the MEMA District 9 Region. Detailed information on repetitive loss properties and NFIP claims and policies can be found in the county-specific annexes. During the 2022 HMP update process updated NFIP/Repetitive Loss was data was requested; however, no new data was made available. The 2016 data is considered best available data for the plan update. Additional updated data provided via the Natural Resource Defense Council (NRDC) is provided within each participating county annex.

Table 18 SUMMARY OF REPETITIVE LOSS PROPERTIES IN THE MEMA DISTRICT 9 REGION

Location	Number of Properties	Number of Losses	Total Payments
George County	3	7	$132,581
Lucedale	0	0	$0
Unincorporated Area	3	7	$132,581
Hancock County	1,060	2,689	$121,615,790
Bay St. Louis	408	1,106	$52,473,189
Diamondhead	23	--	--
Waveland	74	223	$8,268,443
Unincorporated Area	555	1,360	$60,874,158
Harrison County	1,300	3,932	$195,461,466
Biloxi	239	663	$38,868,824
D'Iberville*	25	--	--
Gulfport	493	1,554	$69,452,256
Long Beach	142	540	$15,968,825
Pass Christian	175	493	$32,910,670
Unincorporated Area	226	682	$38,260,891
Jackson County	1,259	3,142	$175,609,018
Gautier	147	335	$22,145,199
Moss Point	186	483	$15,100,411
Ocean Springs	50	135	$15,291,674
Pascagoula	516	1,219	$75,013,407
Unincorporated Area	360	970	$48,058,327
Pearl River County	69	219	$4,367,910
Picayune	30	88	$1,587,927
Poplarville	0	0	$0
Unincorporated Area	39	131	$2,779,983
Stone County	2	4	$23,874
Wiggins	0	0	$0
Unincorporated Area	2	4	$23,874
MEMA DISTRICT 9 REGIONAL TOTAL	3,693	9,993	$497,210,639

*The information provided by D'Iberville and Diamondhead did not include number of losses or total payments information for the city. Therefore, the number of losses and total payments for the city are not included in the regional total.

Source: Federal Emergency Management Agency, National Flood Insurance Program

<u>PROBABILITY OF FUTURE OCCURRENCES</u>

Flood events will remain a threat in the MEMA District 9 Region, and the probability of future occurrences will remain highly likely (100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figure above, which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain). Further, as described in other hazard profiles, it is highly likely that the MEMA District 9 Region will continue to experience inland and coastal flooding associated with large tropical storms, hurricanes, and storm surge events.

It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the region. For example, the southern (coastal) half of the region has more floodplain and thus a higher risk of flood than the northern (inland) half of the region. Flooding will continue to occur and cause damage, therefore mitigation actions may be warranted, particularly for repetitive loss properties.

It should also be noted that anticipated sea level rise will increase the probability and intensity of future tidal flooding events in years to come. Rising sea level over time will shorten the return period (increasing the frequency) of significant flood events. This hazard is discussed elsewhere in this section.

FEMA NRI Expected Annual Loss Estimates

	MEMA DISTRICT 9 FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR FLOODING EVENTS							
Jurisdiction	Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
George County	1	0.01	$123,404	$28,270	$3,827	$155,502	32.4	Very Low
Hancock County	0.8 events/year	0.17	$1,924,306	$124,006	$1,374	$2,049,686	84.3	Relatively Moderate
Harrison County	1.8 events/year	0.04	$476,298	$261,476	$581	$738,356	64.4	Relatively Low
Jackson County	1 event/year	0.44	$5,131,134	$303,000	$2,670	$5,436,806	94.1	Relatively Moderate
Pearl River County	0 events/year	0.00	$180	$162	n/a	$342	24.6	Very Low
Stone County	1.2 events/year	0.00	$29,261	$10,619	$293	$40,174	15.7	Very Low
MEMA District 9	**0.97 events/year**	**0.17**	**$1,280,764**	**$121,256**	**$1,458**	**$1,403,478**	**52.6**	**Relatively Low**
	Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
	Source: FEMA National Risk Index (2023)							

Table A.17: George County Expected Annual Loss Table

FEMA Hazard-Specific Risk Index Table

Table A.18: MEMA District 9 Hazard Specific Risk Index Table

MEMA DISTRICT 9 FEMA HAZARD SPECIFIC RISK INDEX – FLOODING	
Risk Index Score	Risk Index Rating

33.4 / 100	Relatively Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

STORM SURGE

BACKGROUND

Storm surge occurs when the water level of a tidally influenced body of water increases above the normal astronomical high tide and are most common in conjunction with coastal storms with massive low-pressure systems with cyclonic flows such as hurricanes, tropical storms, and nor'easters. The low barometric pressure associated with these storms cause the water surface to rise and storms landfalling during peak tides have surge heights and more extensive flood inundation limits. Storm surges will inundate coastal floodplains by dune overwash, tidal elevation rise in inland bays and harbors, and backwater flooding through coastal river mouths. The duration of a storm is the most influential factor affecting the severity and impact of storm surges.

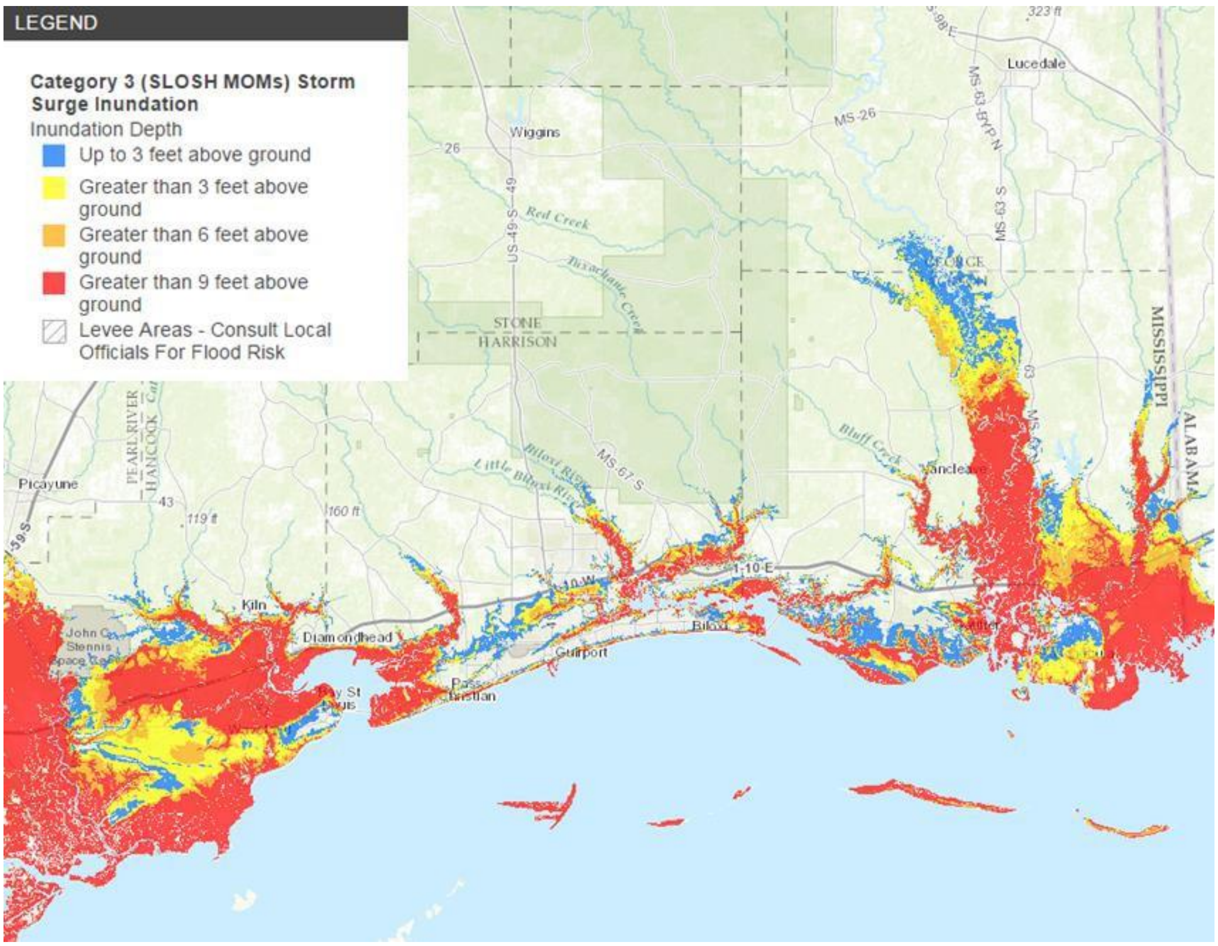
A storm surge is often described as a wave that has outrun its generating source and become a long period swell. It is often recognized as a large dome of water that may be 50 to 100 miles wide and rising anywhere from four to five feet in a Category 1 hurricane up to 20 feet in a Category 5 storm. The storm surge arrives ahead of the storm center's actual landfall and the more intense the storm is, the sooner the surge arrives. Water rise can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas. The surge is always highest in the right-front quadrant of the direction in which the storm is moving. As the storm approaches shore, the greatest storm surge will be to the north of the low-pressure system or hurricane eye. Such a surge of high water topped by waves driven by hurricane force winds can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate shoreline.

Storm surge heights and associated waves are dependent on not only the storm's intensity but also upon the shape of the offshore continental shelf (narrow or wide), the depth of the ocean bottom (bathymetry), and astronomical tides. A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. In addition, a storm surge event occurs during high tide will result in increased flooding and inundation of coastal areas. The storms that generate the largest coastal storm surges can develop year-round, but they are most frequent from late summer to early spring.

LOCATION AND SPATIAL EXTENT

There are many areas in the MEMA District 9 Region that are subject to potential storm surge inundation as modeled and mapped by the National Oceanic and Atmospheric Administration (NOAA). Figure 5.8 illustrates hurricane storm surge inundation zones based on a Category 3 storm. The illustration is derived from geo-referenced SLOSH (Sea, Lake, and Overland Surge from Hurricanes) data produced by the USACE in coordination with NOAA. SLOSH is a modeling tool used to estimate storm surge for coastal areas resulting from historical, hypothetical, or predicted hurricanes taking into account maximum expected levels for pressure, size, forward speed, track, and winds. Therefore, the SLOSH data is best used for defining the potential maximum surge associated with various storm intensities for any particular location. As shown in the figure, the entire coast of the MEMA District 9 Region is at high risk to storm surge inundation. Inland areas may also experience substantial flooding during a storm event.

Figure 11 STORM SURGE RISK AREAS IN THE MEMA DISTRICT 9 REGION



Source: NOAA

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, 30 storm surge events have been reported for the MEMA District 9 Region since 1998. These events accounted for $13.9 billion in property damage.6 A summary of these events is presented in **Table 19.** Detailed information on the recorded storm surge events can be found in the county-specific annexes.

Table 19 SUMMARY OF STORM SURGE EVENTS IN THE MEMA DISTRICT 9 REGION

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
George County	0	0/0	$0	$0
Lucedale	0	0/0	$0	$0
Unincorporated Area	0	0/0	$0	$0
Hancock County	25	0/0	$4,184,523,545	$174,355,148
Bay St. Louis	0	0/0	$0	$0
Diamondhead	0	0/0	$0	$0
Waveland	0	0/0	$0	$0
Unincorporated Area	25	0/0	$4,184,523,545	$174,355,148
Harrison County	19	0/0	$6,958,025,056	$289,917,711
Biloxi	0	0/0	$0	$0
D'Iberville	0	0/0	$0	$0
Gulfport	0	0/0	$0	$0
Long Beach	0	0/0	$0	$0
Pass Christian	1	0/0	$369,406	$15,392
Unincorporated Area	18	0/0	$6,957,655,650	$289,902,319
Jackson County	9	0/0	$2,778,476,950	$115,769,873
Gautier	0	0/0	$0	$0
Moss Point	0	0/0	$0	$0
Ocean Springs	1	0/0	$369,406	$15,392
Pascagoula	0	0/0	$0	$0
Unincorporated Area	8	0/0	$2,778,107,544	$115,754,481
Pearl River County	0	0/0	$0	$0
Picayune	0	0/0	$0	$0
Poplarville	0	0/0	$0	$0
Unincorporated Area	0	0/0	$0	$0
Stone County	0	0/0	$0	$0
Wiggins	0	0/0	$0	$0
Unincorporated Area	0	0/0	$0	$0
MEMA DISTRICT 9 REGIONAL TOTAL	53	0/0	$13,921,025551	$580,042,732

Source: National Center for Environmenental Information

PROBABILITY OF FUTURE OCCURRENCES

It is highly likely (100 percent annual probability) that the MEMA District 9 Region will continue to experience storm surge associated with large tropical storms, hurricanes, and squalls combined with high tides. As noted in the preceding section (under Flood), anticipated sea level rise will increase the probability and intensity of future storm surge events in years to come. This rise in sea level will not only increase the probability and intensity of tidal flooding events, but will also contribute to the loss of coastal wetlands and erosion of sand beaches that act as protective buffers against storm surge events.

FIRE-RELATED HAZARD events

BACKGROUND

Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. High temperatures, high winds, and low humidity can exacerbate drought conditions. In addition, human actions and demands for water resources can hasten drought-related impacts. Droughts may also lead to more severe wildfires.

Droughts are typically classified into one of four types: 1) meteorological, 2) hydrologic, 3) agricultural, or 4) socioeconomic. Table 20 presents definitions for these types of drought.

Table 4 DROUGHT CLASSIFICATION DEFINITIONS

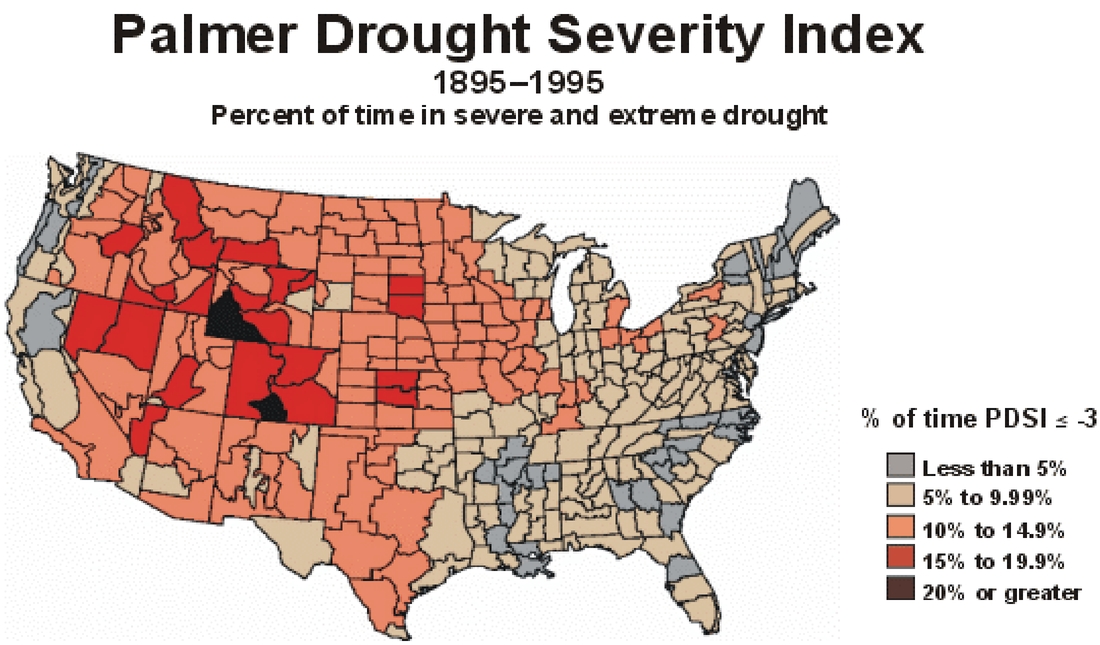
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural Drought	Soil moisture deficiencies relative to water demands of plant life, usually crops.
Socioeconomic Drought	The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.

Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

Droughts are slow-onset hazards, but, over time, can have very damaging affects to crops, municipal water supplies, recreational uses, and wildlife. If drought conditions extend over a number of years, the direct and indirect economic impact can be significant.

The Palmer Drought Severity Index (PDSI) is based on observed drought conditions and range from -0.5 (incipient dry spell) to -4.0 (extreme drought). Evident in **Figure 12**, the Palmer Drought Severity Index Summary Map for the United Stated, drought affects most areas of the United States, but is less severe in the Eastern and Southeastern United States.

Figure 12 PALMER DROUGHT SEVERITY INDEX SUMMARY MAP FOR THE UNITED STATES



Source: National Drought Mitigation Center

The U.S. Drought Monitor also records information on historical drought occurrence. The U.S. Drought Monitor categorizes drought on a D0-D4 scale as Table 21 presents definitions for these classifications.

Table 215 U.S. DROUGHT MONITOR

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
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies

Source: United States Drought Monitor, http://droughtmonitor.unl.edu/classify.htm

LOCATION AND SPATIAL EXTENT

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that the MEMA District 9 Region would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment but may exacerbate wildfire conditions.

HISTORICAL OCCURRENCES

Data from the U.S. Drought Monitor and National Center for Environmental Information National Center for Environmental Information (NCEI) were used to ascertain historical drought events in the MEMA District 9 Region. The U.S. Drought Monitor reports data at the county level on a weekly basis throughout the county. It classifies drought conditions on a scale of D0 to D4, as described in the table above.

According to the U.S. Drought Monitor, all of the counties in the MEMA District 9 Region had drought levels of Severe or worse in at least 6 of the last 17 years (January 2000-October 2022) (Table 5.12). The most severe drought classification reported for each year, according to U.S. Drought Monitor classifications, is listed in the county-specific annexes. It should be noted that the U.S. Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional, but a majority of the county may actually be in a less severe condition.

Table 22 SUMMARY OF DROUGHT OCCURRENCES IN THE MEMA DISTRICT 9 REGION

Location	Number Years with at least Severe Drought Occurrences	Number of years with Exceptional Drought Occurrences
George County	8	2
Hancock County	6	2
Harrison County	6	2
Jackson County	7	2
Pearl River County	8	2
Stone County	8	2

Source: United States Drought Monitor

Some additional anecdotal information was provided from the National Center for Environmental Information on droughts in the MEMA District 9 Region.

Summer 2000 Drought – As shown in Figure 5.10 below, drought conditions were pronounced throughout much of the south and western areas of the nation.

Figure 13 PALMER DROUGHT INDEX FOR AUGUST 2023

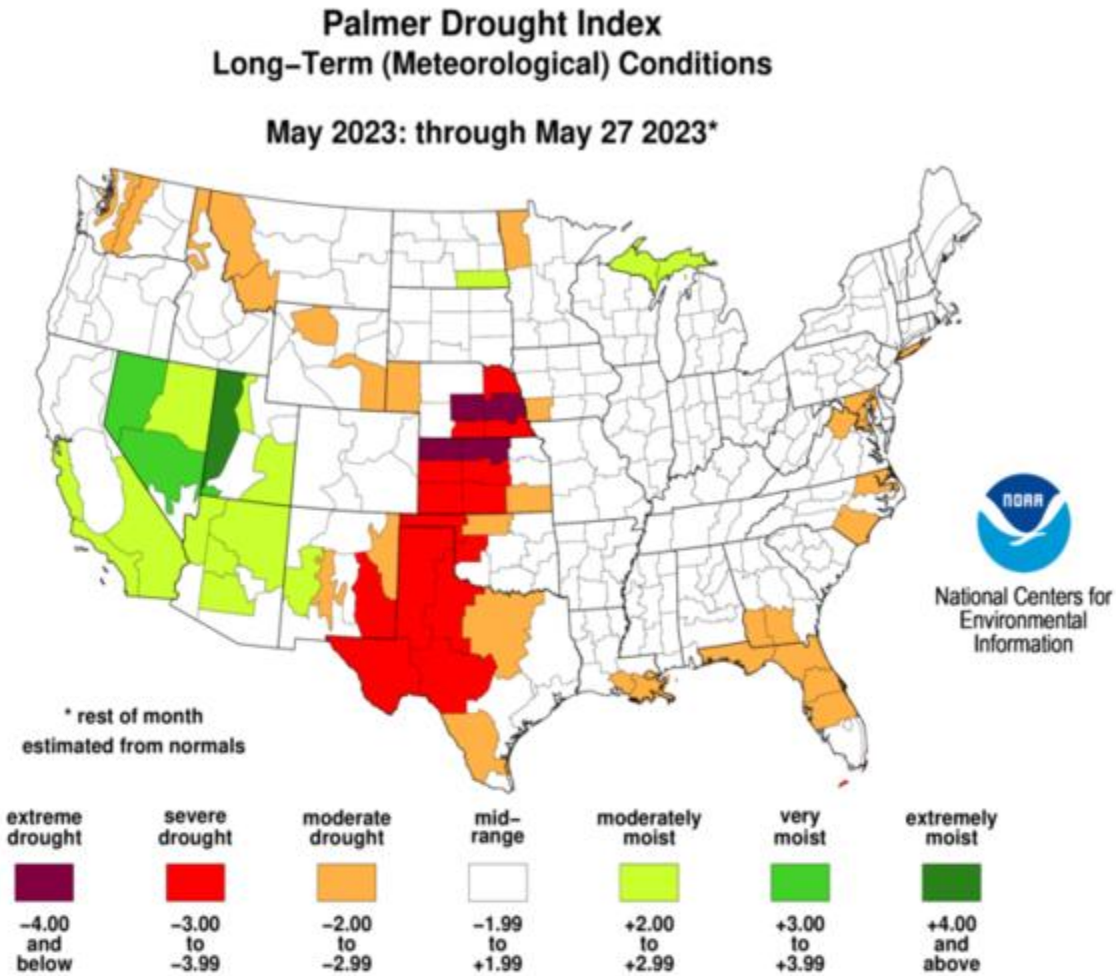
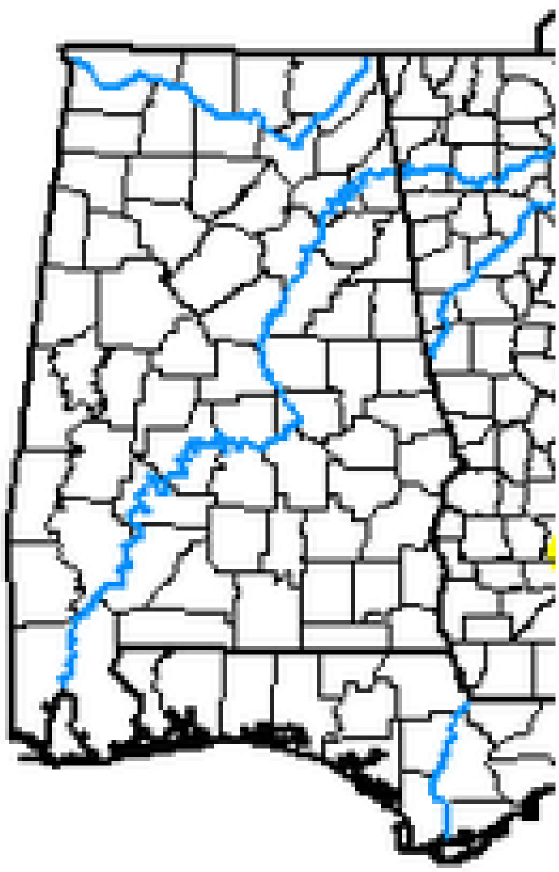


Figure 14: Drought Conditions (2023)



May 23, 2023
(Released Thursday, May. 25, 2023)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	82.97	17.03	5.14	2.98	1.67	0.00
Last Week *05-16-2023*	76.05	23.95	8.99	2.81	1.75	0.00
3 Months Ago *02-21-2023*	79.57	20.43	6.54	0.00	0.00	0.00
Start of Calendar Year *01-03-2023*	58.00	42.00	20.58	5.03	0.00	0.00
Start of Water Year *09-27-2022*	66.05	33.95	5.44	0.21	0.00	0.00
One Year Ago *05-24-2022*	57.72	42.28	10.93	3.46	0.00	0.00

Intensity:

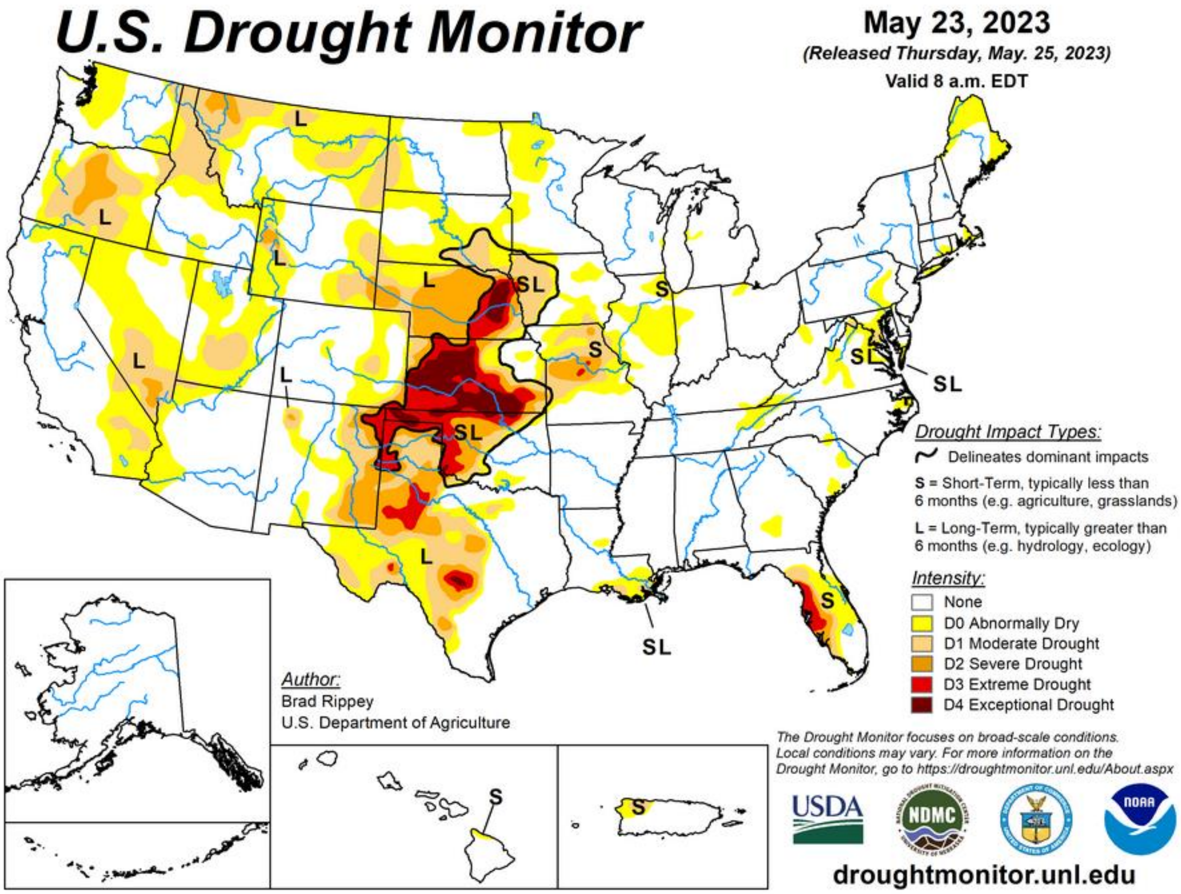
- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:
Brad Rippey
U.S. Department of Agriculture

droughtmonitor.unl.edu

Figure 15: Drought Monitor (2023)



<u>PROBABILITY OF FUTURE OCCURRENCES</u>

According to the Palmer Drought Severity Index (above), MEMA District 9 has a relatively low risk for drought hazard (5 to 9.99%). However, local areas may experience much more severe and/or frequent drought events than what is represented on the Palmer Drought Severity Index map.

Based on historical occurrence information, it is assumed that all of the MEMA District 9 Region has a probability level of likely (between 10 and 100 percent annual probability) for future drought events. However, the extent (or magnitude) of drought and the amount of geographic area covered by drought, varies with each year. Historic information indicates that there is a much lower probability for extreme, long-lasting drought conditions.

LIGHTNING

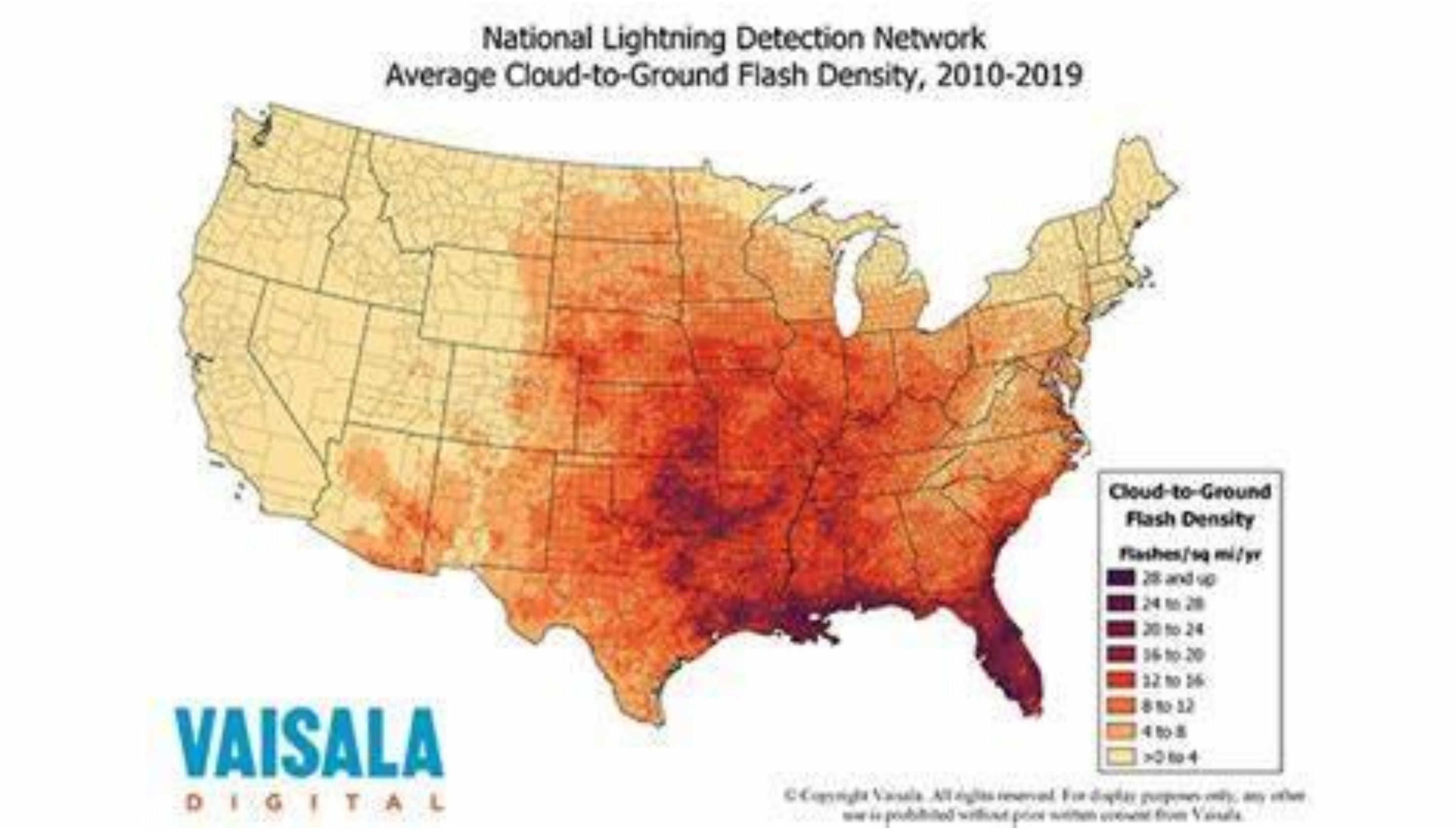
BACKGROUND

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a “bolt” when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes the thunder which often accompanies lightning strikes. While most often affiliated with severe thunderstorms, lightning may also strike outside of heavy rain and might occur as far as 10 miles away from any rainfall.

Lightning strikes occur in very small, localized areas. For example, they may strike a building, electrical transformer, or even a person. According to FEMA, lightning injures an average of 300 people and kills 80 people each year in the United States. Direct lightning strikes also have the ability to cause significant damage to buildings, critical facilities, and infrastructure largely by igniting a fire. Lightning is also responsible for igniting wildfires that can result in widespread damages to property.

Figure 17 shows the Vaisala’s U.S. National Lightning Detection Network which indicates the average flash density per foot per square kilometer per year.

Figure 17 LIGHTNING FLASH DENSITY IN THE UNITED STATES (2005-2016)



Source: Vaisala United States National Lightning Detection Network

LOCATION AND SPATIAL EXTENT

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of the MEMA District 9 Region is uniformly exposed to lightning.

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, there have been a total of 57 recorded lightning events in the MEMA District 9 Region since 1996. These events resulted in over $1.5 million in damages. Furthermore, lightning has caused six fatalities and seven injuries in the MEMA District 9 Region. A summary of these events is presented in Table 23. Detailed information on historical lightning events can be found in the county-specific annexes.

It is certain that more than 57 events have impacted the region. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

Table 23 SUMMARY OF LIGHTNING OCCURRENCES IN THE MEMA DISTRICT 9 REGION

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
George County	5	1/0	$200,760	$10,075
Lucedale	3	0/0	$186,563	$9,328
Unincorporated Area	2	1/0	$14,197	$747
Hancock County	8	2/0	$402,512	$24,550
Bay St. Louis	2	0/0	$7,093	$373
Diamondhead	2	0/0	$163,623	$12,586
Waveland	2	0/0	$231,796	$11,590
Unincorporated Area	2	2/0	$0	$0
Harrison County	15	2/1	$382,387	$22,238
Biloxi	3	0/0	$76,754	$3,838
D'Iberville	1	1/0	$0	$0
Gulfport	6	1/0	$119,966	$6,665
Long Beach	0	0/0	$0	$0
Pass Christian	2	0/1	$31,471	$2,098
Unincorporated Area	3	0/0	$154,196	$9,637
Jackson County	18	1/3	$335,638	$17,009
Gautier	0	0/0	$0	$0
Moss Point	1	0/0	$2,678	$191
Ocean Springs	4	0/0	$89,747	$4,487
Pascagoula	8	1/3	$30,557	$1,698
Unincorporated Area	5	0/0	$212,656	$10,633

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2016)	Annualized Property Losses
Pearl River County	6	0/1	$132,986	$7,388
Picayune	3	0/0	$0	$0
Poplarville	1	0/0	$132,986	$7,388
Unincorporated Area	2	0/1	$0	$0
Stone County	5	0/2	$90,767	$6,483
Wiggins	5	0/2	$90,767	$6,483
Unincorporated Area	0	0/0	$0	$0
MEMA DISTRICT 9 REGIONAL TOTAL	57	6/7	$1,545,050	$87,743

Source: National Center for Environnemental Information

PROBABILITY OF FUTURE OCCURRENCES

Although there was not a high number of historical lightning events reported throughout the MEMA District 9 Region via NCEI data, it is a regular occurrence accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though all events will not cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN), the MEMA District 9 Region is located in an area of the country that experienced an average of 4 to 12 and up lightning flashes per square kilometer per year between 2005 and 2014. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the region.

WILDFIRE

BACKGROUND

A wildfire is any outdoor fire (i.e. grassland, forest, brush land) that is not under control, supervised, or prescribed.10 Wildfires are part of the natural management of forest ecosystems, but may also be caused by human factors.

Nationally, over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning. In Mississippi, a majority of fires are caused by debris burning.

There are three classes of wildland fires: surface fire, ground fire, and crown fire. A surface fire is the most common of these three classes and burns along the floor of a forest, moving slowly and killing or damaging trees. A ground fire (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. Wildfires are usually signaled by dense smoke that fills the area for miles around.

Wildfire probability depends on local weather conditions, outdoor activities such as camping, debris burning, and construction, and the degree of public cooperation with fire prevention measures. Drought conditions and other natural hazards (such as tornadoes, hurricanes, etc.) increase the probability of wildfires by producing fuel in both urban and rural settings.

Many individual homes and cabins, subdivisions, resorts, recreational areas, organizational camps, businesses, and industries are located within high wildfire hazard areas. Furthermore, the increasing demand for outdoor recreation places more people in wildlands during holidays, weekends, and vacation periods. Unfortunately, wildland residents and visitors are rarely educated or prepared for wildfire events that can sweep through the brush and timber and destroy property within minutes.

Wildfires can result in severe economic losses as well. Businesses that depend on timber, such as paper mills and lumber companies, experience losses that are often passed along to consumers through higher prices and sometimes jobs are lost. The high cost of responding to and recovering from wildfires can deplete state resources and increase insurance rates. The economic impact of wildfires can also be felt in the tourism industry if roads and tourist attractions are closed due to health and safety concerns.

State and local governments can impose fire safety regulations on home sites and developments to help curb wildfire. Land treatment measures such as fire access roads, water storage, helipads, safety zones, buffers, firebreaks, fuel breaks, and fuel management can be designed as part of an overall fire defense system to aid in fire control. Fuel management, prescribed burning, and cooperative land management planning can also be encouraged to reduce fire hazards.

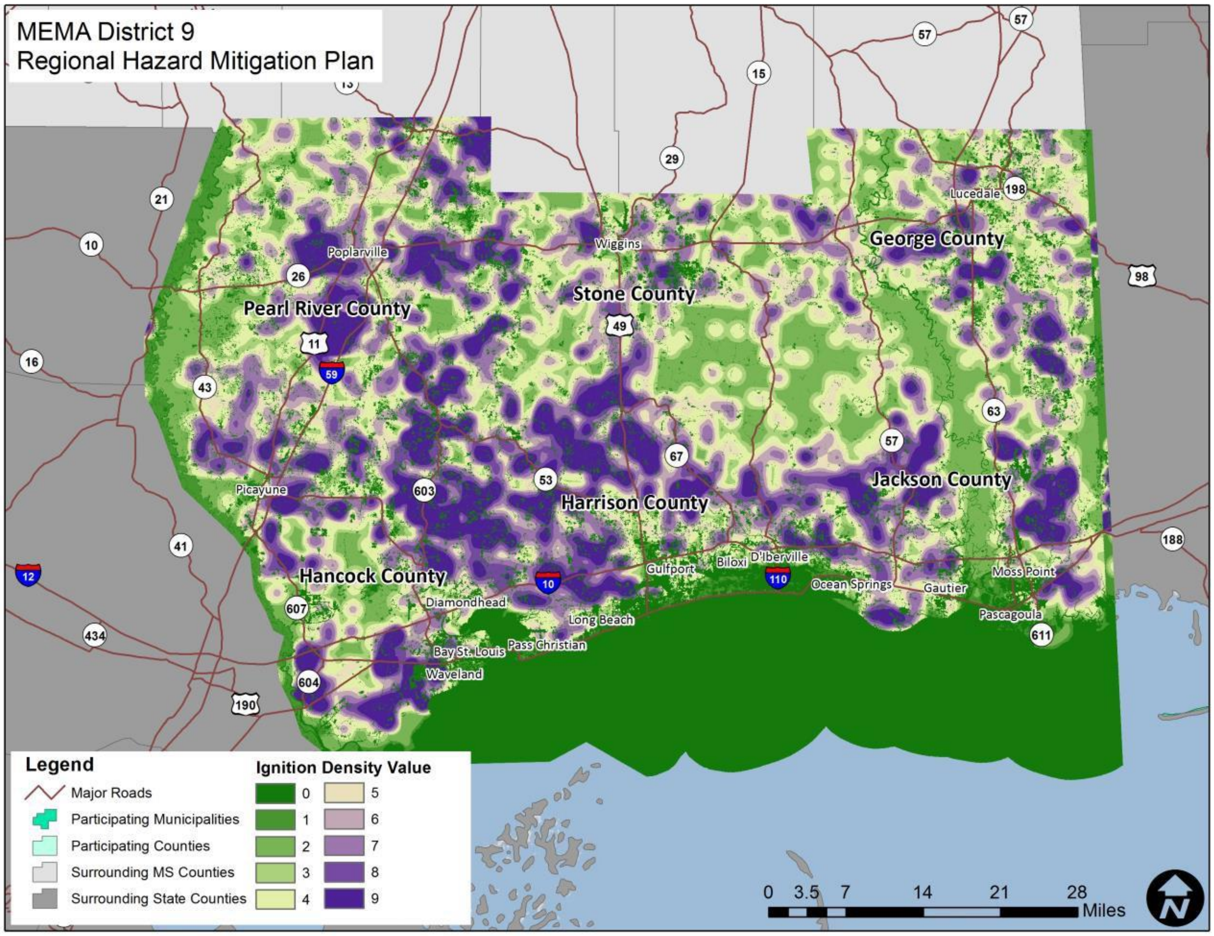
Location and Spatial Extent

The entire region is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Wildfire Ignition Density data shown in the figure below give an indication of historic location.

Historical Occurrences

Figure 18 shows the Wildfire Ignition Density in the MEMA District 9 Region based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.

Figure 18 WILDFIRE IGNITION DENSITY IN THE MEMA DISTRICT 9 REGION



Source: Southern Wildfire Risk Assessment

Based on data from the Mississippi Forestry Commission from 2007 to 2022, the MEMA District 9 Region experiences an average of 464 wildfires annually which burn a combined 8,298 acres, on average per year. The data indicates that most of these fires are small, averaging about 18 acres per fire. Table 24 provides a summary table for wildfire occurrences in the MEMA District 9 Region. The number of reported wildfire occurrences in the participating counties between the years 2007 and 2022 is listed in the county-specific annexes to this plan.

*Table 246 SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2007 -2022)**

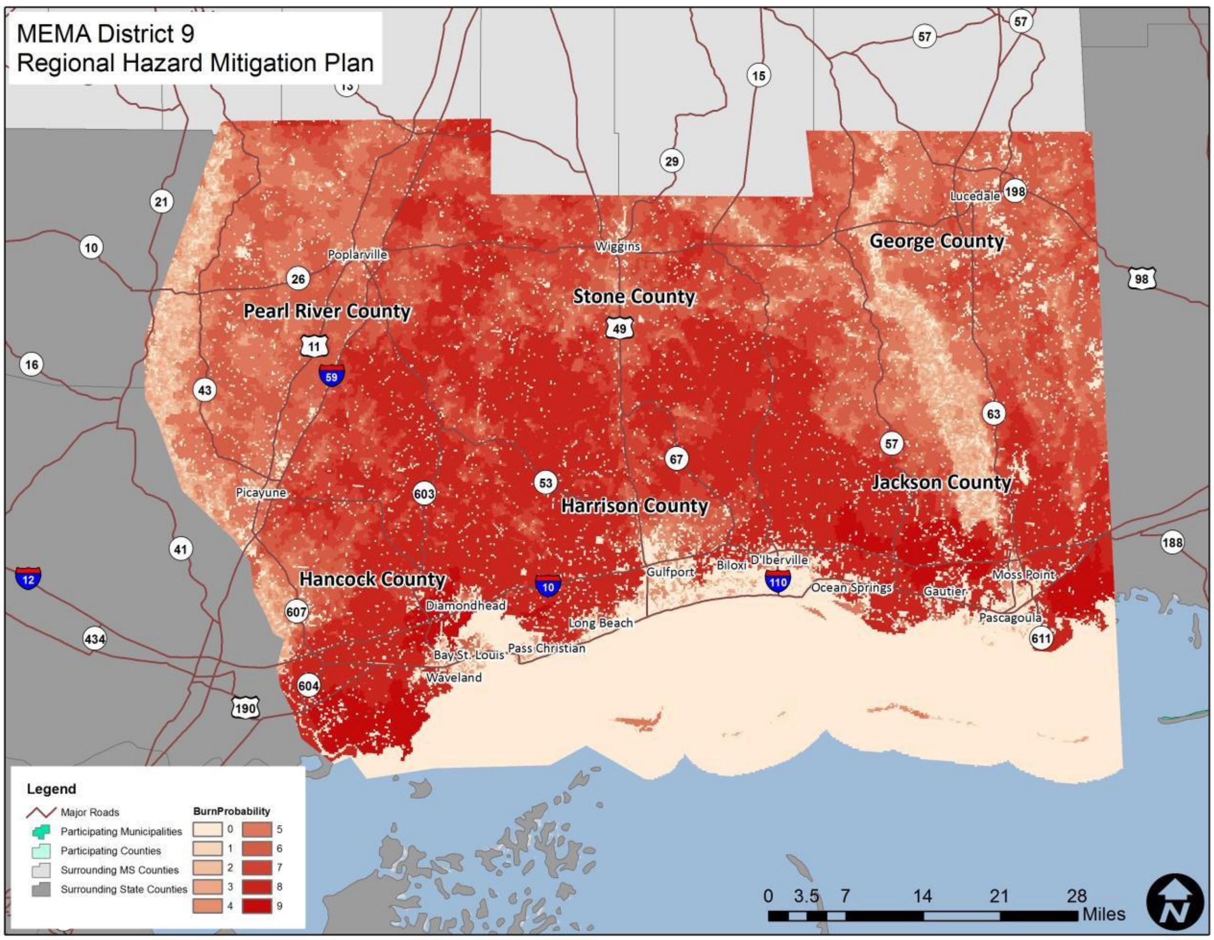
	George County	Hancock County	Harrison County	Jackson County	Pearl River County	Stone County	MEMA D9 Region Total
Average Number of Fires per year	46.7	91.6	87.5	78.7	119.0	40.9	464.4
Average Number of Acres Burned per year	428.5	2,107.4	1,585.0	1,856.7	1,956.2	363.7	8,297.5
Average Number of Acres Burned per fire	9.2	23.0	18.1	23.6	16.4	8.9	17.9

*These values reflect averages over a 15-year period.
Source: Mississippi Forestry Commission

PROBABILITY OF FUTURE OCCURRENCES

Wildfire events will be an ongoing occurrence in the MEMA District 9 Region. Figure 5.13 shows that there is some probability a wildfire will occur throughout the region. However, the likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to the MEMA District 9 Region for future wildfire events is highly likely (100 percent annual probability).

Figure 19 BURN PROBABILITY IN THE MEMA DISTRICT 9 REGION



Source: Southern Wildfire Risk Assessment

Figure 20: Wildfire Hazard Potential

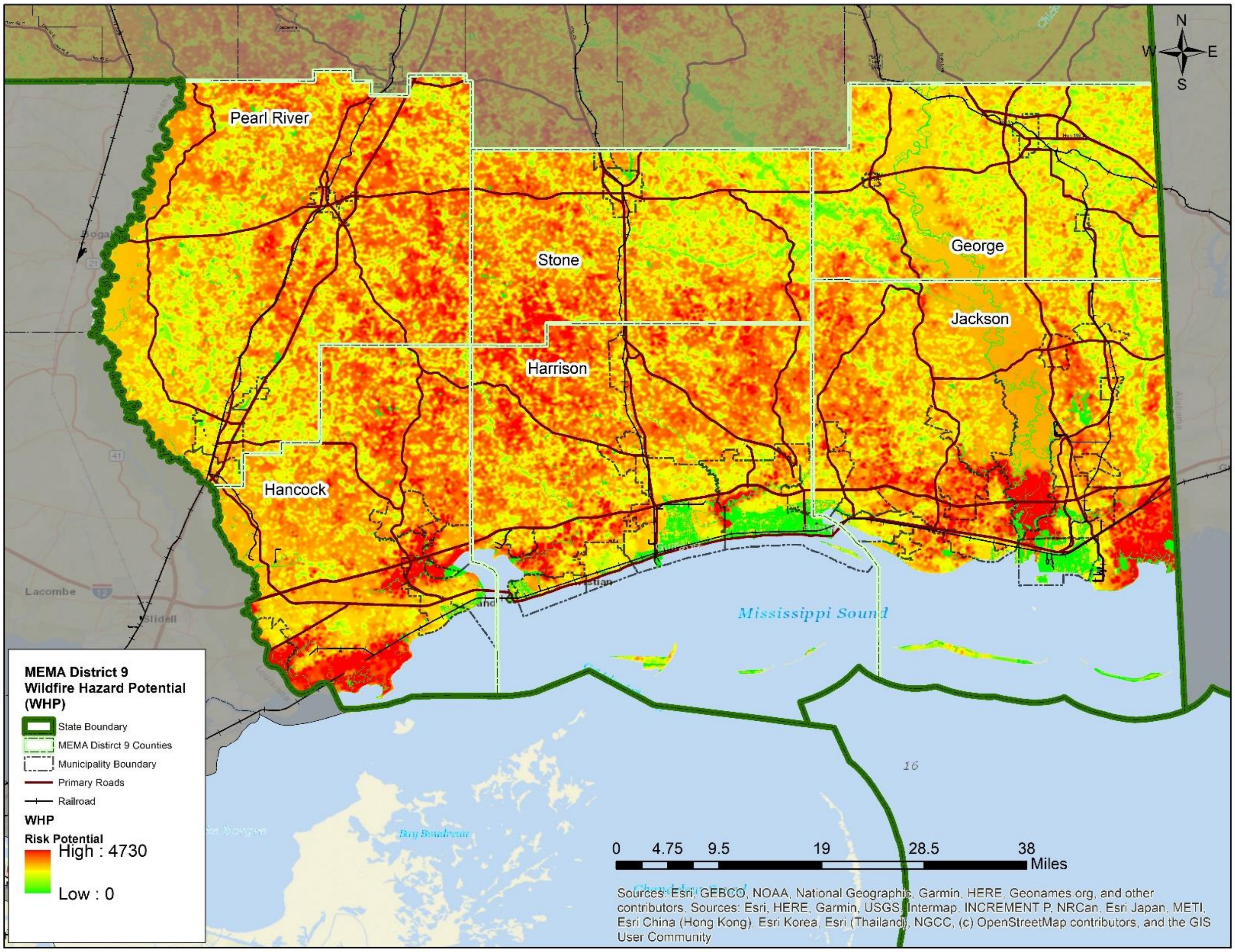
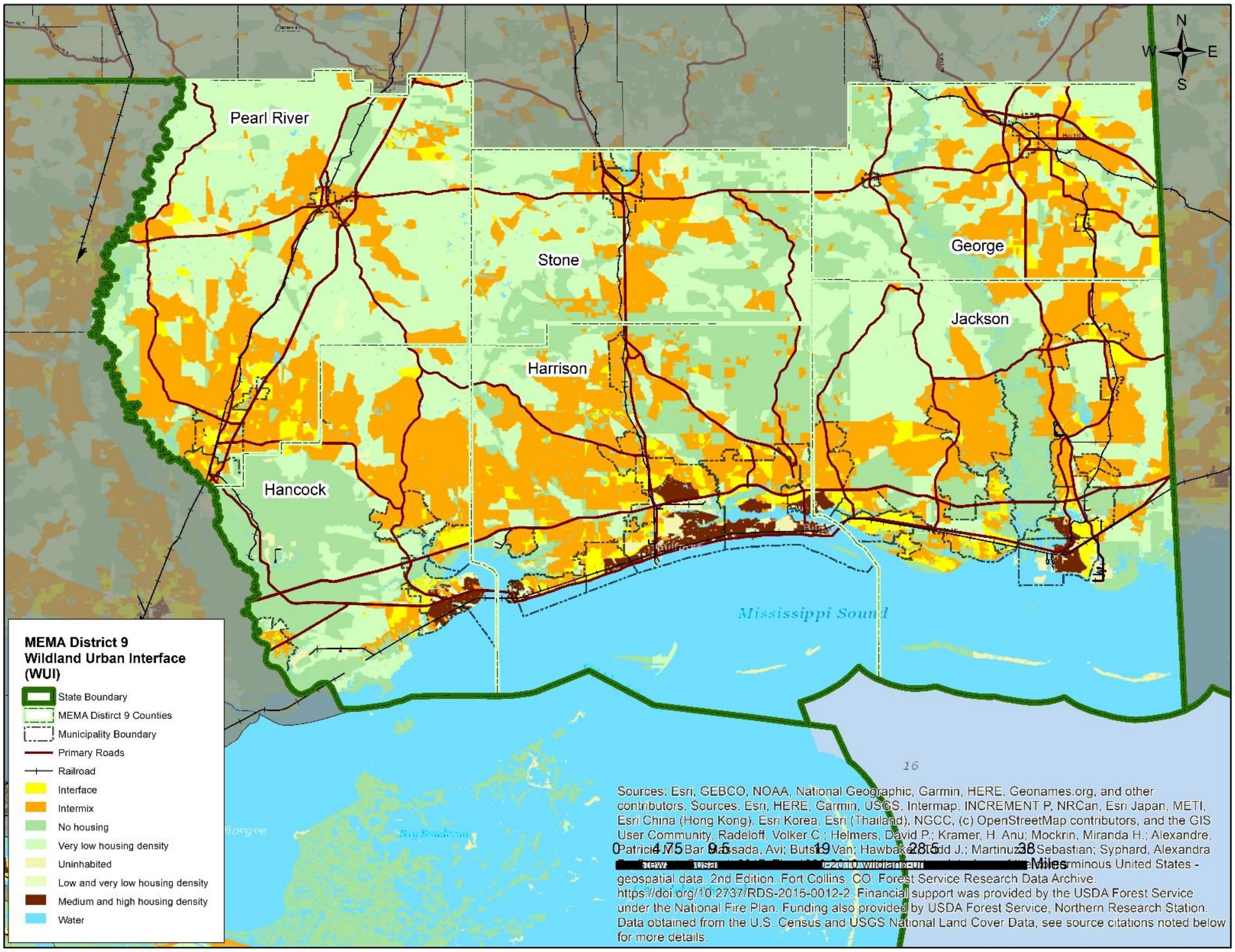


Figure 21: Wildland Urban Interface



GEOLOGIC HAZARDS

EARTHQUAKE

BACKGROUND

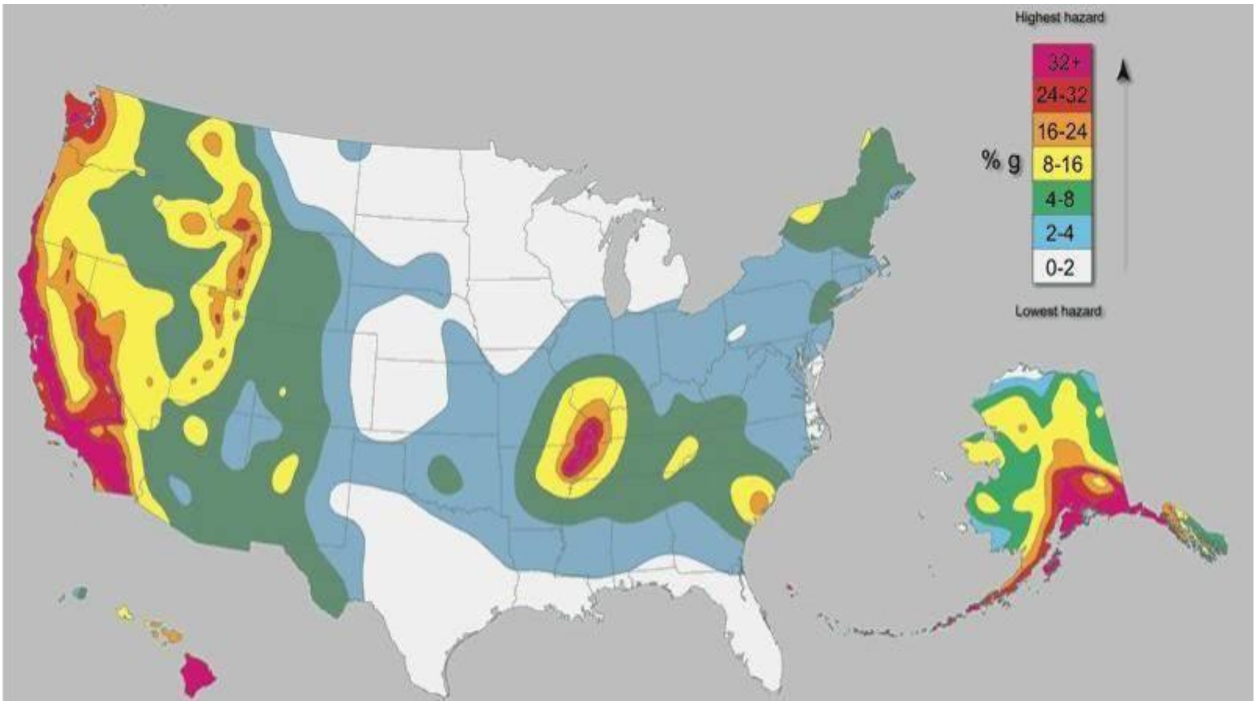
An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area.

Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site, and regional geology. Other damaging earthquake effects include landslides, the down-slope movement of soil and rock (mountain regions and along hillsides), and liquefaction, in which ground soil loses the ability to resist shear and flows much like quick sand. In the case of liquefaction, anything relying on the substrata for support can shift, tilt, rupture, or collapse.

Most earthquakes are caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the Earth’s outer crust. These fault planes are typically found along borders of the Earth's 10 tectonic plates. The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, generating an earthquake.

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United State does face moderate risk to less frequent, less intense earthquake events. Figure 5.22 shows relative seismic risk for the United States.

Figure 22 UNITED STATES EARTHQUAKE HAZARD MAP



Source: United States Geological Survey

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude (Table 5.15). Each unit increase in magnitude on the Richter Scale corresponds to a 10-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, ranging from “I” corresponding to imperceptible (instrumental) events to “XII” for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given in Table 5.16.

Table 7 RICHTER SCALE

RICHTER MAGNITUDES	EARTHQUAKE EFFECTS
< 3.5	Generally not felt, but recorded.
3.5 - 5.4	Often felt, but rarely causes damage.
5.4 - 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 - 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 - 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or >	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: Federal Emergency Management Agency

Table 8 MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

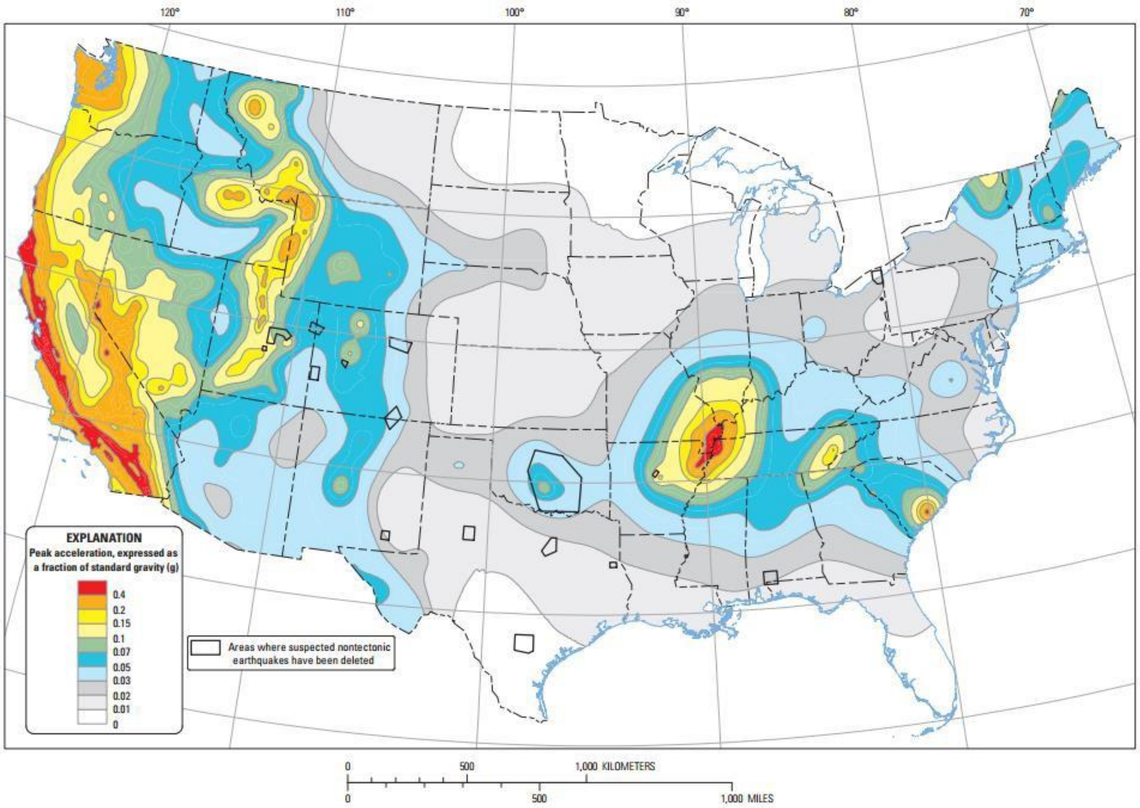
SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	INSTRUMENTAL	Detected only on seismographs.	
II	FEEBLE	Some people feel it.	< 4.2
III	SLIGHT	Felt by people resting; like a truck rumbling by.	
IV	MODERATE	Felt by people walking.	
V	SLIGHTLY STRONG	Sleepers awake; church bells ring.	< 4.8
VI	STRONG	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	VERY STRONG	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	DESTRUCTIVE	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	RUINOUS	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	DISASTROUS	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	VERY DISASTROUS	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	CATASTROPHIC	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: Federal Emergency Management Agency

LOCATION AND SPATIAL EXTENT

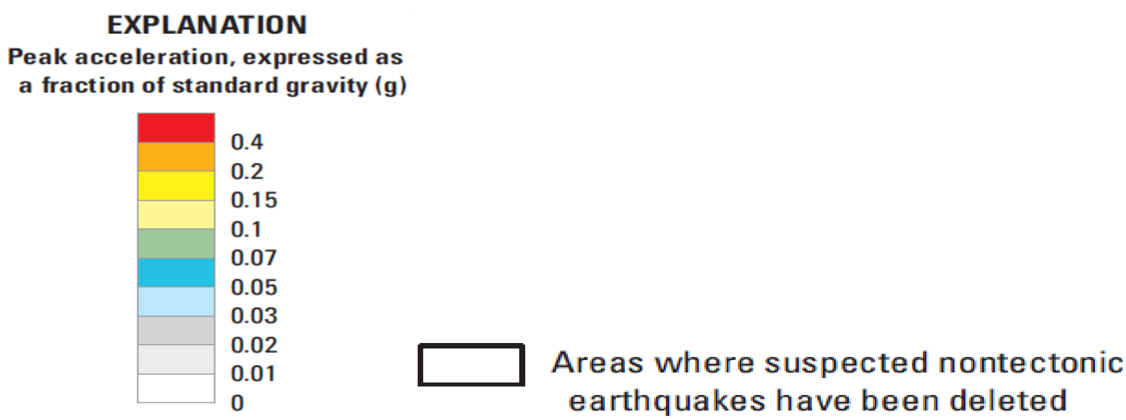
Figure 5.15 shows the intensity level associated with the MEMA District 9 Region, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, all of the MEMA District 9 Region lies within an approximate zone of level “1” to “3” ground acceleration. This indicates that the region as a whole exists within an area of low seismic risk.

FIGURE 23: Figure 3 PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEAR



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

Source: United States Geological Survey, 2014



The primary source of potential damage to the MEMA District 9 Region from an earthquake is the New Madrid Seismic Zone (NMSZ). Historically, a series of earthquakes in 1811 and 1812 demonstrated that this fault zone can produce high magnitude seismic events, sometimes on the scale of a 7.5-8.0 on the Richter scale. The biggest challenge with earthquakes that occur in this area of seismic activity is predicting the recurrence of earthquakes emanating from this zone. Although the magnitude of earthquakes from the NMSZ can be large, they occur very irregularly and fairly infrequently. This makes it extremely difficult to project when they will occur.

It should also be noted that the State of Mississippi Hazard Mitigation Plan identifies certain areas of concern for liquefaction and lists the counties and corresponding zones within those counties that have the highest liquefaction potential. The MEMA District 9 counties do not have any identified liquefaction potential risk.

Historical Occurrences

At least seven earthquakes are known to have affected the MEMA District 9 Region since 1955. The strongest of these measured a V on the Modified Mercalli Intensity (MMI) scale. Table 5.17 provides a summary of earthquake events reported by the National Center for Environmental Information (formerly National Geophysical Data Center) between 1638 and 1985, and Figure 5.16 presents a map showing earthquakes whose epicenters have occurred near the region between 1985 and 2022 (no earthquakes occurred within the region boundaries during this period). A detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known) can be found in the county-specific annexes.

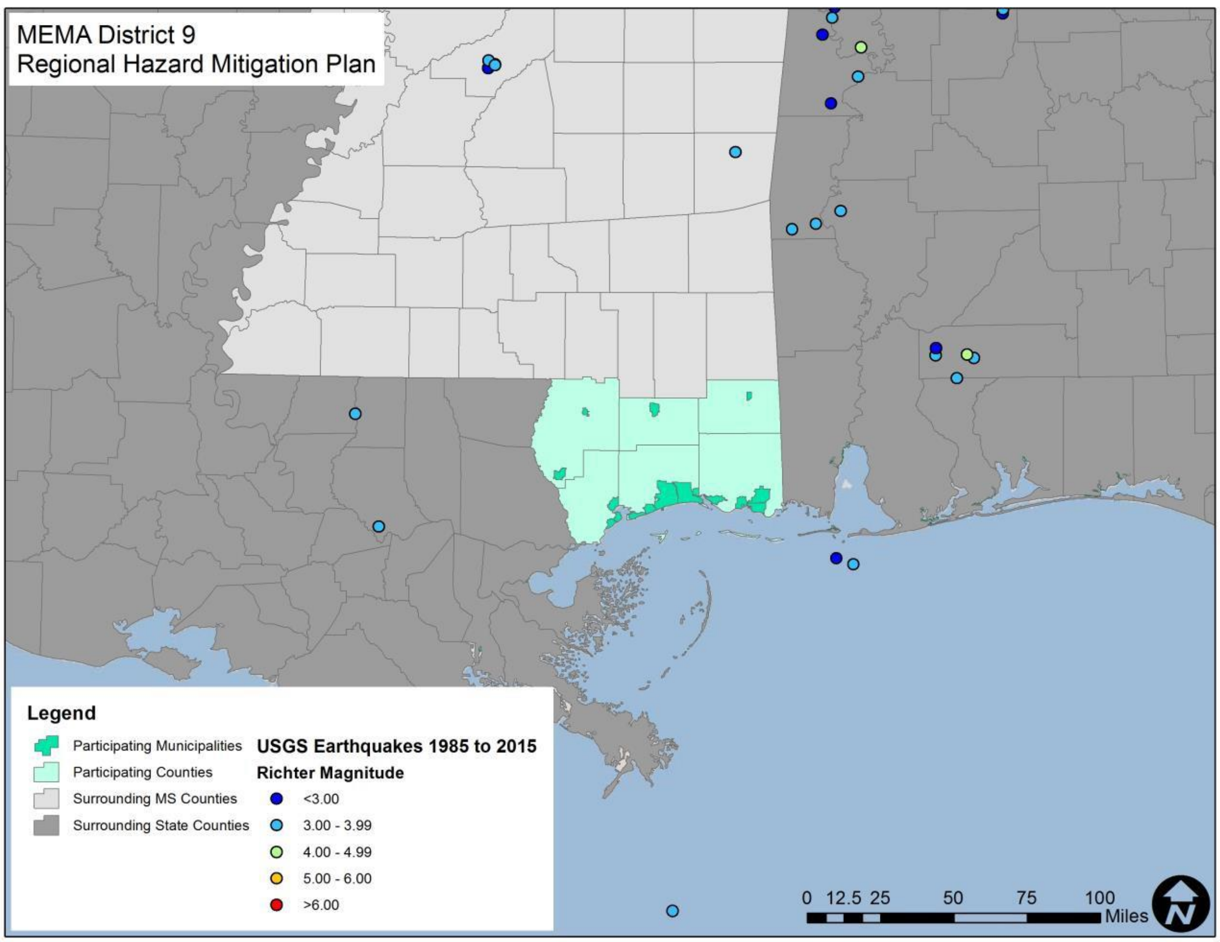
TABLE 27: SUMMARY OF SEISMIC ACTIVITY IN THE MEMA DISTRICT 9 REGION

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
George County	**0**	**--**	**--**
Lucedale	0	--	--
Unincorporated Area	0	--	--
Hancock County	**3**	**IV**	**< 4.8**
Bay St. Louis	2	III	< 4.8
Diamondhead	0	--	--
Waveland	0	--	--
Unincorporated Area	1	IV	< 4.8
Harrison County	**4**	**V**	**< 4.8**
Biloxi	1	IV	< 4.8
D'Iberville	0	--	--
Gulfport	1	V	< 4.8
Long Beach	0	--	--
Pass Christian	1	IV	< 4.8
Unincorporated Area	1	IV	< 4.8
Jackson County	**0**	**--**	**--**
Gautier	0	--	--

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Moss Point	0	--	--
Ocean Springs	0	--	--
Pascagoula	0	--	--
Unincorporated Area	0	--	--
Pearl River County	**0**	**--**	**--**
Picayune	0	--	--
Poplarville	0	--	--
Unincorporated Area	0	--	--
Stone County	**0**	**--**	**--**
Wiggins	0	--	--
Unincorporated Area	0	--	--
MEMA DISTRICT 9 REGIONAL TOTAL	**7**	**V**	**< 4.8**

Source: National Center for Environmental Information (formerly National Geophysical Data Center)

Figure 26 HISTORIC EARTHQUAKES WITH EPICENTERS NEAR THE MEMA DISTRICT 9 REGION (1985-2022)



Source: United States Geological Survey

In addition to those earthquakes specifically affecting the MEMA District 9 Region, a list of earthquakes that have affected Mississippi is presented below in Table 5.18.

Table 9 EARTHQUAKES WHICH HAVE AFFECTED MISSISSIPPI

Date	Origin	Richter Scale (Magnitude)	MMI (Intensity)	MMI in Mississippi	MEMA District 9 Counties Affected
1811-1812	New Madrid Seismic Zone	7.8-8.1	XI	Not available	Affected counties as far as the Gulf Coast
3/29/1972	New Madrid Seismic Zone	Not available	IV	I, II, III, IV	--
4/29/2003	8 miles ENE of Ft. Payne, AL	4.6	V	I, II, III, IV	Hancock and Harrison
11/7/2004	25 miles SW of Tuscaloosa, AL	4.0	V	I, II, III, IV	--
2/10/2005	22 miles WSW of Blytheville, AR	4.1	V	I, II, III	--
5/1/2005	15 miles WSW of Blytheville, AR	4.1	IV	I, II, III	--
6/2/2005	10 miles NNW of Dyersburg, TN	4.0	III	I	--
9/10/2006	253 miles SSW of Apalachicola, FL	6.0	VI	I, II, III, IV	George, Hancock, Harrison, Jackson, and Pearl River

Source: State of Mississippi Standard Mitigation Plan (2019Update)

PROBABILITY OF FUTURE OCCURRENCES

The probability of significant, damaging earthquake events affecting the MEMA District 9 Region is unlikely. However, it is possible that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the region. The annual probability level for the region is estimated to be between 1 and 10 percent (possible).

WIND-RELATED HAZARDS

EXTREME COLD

Background

What constitutes extreme cold and its effect varies across different regions of the United States, according to the NWS. In the South and other areas relatively unaccustomed to winter weather, temperatures near or below freezing (32°F) are considered extreme cold. Freezing temperatures in these areas may cause damage to citrus fruit crops and other vegetation and may cause pipes to freeze and burst in homes that are poorly insulated or without heat. However, in the North, temperatures well below 0°F are considered extreme cold, and long cold spells can cause rivers to freeze, which can disrupt shipping, and ice jams to form, which can lead to flooding.

According to NOAA, frigid winter temperatures are the number two weather-related killer among natural hazards, following heat. Prolonged exposure to extreme cold temperatures can lead to serious health problems, including hypothermia, cold stress, frostbite, or freezing, and infants and the elderly are most susceptible to these conditions.

Extreme cold events are most likely to occur during January and February, and even areas that normally experience mild winters can be hit with extreme cold.

Extreme cold conditions can be the result of cold temperatures and high winds, a combination known as "wind chill." The Wind Chill Temperature index, in Figure 5.17, shows the apparent temperature combining the effect of wind and air temperatures on exposed skin.

Figure 25 WIND CHILL TEMPERATURE INDEX

Wind Chill Chart

Temperature (°F)

Wind (mph) / Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes; 10 minutes; 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Source: National Weather Service, National Oceanic and Atmospheric Administration

The NWS issues wind chill advisories when wind chill hazards are potentially hazardous. Wind chill warnings are issued when wind chill temperatures are life threatening. Criteria for issuing wind chill warnings and advisories are set locally. For example, in Rochester, New York, wind chill advisories are issued when the wind chill temperature is expected to fall between -15°F to -24°F, and wind chill warnings are issued when wind chill temperature is expected to fall at or below -25°F. Again, this warning system should not be mistaken as describing the extent or magnitude of extreme cold; rather, it is intended to provide advanced notice of excessive cold conditions for the protection of life and property.

<u>LOCATION AND SPATIAL EXTENT</u>

Extreme cold typically impacts a large area and cannot be confined to any geographic or political boundaries. The entire region is susceptible to extreme cold conditions.

HISTORICAL OCCURRENCES
Data from the National Center for Environmental Information was used to determine historical extreme cold events in the MEMA District 9 Region. Two events were reported:

February 2, 1996 – Cold/Wind Chill – An arctic airmass overspread much of south Mississippi bringing the longest extended period of cold weather since 1989. In Amite County, 4SW Gillsburg, a 67 year old man died from hypothermia on the 4th after the fire in a wood burning heater went out. Considerable property damage resulted from broken pipes due to the extended period of subfreezing temperatures. In Jackson County, Moss Point and Gautier had broken pipes in 100 and 147 houses, respectively.

December 18, 1996 – Cold/Wind Chill – An arctic airmass overspread south Mississippi resulting in three consecutive nights with subfreezing minimum temperatures. Temperatures lowered into the mid-teens over the southwest section of the state and near 20 degrees along the Gulf Coast.

Probability of Future Occurrences
Based on historical occurrence information, it is assumed that all of the MEMA District 9 Region has a probability level of possible (between 1 and 10 percent annual probability) for future extreme cold events to impact the region.

EXTREME HEAT

BACKGROUND
Extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and that last for an extended period of time. A heat wave may occur when temperatures hover 10 degrees or more above the average high temperature for the region and last for a prolonged number of days or several weeks. Humid conditions may also add to the discomfort of high temperatures.

While extreme heat does not typically affect buildings, the impact to the population can have grave effects. Health risks from extreme heat include heat cramps, heat fainting, heat exhaustion and heat stroke. According to the National Weather Service (which compiles data from the National Center for Environmental Information), heat is the leading weather-related killer in the United States. During the ten-year period between 2000 and 2009 heat events killed 162 people - more people than lightning, tornado, flood, cold, winter storm, wind and hurricane hazards. However, most deaths are attributed to prolonged heat waves in large cities that rarely experience hot weather. The elderly and the ill are most at-risk, along with those who exercise outdoors in hot, humid weather.

The National Weather Service devised the Heat Index as a mechanism to better inform the public of heat dangers. The Heat Index Chart, shown in Figure 5.18, uses air temperature and humidity to determine the heat index or apparent temperature. Table 5.19 shows the dangers associated with different heat index temperatures. Some populations, such as the elderly and young, are more susceptible to heat danger than other segments of the population.

Figure 28 HEAT INDEX CHART

Air Temp (in F)	Relative Humidity (in percent)																				
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
140	125																				
135	120	128																			
130	117	122	131																		
125	111	116	123	131	141																
120	107	111	116	123	130	139	148														
115	103	107	111	115	120	127	135	143	151												
110	99	102	105	108	112	117	123	130	137	143	150										
105	95	97	100	102	105	109	113	118	123	129	135	142	149								
100	91	93	95	97	99	101	104	107	110	115	120	126	132	138	144						
95	87	88	90	91	93	94	96	98	101	104	107	110	114	119	124	130	136				
90	83	84	85	86	87	88	90	91	93	95	96	98	100	102	106	109	113	117	122		
85	78	79	80	81	82	83	84	85	86	87	88	89	90	91	93	95	97	99	102	105	108
80	73	74	75	76	77	77	78	79	79	80	81	81	82	83	85	86	86	87	88	89	91
75	69	69	70	71	72	72	73	73	74	74	75	75	76	76	77	77	78	78	79	79	80
70	64	64	65	65	66	66	67	67	68	68	69	69	70	70	70	70	71	71	71	71	72

Source: National Oceanic and Atmospheric Administration

Table 10 HEAT DISORDERS ASSOCIATED WITH HEAT INDEX TEMPERATURE

Heat Index Temperature (Fahrenheit)	Description of Risks
80°- 90°	Fatigue possible with prolonged exposure and/or physical activity
90°- 105°	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105°- 130°	Sunstroke, heat cramps, and heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity
130° or higher	Heatstroke or sunstroke is highly likely with continued exposure

Source: National Weather Service, National Oceanic and Atmospheric Administration

LOCATION AND SPATIAL EXTENT

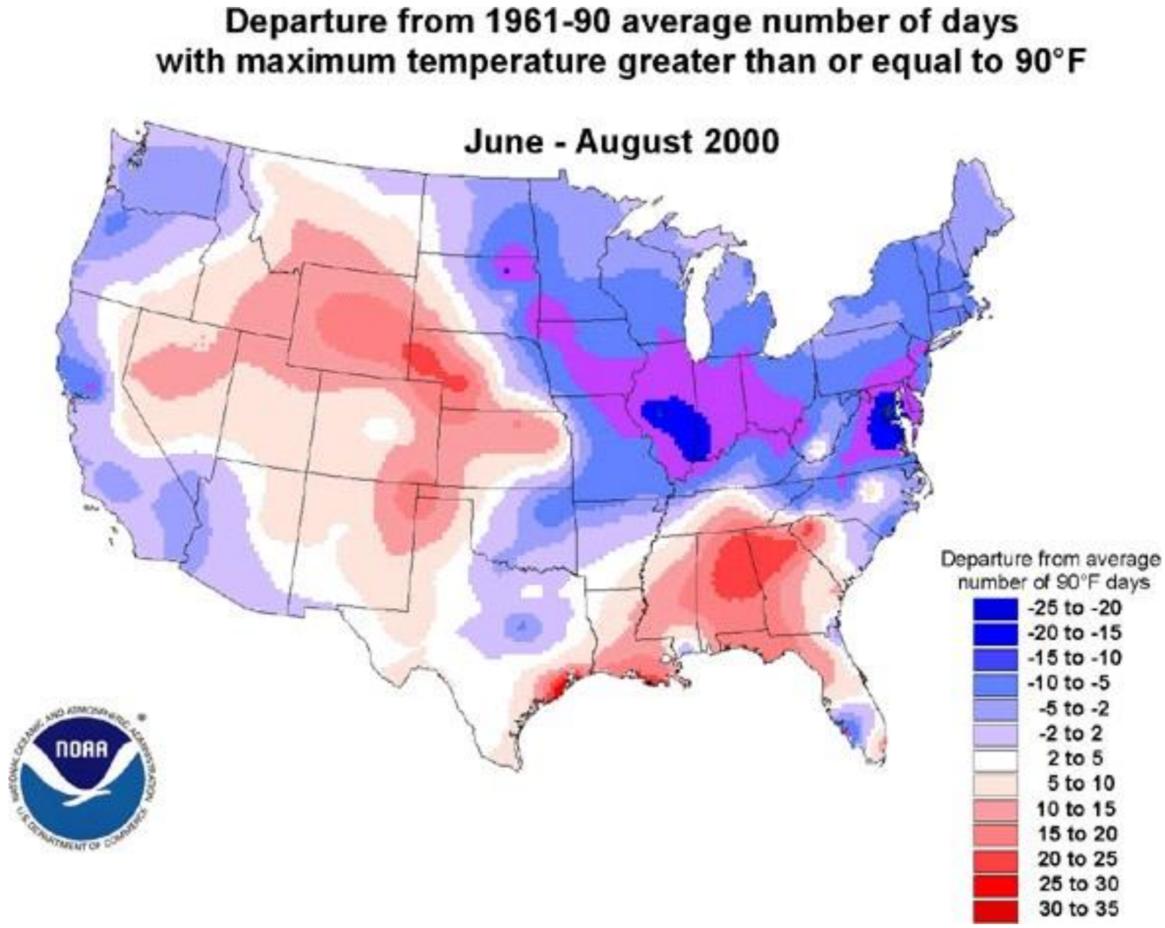
Heat waves typically impact a large area and cannot be confined to any geographic or political boundaries. The entire region is susceptible to extreme heat conditions.

HISTORICAL OCCURRENCES

The National Center for Environmental Information was used to determine historical heat wave occurrences in the region.

Summer of 2000 Heat Wave – Hot temperatures persisted from July to September across the South and Plains. Known as the Summer of 2000 Heat Wave, high temperatures commonly peaked over 100 degrees. As shown in Figure 27 below, there were several days over 90 degree than the typical average. This was the fourth warmest July-August on record.

Figure 27 DEPARTURE FROM AVERAGE NUMBER OF 90 DEGREE DAYS



Source: http://www.NCEI.noaa.gov/sotc/drought/2000/16#Heat

July 2000 – July was a hot and dry month in Southeast Mississippi. In Beaumont the temperature was 100 degrees or higher eleven days during the month with the hottest being 105 degrees. In Richton the temperature was 100 degrees or higher three days during the month with the hottest being 102 degrees. In Waynesboro the temperature was 100 degrees or higher four days during the month with the hottest being 103 degrees. In Wiggins the temperature was 100 degrees or higher nine days during the month with 105 degrees being the hottest. In addition to being hot is was also a dry month across the area. Most stations ended up with below normal rainfall totals for the month. In Jackson County, a 68 year old man died from heat exhaustion while sitting in his pickup truck in a parking lot with the windows rolled up, and 10 days later, a 58 year old male was found dead from heat exhaustion while sitting in his truck in the driveway of his home with the windows rolled up.

August 2007 – Heat advisories were issued for a combination of high temperatures and high humidities. Heat index vales were between 110 and 115 degrees. Several public buildings and churches allowed people to come in and cool off during the heat of the day.

July 2010 – Several days of temperatures near 100 degrees contributed to two deaths from heat stroke in the Gulfport area. The Harrison County Coroner stated that two deaths in a mobile home on Smith Road near Canal Road were caused by heat stroke. High temperatures at Gulfport Airport, approximately 3 miles away, were between 98 and 102 degrees from July 29 through August 2. Bodies were discovered on August 4, but deaths occurred several days prior to that. Date of deaths was estimated.

August 2010 – Hot and humid conditions produced heat index values between 110 and 115 degrees over coastal Mississippi. A 48 year old construction worker collapsed and died while working on a highway construction project. Jackson County coroner classified the fatality as heat related with the cause of death as hyperthermia.

Probability of Future Occurrences
Based on historical occurrence information, it is assumed that all of the MEMA District 9 Region has a probability level of highly likely (100 percent annual probability) for future heat wave events.

HAILSTORM

BACKGROUND
Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop to a sufficient weight and fall as precipitation. Hail typically takes the form of spheres or irregularly-shaped masses greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size. Table 5.20 shows the TORRO Hailstorm Intensity Scale which is a way of measuring hail severity.

TABLE 29: TORRO HAILSTORM INTENSITY SCALE

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m2	mm to inch conversion (inches)	Typical Damage Impacts
H0	Hard Hail	5	0-20	0 - 0.2	No damage
H1	Potentially Damaging	5-15	>20	0.2 - 0.6	Slight general damage to plants, crops
H2	Significant	10-20	>100	0.4 - 0.8	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	0.8 - 1.2	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	1.0 - 1.6	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	1.2 - 2.0	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m2	mm to inch conversion (inches)	Typical Damage Impacts
H6	Destructive	40-60		1.6 - 2.4	Bodywork of grounded aircraft dented, brick walls pitted

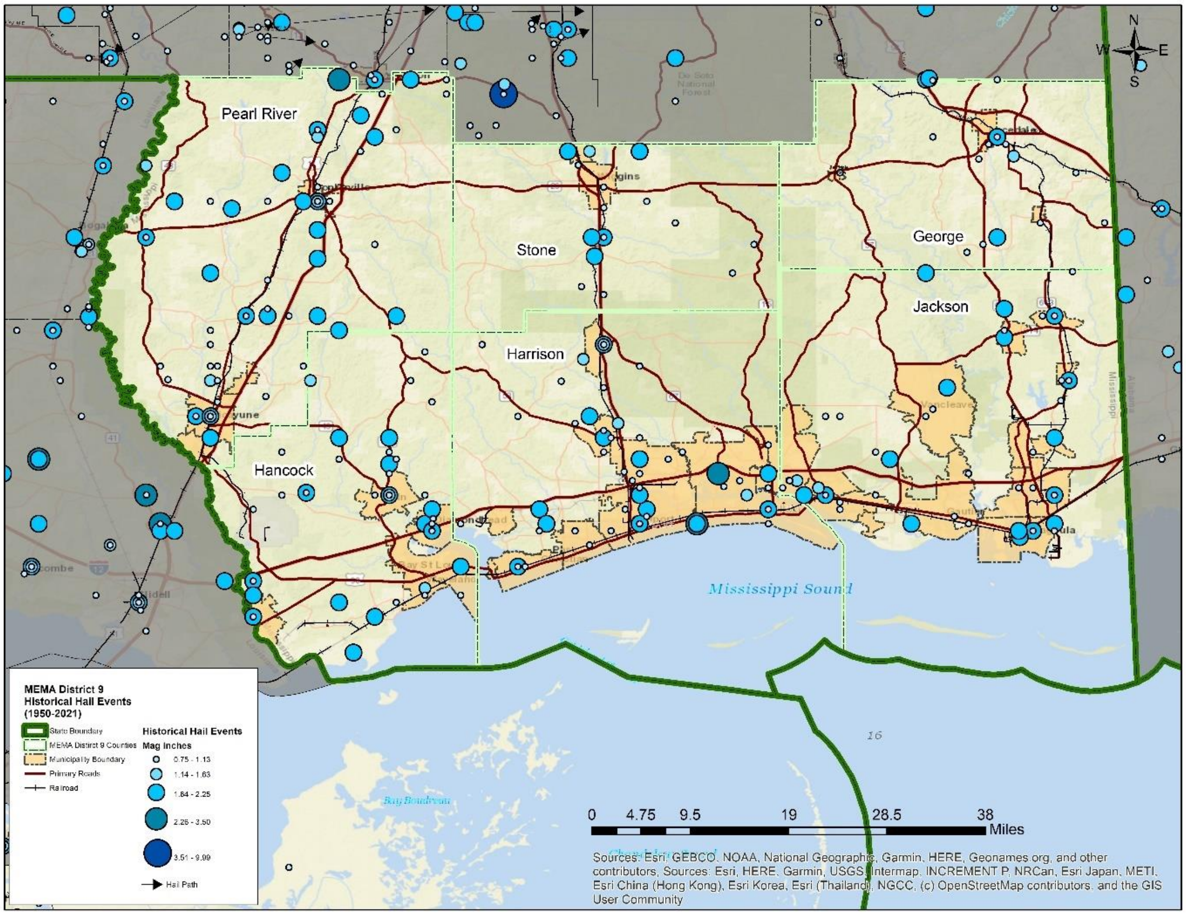
H7	Destructive	50-75		2.0 - 3.0	Severe roof damage, risk of serious injuries
H8	Destructive	60-90		1.6 - 3.5	(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100		3.0 - 3.9	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100			Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: http://www.torro.org.uk/site/hscale.php

LOCATION AND SPATIAL EXTENT

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that the MEMA District 9 Region is uniformly exposed to severe thunderstorms; therefore, all areas of the region are equally exposed to hail which may be produced by such storms. Figure 28 shows the location of hail events that have impacted the region between 1955 and 2021.

Figure 28 HAILSTORM TRACKS IN MEMA DISTRICT 9 REGION



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, 310 recorded hailstorm events have affected the MEMA District 9 Region since 1959. In all, hail occurrences resulted in over $1,000 in property damages. Hail ranged in diameter from 0.25 inches to 3.0 inches. Table 30 provides a summary of the hail events in the MEMA District 9 Region. Detailed information about each event that occurred in the region is provided in the county-specific annexes.

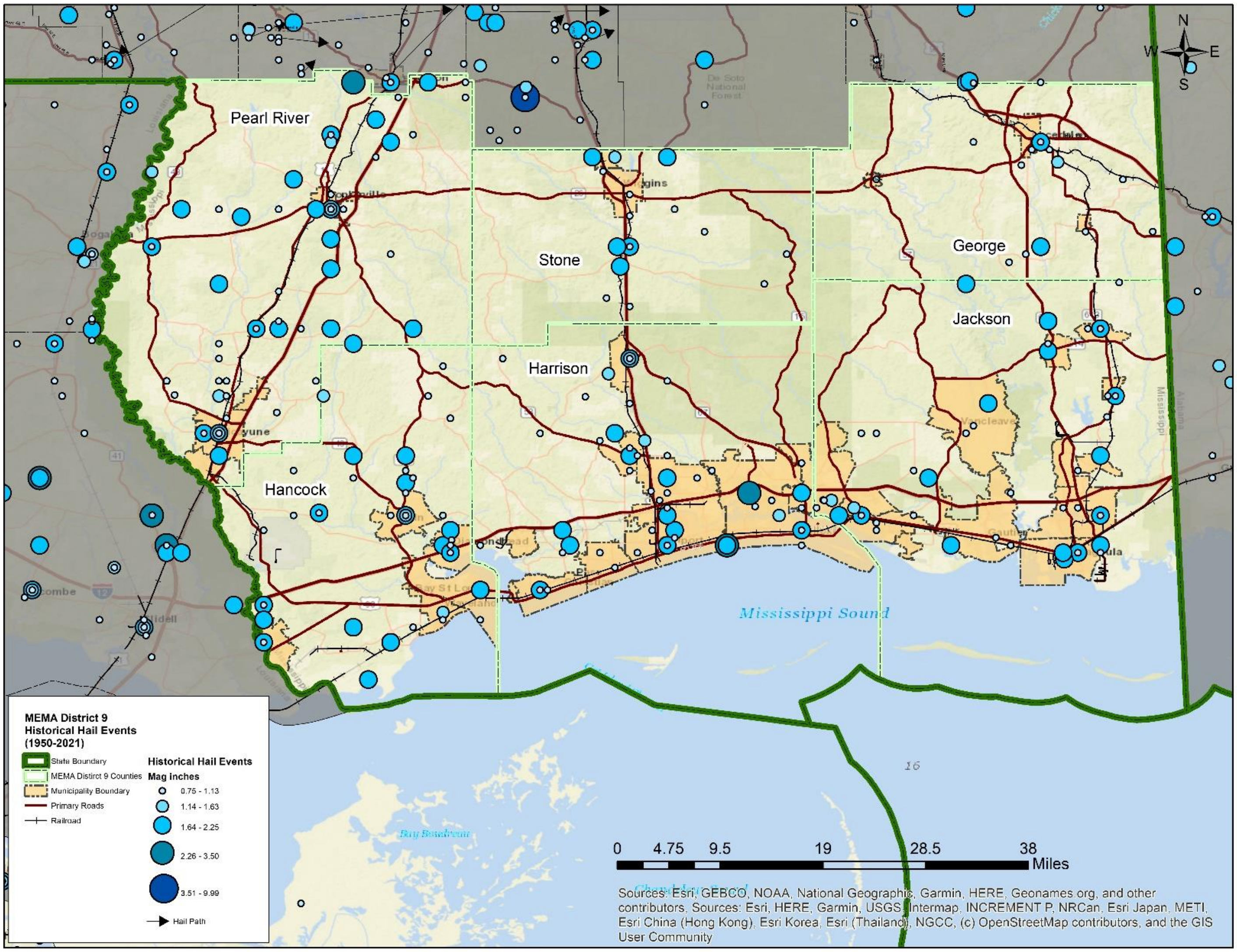
It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Center for Environmental Information. Therefore, it is likely that damages are greater than the reported value. Additionally, a single storm event may have affected multiple counties.

Table 30: SUMMARY OF HAIL OCCURRENCES IN THE MEMA DISTRICT 9 REGION

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2016)	Annualized Property Losses
George County	**33**	**0/0**	**$790**	**$36**
Lucedale	17	0/0	$790	$36
Unincorporated Area	16	0/0	$0	$0
Hancock County	**55**	**0/0**	**$0**	**$0**
Bay St. Louis	2	0/0	$0	$0
Diamondhead	8	0/0	$0	$0
Waveland	6	0/0	$0	$0
Unincorporated Area	39	0/0	$0	$0
Harrison County	**73**	**0/0**	**$0**	**$0**
Biloxi	7	0/0	$0	$0
D'Iberville	4	0/0	$0	$0
Gulfport	13	0/0	$0	$0
Long Beach	3	0/0	$0	$0
Pass Christian	4	0/0	$0	$0
Unincorporated Area	42	0/0	$0	$0
Jackson County	**64**	**0/0**	**$289**	**$17**
Gautier	4	0/0	$289	$17
Moss Point	3	0/0	$0	$0
Ocean Springs	9	0/0	$0	$0
Pascagoula	6	0/0	$0	$0
Unincorporated Area	42	0/0	$0	$0
Pearl River County	**61**	**0/0**	**$0**	**$0**
Picayune	11	0/0	$0	$0
Poplarville	16	0/0	$0	$0
Unincorporated Area	34	0/0	$0	$0
Stone County	**24**	**0/0**	**$0**	**$0**
Wiggins	8	0/0	$0	$0
Unincorporated Area	16	0/0	$0	$0
MEMA DISTRICT 9 REGIONAL TOTAL	**310**	**0/0**	**$1,079**	**$53**

Source: National Center for Environnemental Information

Figure 29 : Historical Hail Events (1950-2021)



PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard, it is assumed that the entire MEMA District 9 Region has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the region.

HURRICANE AND TROPICAL STORM

BACKGROUND

Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. A tropical cyclone refers to any such circulation that develops over tropical waters. Tropical cyclones act as a “safety-valve,” limiting the continued build-up of heat and energy in tropical regions by maintaining the atmospheric heat and moisture balance between the tropics and the pole-ward latitudes. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes.

The key energy source for a tropical cyclone is the release of latent heat from the condensation of warm water. Their formation requires a low-pressure disturbance, warm sea surface temperature, rotational force from the spinning of the earth, and the absence of wind shear in the lowest 50,000 feet of the atmosphere. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season, which encompasses the months of June through November. The peak of the Atlantic hurricane season is in early to mid-September and the average number of storms that reach hurricane intensity per year in the Atlantic basin is about six.

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Scale (Table 5.22), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.

Table 11: SAFFIR-SIMPSON SCALE

Category	Maximum Sustained Wind Speed (MPH)
1	74–95
2	96–110
3	111–129
4	130–156
5	157 +

Source: National Hurricane Center

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure and storm surge potential, which are combined to estimate potential damage. Categories 3, 4, and 5 are classified as “major” hurricanes and, while hurricanes within this range comprise only 20 percent of total tropical cyclone landfalls, they account for over 70 percent of the damage in the United States. Table 5.23 describes the damage that could be expected for each category of hurricane. Damage during hurricanes may also result from spawned tornadoes, storm surge, and inland flooding associated with heavy rainfall that usually accompanies these storms.

Table 32: HURRICANE DAMAGE CLASSIFICATIONS

Storm Category	Damage Level	Description of Damages	Photo Example
1	MINIMAL	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.	
2	MODERATE	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings.	
3	EXTENSIVE	Some structural damage to small residences and utility buildings, with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland.	
4	EXTREME	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.	
5	CATASTROPHIC	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.	

Source: National Hurricane Center; Federal Emergency Management Agency

LOCATION AND SPATIAL EXTENT

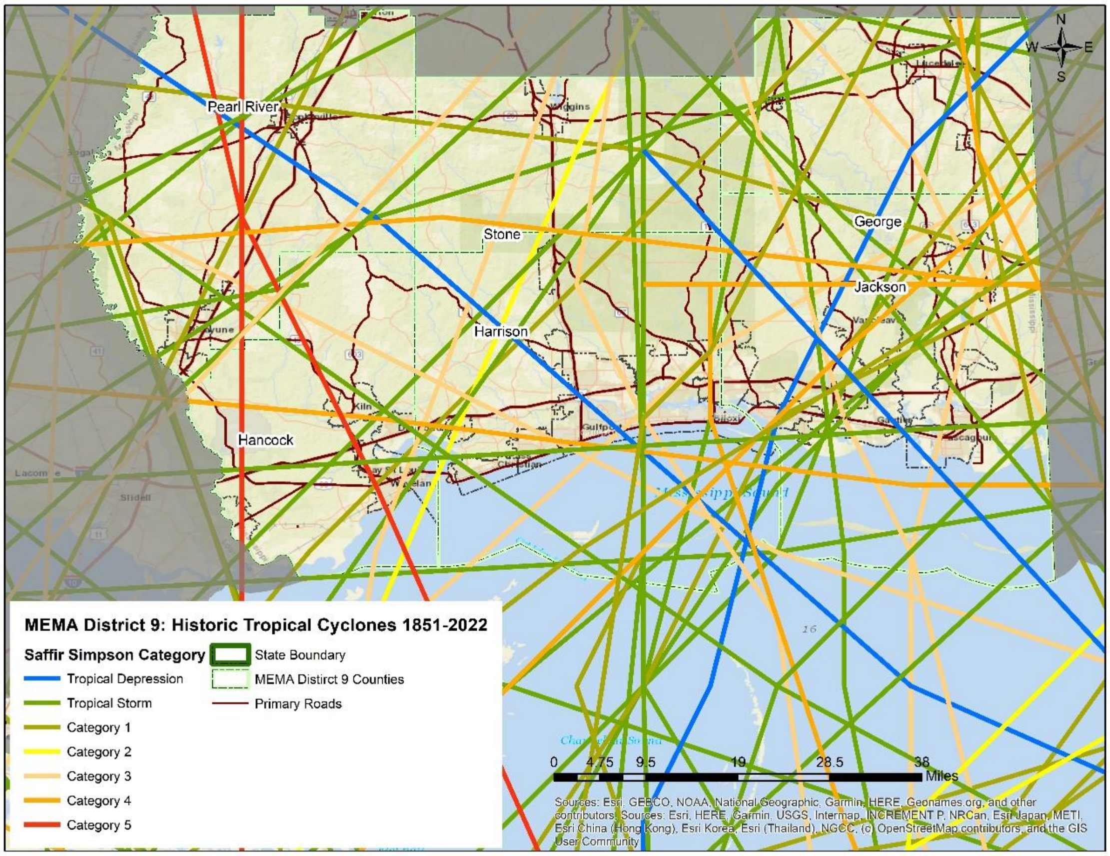
Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States, and while coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland. The MEMA District 9 Region is located in a region of the country that is susceptible to all of the hazards wrought by hurricanes and tropical storms. All areas throughout the MEMA District 9 Region are susceptible to the accompanying hazard effects of extreme wind, flooding, and tornadoes, and coastal areas are also extremely susceptible to the added effects of storm surge, wave action, coastal erosion, and tidal flooding.

HISTORICAL OCCURRENCES

According to the National Hurricane Center's historical storm track records, 119 hurricane or tropical storm/depression tracks have passed within 100 miles of the MEMA District 9 Region since 1852. This includes: 4 Category 3 hurricanes, 15 Category 2 hurricanes, 28 Category 1 hurricanes, 29 tropical storms, and 43 tropical depressions. Additionally, four other major storms had large-scale impacts on the region and are not included in these totals. These storms are listed below and range in Category from 1 to 4.

Of the recorded storm events, 62 hurricane or tropical storm/depression events traversed directly through the region as shown in Figure 30. Notable storms include Hurricane Camille (1969), Hurricane Frederic (1979), and Hurricane Katrina (2005). Table 33 provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 100 miles of the MEMA District 9 Region) and category of the storm based on the Saffir-Simpson Scale.

Figure 30: HISTORICAL HURRICANE STORM TRACKS WITHIN 100 MILES OF THE MEMA District 9 Region



Source: National Oceanic and Atmospheric Administration, National Hurricane Center

Table 33: HISTORICAL STORM TRACKS WITHIN 100 MILES OF THE MEMA 9 DISTRICT REGION (1842–2022)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/25/1852	UNNAMED	93	Category 2
8/3/1855	NOT NAMED	--	Tropical Depression
9/16/1855	UNNAMED	96	Category 2
6/24/1857	NOT NAMED	--	Tropical Depression
9/15/1859	UNNAMED	79	Category 1
8/11/1860	UNNAMED	96	Category 2

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/15/1860	UNNAMED	89	Category 2
8/17/1861	NOT NAMED	--	Tropical Depression
11/1/1861	NOT NAMED	--	Tropical Depression
9/15/1862	NOT NAMED	--	Tropical Depression
9/16/1862	NOT NAMED	--	Tropical Depression
10/1/1863	UNNAMED	43	Tropical Storm
6/3/1866	NOT NAMED	--	Tropical Depression
9/16/1867	NOT NAMED	--	Tropical Depression
10/5/1867	UNNAMED	89	Category 2
10/3/1868	NOT NAMED	--	Tropical Depression
9/5/1869	UNNAMED	79	Category 1
7/30/1870	NOT NAMED	--	Tropical Depression
7/11/1872	UNNAMED	59	Tropical Storm
9/18/1875	UNNAMED	18	Tropical Depression
9/18/1877	UNNAMED	79	Category 1
9/1/1879	UNNAMED	89	Category 2
10/7/1879	UNNAMED	59	Tropical Storm
8/31/1880	UNNAMED	70	Category 1
8/2/1881	NOT NAMED	--	Tropical Depression
8/3/1881	UNNAMED	59	Tropical Storm
8/30/1885	UNNAMED	59	Tropical Storm
9/26/1885	UNNAMED	70	Category 1
6/15/1886	UNNAMED	50	Tropical Storm
6/14/1887	UNNAMED	33	Tropical Depression
10/19/1887	UNNAMED	82	Category 1
6/27/1888	NOT NAMED	--	Tropical Depression
9/23/1889	UNNAMED	79	Category 1
8/27/1890	UNNAMED	43	Tropical Storm
9/21/1891	NOT NAMED	--	Tropical Depression
9/12/1892	UNNAMED	59	Tropical Storm
9/7/1893	UNNAMED	79	Category 1
10/2/1893	UNNAMED	97	Category 3
8/7/1894	UNNAMED	59	Tropical Storm
8/15/1895	UNNAMED	59	Tropical Storm
9/13/1900	UNNAMED	43	Tropical Storm
8/14/1901	UNNAMED	82	Category 1
10/9/1905	UNNAMED	43	Tropical Storm
9/27/1906	UNNAMED	93	Category 2
9/21/1907	UNNAMED	43	Tropical Storm
8/11/1911	UNNAMED	79	Category 1
6/13/1912	UNNAMED	59	Tropical Storm
7/17/1912	UNNAMED	5	Tropical Depression
9/13/1912	UNNAMED	82	Category 1
9/18/1914	UNNAMED	33	Tropical Depression
9/29/1915	UNNAMED	96	Category 2
7/5/1916	UNNAMED	95	Category 2

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
10/17/1922	UNNAMED	18	Tropical Depression
6/26/1923	UNNAMED	43	Tropical Storm
10/17/1923	UNNAMED	59	Tropical Storm
9/20/1926	UNNAMED	93	Category 2
9/1/1932	UNNAMED	82	Category 1
10/15/1932	UNNAMED	59	Tropical Storm
7/27/1936	UNNAMED	43	Tropical Storm
8/22/1936	UNNAMED	5	Tropical Depression
6/16/1939	UNNAMED	59	Tropical Storm
9/26/1939	UNNAMED	50	Tropical Storm
9/24/1940	UNNAMED	18	Tropical Depression
9/10/1944	UNNAMED	64	Category 1
9/5/1945	UNNAMED	18	Tropical Depression
9/19/1947	UNNAMED	92	Category 2
9/4/1948	UNNAMED	79	Category 1
9/4/1949	UNNAMED	43	Tropical Storm
8/31/1950	BAKER	82	Category 1
8/1/1955	BRENDA	70	Category 1
8/27/1955	UNNAMED	50	Tropical Storm
9/24/1956	FLOSSY	82	Category 1
9/18/1957	ESTHER	64	Category 1
10/8/1959	IRENE	43	Tropical Storm
9/15/1960	ETHEL	85	Category 2
9/26/1960	FLORENCE	1	Tropical Depression
10/4/1964	HILDA	70	Category 1
9/10/1965	BETSY*	117	Category 4
9/29/1965	DEBBIE	33	Tropical Depression
8/18/1969	CAMILLE	100	Category 3
8/8/1971	UNNAMED	5	Tropical Depression
9/4/1971	FERN	5	Tropical Depression
9/16/1971	EDITH	70	Category 1
7/29/1975	UNNAMED	18	Tropical Depression
10/17/1975	UNNAMED	5	Tropical Depression
9/24/1976	UNNAMED	5	Tropical Depression
7/19/1977	UNNAMED	18	Tropical Depression
9/6/1977	BABE	18	Tropical Depression
10/25/1977	UNNAMED	18	Tropical Depression
8/10/1978	UNNAMED	5	Tropical Depression
7/11/1979	BOB	74	Category 1
9/12/1979	FREDERICK	97	Category 3
7/20/1980	UNNAMED	5	Tropical Depression
10/27/1984	UNNAMED	18	Tropical Depression
9/2/1985	ELENA	95	Category 2
10/31/1985	JUAN	64	Category 1
8/12/1987	UNNAMED	5	Tropical Depression
8/8/1988	BERYL	5	Tropical Depression

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/9/1988	BERYL	50	Tropical Storm
9/10/1988	FLORENCE	79	Category 1
8/3/1995	ERIN	82	Category 1
7/19/1997	DANNY	79	Category 1
9/27/1998	GEORGES	92	Category 2
9/20/1998	HERMINE	33	Tropical Depression
6/11/2001	ALLISON	43	Tropical Storm
8/5/2002	BERTHA	33	Tropical Depression
9/14/2002	HANNA	59	Tropical Storm
9/26/2002	ISIDORE	64	Category 1
6/30/2003	BILL	59	Tropical Storm
7/1/2003	BILL	18	Tropical Depression
9/16/2004	IVAN	96	Category 2
6/11/2005	ARLENE	59	Tropical Storm
7/6/2005	CINDY	74	Category 1
7/10/2005	DENNIS*	100	Category 3
8/29/2005	KATRINA	98	Category 3
9/22/2007	TEN	5	Tropical Depression
8/24/2008	FAY	18	Tropical Depression
9/1/2008	GUSTAV*	87	Category 2
11/10/2009	IDA	70	Category 1
7/25/2010	BONNIE	5	Tropical Depression
8/12/2010	FIVE	5	Tropical Depression
9/5/2011	LEE	43	Tropical Storm
8/28/2012	ISAAC*	70	Category 1
10/07/2017	Nate	85	Category 1
9/04/2018	Gordon	70	Tropical Storm
10/28/2020	Zeta	110	Category 2
10/22/2021	Ida	150	Category 4

*It should be noted that the track of several major hurricanes that impacted the region fell outside of the 100-mile buffer. These storms were included in the table due to their significant impact (Betsy, 1965; Dennis, 2005; Gustav, 2008; Isaac, 2012, Hurricane Nate, 2017, Hurricane Zeta 2020 and Hurricane Ida 2021), but it should be noted that wind speed and storm category are estimated based on anecdotal information.

Source: National Hurricane Center

Federal records indicate that 12 disaster declarations were made in 1965 (Hurricane Betsy), 1969 (Hurricane Camille), 1979 (Hurricane Frederic), 1985 (Hurricane Elena), 1998 (Hurricane Georges), 2001 (Tropical Storm Allison), 2002 (Tropical Storm Isidore), 2004 (Hurricane Ivan), 2005 (Hurricane Dennis and Hurricane Katrina), 2008 (Hurricane Gustav), and 2012 (Hurricane Isaac). Hurricane and tropical storm events can cause substantial damage in the area due to high winds and flooding.

Flooding and high winds from hurricanes and tropical storms can cause damage throughout the region. Anecdotes are available from NCEI for the major storms that have impacted the area as found below:

Hurricane Georges – September 25-29, 1998

Hurricane Georges, a strong Category 2 hurricane moved slowly northwest across the Gulf of Mexico toward southeast Louisiana and coastal Mississippi on the September 25 and September 26. As the hurricane approached the mouth of the Mississippi River on September 27, it slowly turned toward the north making landfall along the Mississippi Coast just to the east of Biloxi, MS at 0400 CST on September 28. The hurricane moved only slowly north during the morning hours, at times becoming nearly stationary. The hurricane finally was downgraded to a tropical storm at 1500CST on September 28 when it was located north of Biloxi. The tropical storm then moved very slowly eastward into southern Alabama on September 29.

Most of the inland counties in Southeast Mississippi had damage from heavy rains and from trees and power lines being blown down by the persistent winds. One of the hardest hit areas by the high winds was in Stone County Mississippi near where the center of the hurricane moved. Eighty five homes were damaged in Stone County by the wind. Fifty four homes had minor damage, twenty six had major damage and five were destroyed. Most of the damage was along and east of U. S. Highway 49.

Throughout the area, agriculture took a beating with the cotton, soybean and pecan crop almost totally destroyed.

The greatest affect from the hurricane occurred over Jackson County which experienced the intense eastern portion of the hurricanes eyewall and highest storm surge.

Due to the slow forward speed of the hurricane very heavy rainfall occurred over eastern Harrison County and Jackson County leading to record flooding on streams and rivers. The barrier islands in the Mississippi Sound were also heavily damaged by wind and storm surge. A new three quarter mile cut developed in the east portion of Ship Island. Total insured property damage in Mississippi was estimated at near 310 million dollars by insurance industry sources. When uninsured losses and public property damage considered, total damages in Mississippi will likely approach $620 million.

Hancock County - Wind damage in Hancock County was mostly confined to large tree limbs snapped off, trees downed, and minor roof damage to houses and businesses, and damage to commercial signs. Storm surge was of minimal impact with the county remaining on the west side of the hurricane. Storm surge was 4 to 5 feet above normal with only minor coastal flooding and beach erosion occurring. Approximately 2,000 people were housed in public shelters.

Harrison County - Moderate wind damage occurred throughout the parish. Many commercial signs were damaged or destroyed, large trees limbs and trees downed, and wind damaged roofs or houses and businesses. At the Gulfport Harbor, a wind gage recorded a maximum gust of 80 mph at 0415CST on September 28. At approximately the same time period, a gust to 117 mph was recorded in Gulfport, one mile north of the beach. Storm surge flooding was generally 6 to 7 feet above normal across the coast. Storm surge flooding crossed US Highway 90 in several locations, but storm surge flooding to property was not considered major. A maximum stage of 8.1 feet was recorded at the Gulfport Harbor.

Due to the slow movement of the hurricane, heavy rain occurred over the east portion of the county and adjacent areas. Significant river flooding occurred on the Biloxi and Tchoutacabouffa Rivers on the September 28 and September 29. Wortham, on the Biloxi River reached its second highest stage of record with a reading of 25.47 feet on September 29.

Many county residents evacuated low lying areas in advance of the hurricane with approximately 3700 seeking refuge in public evacuation shelters within the county.

Jackson County - Jackson County bore the brunt of Hurricane Georges with the area experiencing the strong right front quadrant of the hurricane's circulation. A storm surge of 8 to 11 feet caused storm surge flooding along low lying coastal areas. This was the greatest storm surge flooding in Jackson County in nearly 30 years. In the east beach section of the Bellefontaine area, 23 of 27 homes were heavily damaged or destroyed by storm surge. Many businesses and industries located in low lying coastal areas were flooded causing considerable property damage and loss of revenue. The U.S. Navy facility at Pascagoula suffered $2.2 million in property damage, primarily roof and water damage.

Several unofficial anemometers recorded gusts between 85 and 100 mph in the Pascagoula area. Moderate wind damage was reported across the parish. Numerous commercial signs were destroyed, trees downed, roofs damaged, and power lines and poles downed.

Approximately 4600 people sought refuge in public hurricane evacuation shelters in Jackson County. Two shelters, one in Gautier and one in Pascagoula, suffered wind damage to the roof at the height of the storm.

Due to the slow forward speed of Hurricane Georges, widespread heavy rainfall occurred over Jackson County and over the watershed of the Pascagoula and Escatawpa Rivers. Rainfall of 10 to 15 inches was common over Jackson County. River flooding developed over much of the county by September 28. A record flood crest of 20.82 feet was established on Red Creek at Vestry. On the Escatawpa River, a record flood crest of 22.70 feet was established at Agricola. Approximately 3,000 people were evacuated from flooded areas, primarily in the Escatawpa River basin, with hundreds of structures flooded in the county.

Pearl River County - Damage was mainly confined to downed tree limbs and trees, minor to moderate roof damage to homes and businesses, and power outages from downed power lines. Several secondary highways and roadways in the county were blocked by fallen trees. Storm total rainfall was fairly light with amounts of 2 to 4 inches common. About 200 people were sheltered in public hurricane evacuations shelters in the county.

Hurricane Katrina – August 24-30, 2005
Hurricane Katrina was one of the strongest and most destructive hurricanes on record to impact the coast of the United States. It will likely be recorded as one the worst natural disaster in the history of the United States to date resulting in catastrophic damage and numerous casualties in southeast Louisiana and along the Mississippi coast. Damage and casualties resulting from Hurricane Katrina extended as far east as Alabama and the panhandle of Florida. Katrina developed from a tropical depression southeast of the Bahamas on August 24th. After moving through the Bahamas as a tropical storm, Katrina strengthened to a category 1 hurricane prior to landfall in south Florida around the Miami area on the 25th of August. Katrina crossed south Florida and entered the Gulf of Mexico and began to strengthen. Hurricane Katrina strengthened to a category 5 storm on August 28th about 250 miles south southeast of the mouth of the Mississippi River with winds reaching their peak intensity of 175 mph and a central pressure of 902 mb. Post event analysis by the National Hurricane Center indicates that Katrina weakened slightly before making landfall as a strong category 3 storm in initial landfall in lower Plaquemines Parish. Maximum sustained winds were estimated at 110 knots or 127 mph and a central pressure of 920 mb around 610 AM CDT on August 29th in southeast Louisiana just south of Buras in Plaquemines Parish. The storm continued on a north northeast track with the center passing about 40 miles southeast of New Orleans with a second landfall occurring near the Louisiana and Mississippi border around 945 AM CDT as a category 3 storm with maximum sustained winds estimated around 105 knots or 121 mph. Katrina continued to weaken as it moved north northeast across Mississippi during the day, but remained at hurricane strength 100 miles inland near Laurel, Mississippi. Katrina weakened to a tropical depression near Clarksville, Tennessee on August 30th.

Damage across coastal Mississippi was catastrophic. The storm surge associated with Hurricane Katrina approached or exceeded the surge associated with Hurricane Camille and impacted a much more extensive area. Almost total destruction was observed along the immediate coast in Hancock and Harrison Counties with storm surge damage extending north along bays and bayous to Interstate 10. Thousands of homes and businesses were destroyed by the storm surge. Hurricane force winds also caused damage to roofs, power lines, signage, downed trees, and some windows were broken by wind and wind driven debris in areas away from storm surge flooding, wind damage was widespread with fallen trees taking a heavy toll on houses and power lines. Damage was less extensive in southwest Mississippi. Excluding losses covered by the Federal Flood Insurance Program, insured property losses in Mississippi were estimated at 9.8 billion dollars. Uninsured and insured losses combined were estimated to exceed 100 billion dollars across the Gulf Coast.

As of late October, the following fatality figures were reported in the Mississippi coastal counties; Hancock- 52, Harrison

- 83, Jackson - 17. Additional details on fatalities will be given in later updates to storm data.

Due to the failure of power and equipment prior to the peak of the storm, data for wind, storm surge, pressure, and rainfall are incomplete. The lowest pressure on the Mississippi coast was estimated to be 928 mb where the hurricane made landfall near the Louisiana Mississippi border. A pressure of 976 mb was recorded at 0951 CDT by a university weather station deployed in Pascagoula, well east of the landfall location. At approximately the same time, the pressure at the NWS office in Slidell, just to the west of landfall location, recorded a pressure of 934.1 mb at 0938 AM CDT.

The highest wind gusts recorded in Mississippi and the adjacent coastal waters were 117 knots (134 mph) at the Pearl River County EOC office in Poplarville and 102 knots (118 mph) at 1000AM CDT by a university wind tower deployed at the Stennis Space Center in Hancock County. Maximum sustained winds in Mississippi were estimated around 105 knots (121 mph) near the storm's second landfall along the Mississippi and Louisiana border. Unofficial wind observations before the gage failed included a wind gust of 106 kt, (122 mph) at 0615 CDT by an amateur radio operator in Long Beach and a wind gust of 108 kt (124 mph) at the EOC in Pascagoula.

High winds from Katrina caused significant tree and power line damage to the counties that border the Mississippi and Alabama state line. Wind gusts of 80-100 mph were estimated across Stone County and 70-90 mph across George County. Many of the fallen trees fell on structures and caused damage. Stone County received the most damage.

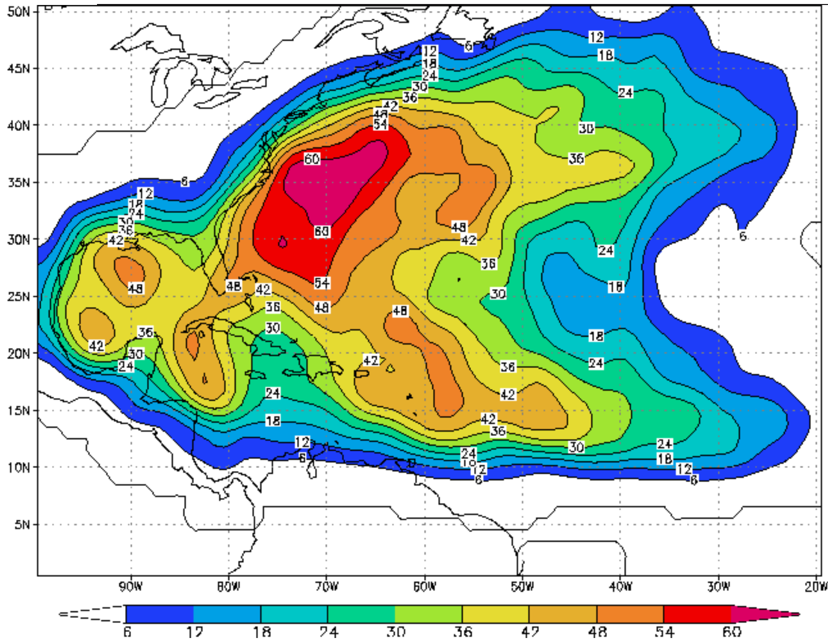
Most tide gages were destroyed by the storm surge so storm surge was determined primarily by post storm high water mark surveys conducted by FEMA. An estimated storm surge of approximately 23.0 feet occurred at the Hancock County EOC operations area in Waveland, and the high water mark measured on the Jackson County EOC building in Pascagoula was 16.1 feet. Preliminary estimates of storm surge along the Mississippi Coast include Hancock County 19-25 feet, Harrison County 19-25 feet, Jackson County 17-21 ft. All storm surge heights are still water elevations referenced to NAVD88 datum.

Storm total rainfall amounts generally ranged from 10 to 16 inches across coastal and south Mississippi with much lower amounts observed over southwest Mississippi. The highest observed storm total rainfall was 11 inches at Stennis Space Center and near Picayune.

PROBABILITY OF FUTURE OCCURRENCES

According to NOAA statistical data, the region is located in an area with an annual probability of a named storm between 30 and 42 percent as presented in Figure 32. This illustration was created by the National Oceanic and Atmospheric Administration's Hurricane Research Division using data from 1944 to 1999 and counting hits when a storm or hurricane was within approximately 100 miles (165 km) of each location. As a reference point, the tip of Florida's outline can be found near the 25N, 80W intersection, and the MEMA District 9 Region is near the 30N, 90W intersection. This empirical probability is fairly consistent with other scientific studies and observed historical data made available through a variety of federal, state, and local sources.

Figure 32 EMPIRICAL PROBABILITY OF A NAMED HURRICANE OR TROPICAL STORM



Source: National Oceanic and Atmospheric Administration

The probability of storm occurrences will vary significantly based on the return interval for different categories of magnitude. The probability of less intense storms (lower return periods) is higher than more intense storms (higher return periods). Table 34 profiles the potential peak gust wind speeds that can be expected in the MEMA District 9 Region during a hurricane event for various return periods according to FEMA's HAZUS-MH®.

Table 12 POTENTIAL PEAK GUST WIND SPEEDS PER RETURN PERIOD

50-Year	100-Year	500-Year	1,000-Year
119.4 mph	133.9 mph	160.3 mph	170.0

Source: Federal Emergency Management Agency (Hazus-MH 3.2)

Overall, the probability level of future hurricane and tropical storm occurrence for the MEMA District 9 Region is highly likely (100 percent annual probability).

SEVERE THUNDERSTORM/HIGH WIND

BACKGROUND

Thunderstorms can produce a variety of accompanying hazards including wind (discussed here), hail, and lightning. Although thunderstorms generally affect a small area, they are very dangerous may cause substantial property damage.

Three conditions need to occur for a thunderstorm to form. First, it needs moisture to form clouds and rain. Second, it needs unstable air, such as warm air that can rise rapidly (this often referred to as the "engine" of the storm). Third, thunderstorms need lift, which comes in the form of cold or warm fronts, sea breezes, mountains, or the sun's heat. When these conditions occur simultaneously, air masses of varying temperatures meet, and a thunderstorm is formed. These storm events can occur singularly, in lines, or in clusters. Furthermore, they can move through an area very quickly or linger for several hours.

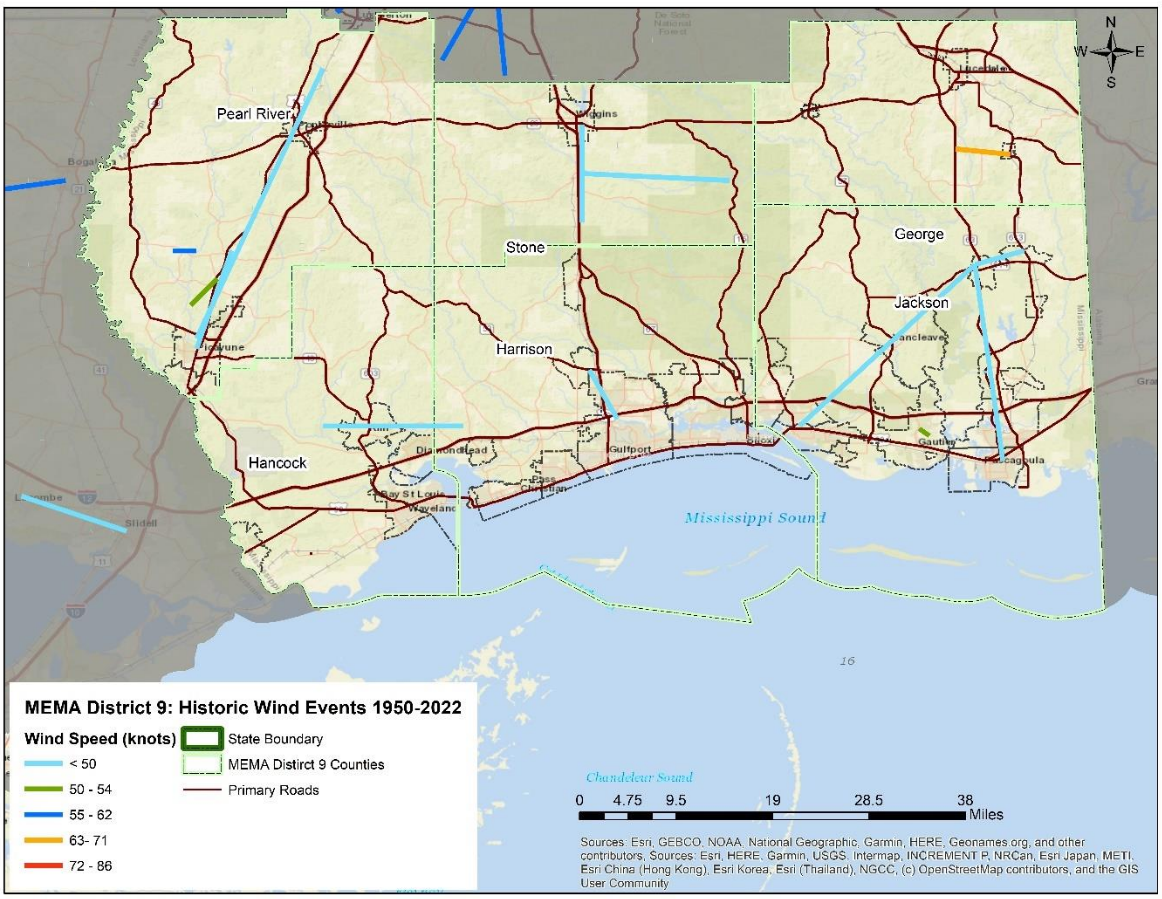
According to the National Weather Service, more than 100,000 thunderstorms occur each year, though only about 10 percent of these storms are classified as "severe." A severe thunderstorm occurs when the storm produces at least one of these three elements: 1) hail of three-quarters of an inch, 2) a tornado, or 3) winds of at least 58 miles per hour.

Downbursts are also possible with thunderstorm events. Such events are an excessive burst of wind in excess of 125 miles per hour. They are often confused with tornadoes. Downbursts are caused by down drafts from the base of a convective thunderstorm cloud. It occurs when rain-cooled air within the cloud becomes heavier than its surroundings. Thus, air rushes towards the ground in a destructive yet isolated manner. There are two types of downbursts. Downbursts less than 2.5 miles wide, duration less than 5 minutes, and winds up to 168 miles per hour are called "microbursts." Larger events greater than 2.5 miles at the surface and longer than 5 minutes with winds up to 130 miles per hour are referred to as "macrobursts."

LOCATION AND SPATIAL EXTENT

A thunderstorm event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. It is assumed that the MEMA District 9 Region has uniform exposure to an event and the spatial extent of an impact could be large. With that in mind, Figure 33 shows the location of wind events that have impacted the region between 1955 and 2021.

Figure 33 SEVERE THUNDERSTORM TRACKS IN MEMA DISTRICT 9 REGION



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Severe storms were at least partially responsible for 12 disaster declarations in the MEMA District 9 Region in between 1971 and 2022. According to NCEI, there have been 704 reported thunderstorm and high wind events since 1959 in the MEMA District 9 Region. These events caused almost $11.1 million in damages. There were also reports of 2 fatalities and 39 injuries. Table 35 summarizes this information. Detailed thunderstorm and high wind event reports including date, magnitude, and associated damages for each event are presented in the county-specific annexes.

Table 35: Summary of Thunderstorm/ High Wind Occurrences in the MEMA District 9 Region

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
George County	73	0/16	$955,002	$33,394
Lucedale	22	0/6	$548,223	$24,919
Unincorporated Area	51	0/10	$406,779	$8,475
Hancock County	102	0/4	$428,553	$11,182
Bay St. Louis	6	0/0	$1,981	$99
Diamondhead	3	0/0	$17,584	$1,099
Waveland	14	0/0	$59,427	$2,701
Unincorporated Area	79	0/4	$349,561	$7,283
Harrison County	185	1/8	$1,027,677	$38,753
Biloxi	19	0/0	$350,990	$16,714
D'Iberville	10	0/0	$95,625	$4,554
Gulfport	24	0/0	$241,992	$10,521
Long Beach	5	0/0	$5,684	$284
Pass Christian	6	0/0	$15,825	$688
Unincorporated Area	121	1/8	$317,561	$5,992
Jackson County	127	0/3	$459,368	$20,249
Gautier	3	0/2	$109,389	$9,116
Moss Point	3	0/0	$7,226	$602
Ocean Springs	12	0/0	$29,120	$1,456
Pascagoula	15	0/0	$118,805	$5,657
Unincorporated Area	94	0/1	$194,828	$3,418
Pearl River County	145	0/3	$7,302,402	$373,483
Picayune	22	0/2	$6,844,811	$360,253
Poplarville	38	0/1	$183,304	$8,332
Unincorporated Area	85	0/0	$274,287	$4,898
Stone County	72	1/5	$907,929	$35,155
Wiggins	39	1/5	$589,788	$28,085
Unincorporated Area	33	0/0	$318,141	$7,070
MEMA DISTRICT 9 REGIONAL TOTAL	704	2/39	$11,080,931	$512,216

Source: National Center for Environnemental Information

PROBABILITY OF FUTURE OCCURRENCES

Given the high number of previous events, it is certain that thunderstorm events, including straight-line wind events, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for the entire planning area.

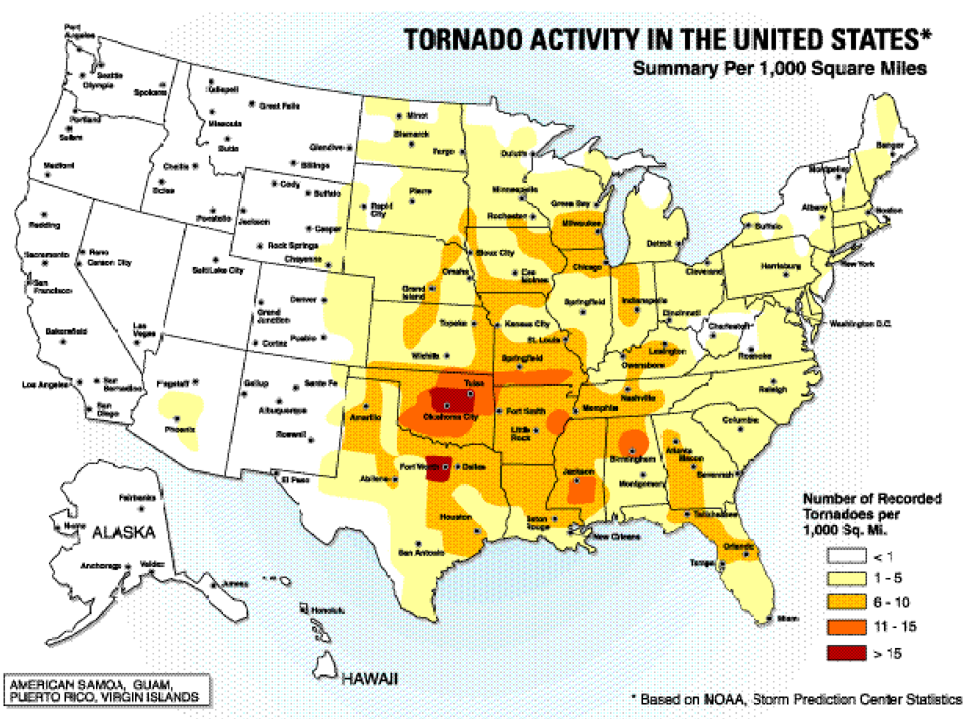
TORNADO

BACKGROUND

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes and other tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the National Weather Service, tornado wind speeds normally range from 40 miles per hour to more than 300 miles per hour. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.

Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries. According to the NOAA Storm Prediction Center (SPC), the highest concentration of tornadoes in the United States has been in Oklahoma, Texas, Kansas, and Florida respectively. Although the Great Plains region of the Central United States does favor the development of the largest and most dangerous tornadoes (earning the designation of “tornado alley”), Florida experiences the greatest number of tornadoes per square mile of all U.S. states (SPC, 2002). Figure 35 shows tornado activity in the United States based on the number of recorded tornadoes per 1,000 square miles.

Figure 35 TORNADO ACTIVITY IN THE UNITED STATES



Source: Federal Emergency Management Agency

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Tornadoes are more likely to occur during the months of March through May and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long.

The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings (particularly mobile homes). Tornadic magnitude is reported according to the Fujita and Enhanced Fujita Scales. Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale (Table 36). Tornado magnitudes that were determined in 2005 and later were determined using the Enhanced Fujita Scale (Table 37).

Table 36: THE FUJITA SCALE (EFFECTIVE PRIOR TO 2005)

F-SCALE NUMBER	INTENSITY	WIND SPEED	TYPE OF DAMAGE DONE
F0	GALE TORNADO	40–72 MPH	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
F1	MODERATE TORNADO	73–112 MPH	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	SIGNIFICANT TORNADO	113–157 MPH	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	SEVERE TORNADO	158–206 MPH	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	DEVASTATING TORNADO	207–260 MPH	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	INCREDIBLE TORNADO	261–318 MPH	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	INCONCEIVABLE TORNADO	319–379 MPH	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies.

Source: National Weather Service

Table 13 THE ENHANCED FUJITA SCALE (EFFECTIVE 2005 AND LATER)

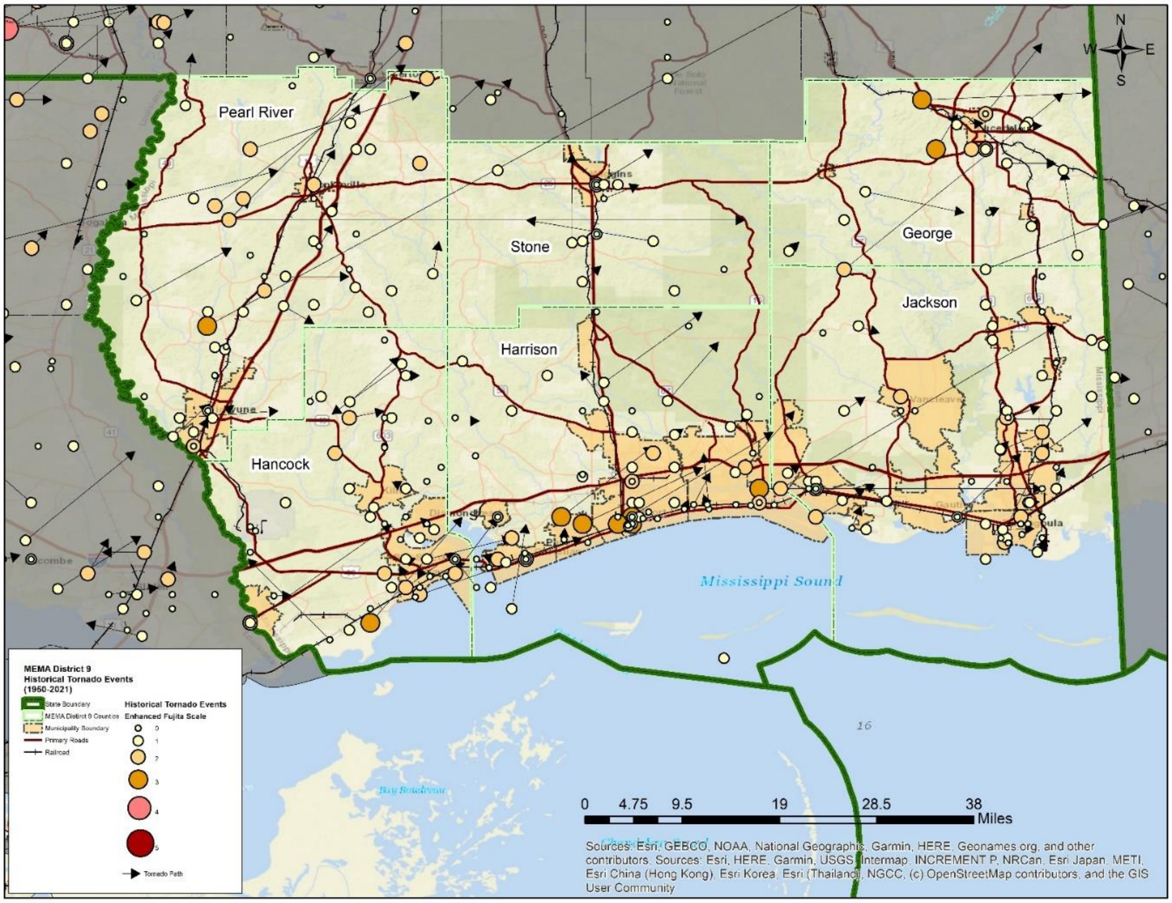
EF-SCALE NUMBER	INTENSITY PHRASE	3 SECOND GUST (MPH)	TYPE OF DAMAGE DONE
EF0	GALE	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
EF1	MODERATE	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
EF2	SIGNIFICANT	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	SEVERE	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	DEVASTATING	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
EF5	INCREDIBLE	Over 200	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.

Source: National Weather Service

LOCATION AND SPATIAL EXTENT

Tornadoes occur throughout the state of Mississippi, and thus in the MEMA District 9 Region. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that the MEMA District 9 Region is uniformly exposed to this hazard. With that in mind, Figure 36 shows tornado track data for many of the major tornado events that have impacted the region between 1950 and 2022. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

Figure 36 TORNADO TRACKS IN THE MEMA DISTRICT 9 REGION; Source: National Weather Service Storm Prediction Center



<u>HISTORICAL OCCURRENCES</u>

Tornadoes were at least partially responsible for 11 disaster declarations in the MEMA District 9 Region between 1965 and 2022. According to the National Center for Environmental, there have been a total of 283 recorded tornado events in the MEMA District 9 Region since 1952, resulting in more than $385 million in property damages. In addition, 6 fatalities and 170 injuries were reported. The magnitude of these tornadoes ranged from F0 to F3 and EF0 to EF3 in intensity. A summary of these events is presented in Table 38. Detailed information on historical tornado events can be found in the county-specific annexes.

Table 38: SUMMARY OF TORNADO OCCURRENCES IN THE MEMA DISTRICT 9 REGION

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
George County	16	0/14	$4,884,598	$88,811
Lucedale	3	0/0	$12,750	$232
Unincorporated Area	13	0/14	$4,871,848	$88,579
Hancock County	55	0/14	$78,977,561	$1,128,251
Bay St. Louis	9	0/0	$22,776	$325
Diamondhead	2	0/0	$24,437	$349
Waveland	6	0/0	$332,971	$4,757
Unincorporated Area	38	0/14	$78,597,377	$1,122,820
Harrison County	87	6/81	$281,748,851	$4,084,317
Biloxi	9	0/0	$227,157	$3,292
D'Iberville	2	0/0	$10,490	$152
Gulfport	14	0/0	$375,720	$5,445
Long Beach	4	0/0	$71,415	$1,035
Pass Christian	4	0/0	$100,000	$1,449
Unincorporated Area	63	6/81	$280,964,069	$4,071,943
Jackson County	82	1/20	$8,551,011	$133,610
Gautier	2	0/0	$153,507	$2,399
Moss Point	5	0/0	$0	$0
Ocean Springs	8	0/0	$118,939	$1,858
Pascagoula	9	0/1	$347,885	$5,436
Unincorporated Area	58	1/19	$7,930,682	$123,917
Pearl River County	61	0/37	$9,505,431	$144,022
Picayune	4	0/0	$189,531	$2,872
Poplarville	14	0/1	$287,680	$4,359
Unincorporated Area	43	0/36	$9,028,220	$136,791
Stone County	22	0/5	$1,799,664	$26,082
Wiggins	7	0/0	$134,091	$1,943
Unincorporated Area	15	0/5	$1,665,573	$24,139
MEMA DISTRICT 9 REGIONAL TOTAL	283	7/171	$385,467,116	$5,605,093

Source: National Center for Environnemental Information

<u>PROBABILITY OF FUTURE OCCURRENCES</u>

According to historical information, tornado events pose a significant threat to the MEMA District 9 Region. The probability of future tornado occurrences affecting MEMA District 9 Region is highly likely (100 percent annual probability).

WINTER WEATHER

BACKGROUND

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Events may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Some winter storms might be large enough to affect several states, while others might affect only localized areas. Occasionally, heavy snow might also cause significant property damages, such as roof collapses on older buildings.

All winter storm events have the potential to present dangerous conditions to the affected area. Larger snowfalls pose a greater risk, reducing visibility due to blowing snow and making driving conditions treacherous. A heavy snow event is defined by the National Weather Service as an accumulation of 4 of more inches in 12 hours or less. A blizzard is the most severe form of winter storm. It combines low temperatures, heavy snow, and winds of 35 miles per hour or more, which reduces visibility to a quarter mile or less for at least 3 hours. Winter storms are often accompanied by sleet, freezing rain, or an ice storm. Such freeze events are particularly hazardous as they create treacherous surfaces.

Ice storms are defined as storms with significant amounts of freezing rain and are a result of cold air damming (CAD). CAD is a shallow, surface-based layer of relatively cold, stably-stratified air entrenched against the eastern slopes of the Appalachian Mountains. With warmer air above, falling precipitation in the form of snow melts, then becomes either super-cooled (liquid below the melting point of water) or re-freezes. In the former case, super-cooled droplets can freeze on impact (freezing rain), while in the latter case, the re-frozen water particles are ice pellets (or sleet). Sleet is defined as partially frozen raindrops or refrozen snowflakes that form into small ice pellets before reaching the ground. They typically bounce when they hit the ground and do not stick to the surface. However, it does accumulate like snow, posing similar problems and has the potential to accumulate into a layer of ice on surfaces. Freezing rain, conversely, usually sticks to the ground, creating a sheet of ice on the roadways and other surfaces. All of the winter storm elements – snow, low temperatures, sleet, ice, etcetera – have the potential to cause significant hazard to a community. Even small accumulations can down power lines and trees limbs and create hazardous driving conditions. Furthermore, communication and power may be disrupted for days.

LOCATION AND SPATIAL EXTENT

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. The MEMA District 9 Region is not accustomed to severe winter weather conditions and rarely receives severe winter weather, even during the winter months. Events tend to be mild in nature; however, even relatively small accumulations of snow, ice, or other wintery precipitation can lead to losses and damage due to the fact that these events are not commonplace. Given the atmospheric nature of the hazard, the entire region has uniform exposure to a winter storm.

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, there have been a total of 33 recorded winter storm events in the MEMA District 9 Region since 1996. These events did not result in any property damage A summary of these events is presented in Table 39. Detailed information on the recorded winter storm events can be found in the county-specific annexes.

Table 39 SUMMARY OF WINTER STORM EVENTS IN THE MEMA DISTRICT 9 REGION

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
George County	4	0/0	$0	$0
Hancock County	6	0/0	$0	$0
Harrison County	6	0/0	$0	$0
Jackson County	6	0/0	$0	$0
Pearl River County	6	0/0	$0	$0
Stone County	5	0/0	$0	$0
MEMA DISTRICT 9 REGION TOTAL	33	0/0	$0	$0

Source: National Center for Environmental Information

There have been several severe winter weather events in the MEMA District 9 Region. The text below describes three of the major events and associated impacts on the region. Similar impacts can be expected with severe winter weather.

December 2004

A mixture of sleet and snow fell off and on during much of Christmas day resulting in a dusting to one half inch of accumulation across much of southwest, south, and coastal Mississippi. Although not heavy, accumulation of ice and snow in coastal Mississippi is unusual and the winter weather impacted transportation. The mixture of sleet and snow caused a number of bridges and overpasses to become icy which resulted in some traffic accidents and closure of some the elevated roadways.

December 2008

A rare and widespread snowfall occurred across much of south Mississippi, beginning early in the morning of December 11th and continuing until around the noon hour, as an unusually strong and cold upper level storm system moved across the region. The snow, which was occasionally heavy, affected all but the coastal areas of south Mississippi. Snowfall amounts of 2 to 3 inches were common in this area; however, up to 6 inches of snow was reported in western Pearl River County.

February 2010

An area of low pressure moved across the north central Gulf. Heavy rain changed over to snow across portions of the central gulf coast as the low moved to the east. Snowfall accumulations ranged from a dusting to as much as 4 inches across interior southeast Mississippi. Broadcast media reported 3 inches of snow on cars in Lucedale. The emergency manager reported 1 inch of snow across Stone County. Some power outages were also reported.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

January 2018
Another winter weather event occurred across the area on the 16th into the 17th across the Gulf Coast. This marks only the 2nd time in recorded history that two measurable snow events occurred in one winter in Mobile. With low temperatures in the 20s, the winter accumulation resulted in very hazardous traveling conditions, particularly over bridges and overpasses. Several roads were closed throughout the area. Total snow amounts of 1 inch in Bexley and 1 inch in Lucedale.

Probability of Future Occurrences
Winter storm events will continue to occur in the MEMA District 9 Region. Based on historical information, the probability is likely (between 10 and 100 percent annual probability).

OTHER HAZARDS

CLIMATE CHANGE/SEA LEVEL RISE

BACKGROUND

CLIMATE CHANGE

According to the Environmental Protection Agency (EPA), climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer.

The National Climate Assessment (2014) is a report on climate change in the United States that has been developed to increase understanding of the impacts of climate change throughout the country, with specific focus on regional effects and outcomes. The report is based on a wealth of information and data analysis, evaluating both past trends and future projections related to changes in our climate. Much of the data indicates that the primary factor in altering the global climate is greenhouse gas emissions from human activities.

The MEMA District 9 Region appears to be fundamentally changing due to climate change which has resulted in more violent storms, higher temperatures, and changes in precipitation leading to increased drought and/or flood risk. These changes are expected to continue in the foreseeable future for the region at-large. Primary public health concerns as a result of climate change impacts in the Southeast include a number of potential impacts such as the urban heat island effect upon city residents and outdoor workers, heat-related issues for rural workers (primarily farmworkers), increased health risks to the elderly and other vulnerable populations in both rural and urban communities, and impacts to local ecosystems that can have widespread effects on human health.

Additional data is provided within each participating county annex associated with climate change. Data provided via Neighborhoods at Risk pertaining to temperature and precipitation 70 year projections are provided within each annex.

SEA LEVEL RISE

Sea Level Rise is defined as the mean rise in sea level. It is caused by two factors: 1) as the ocean warms, sea water expands in volume and 2) continental ice shelves melt, increasing the amount of water in the oceans. This leads to a greater area of land being inundated by sea water.

Rising sea level contributes to the loss of coastal wetlands (which provide protective buffers from flood events), beach erosion, impacts on population and property in low areas, and disruption of coastal habitats and species. Further, flooding and hurricane events are more severe and affect a greater area.

Given that 600 million people live in an area that is less than 10 meters or 33 feet above sea level and the coastal population has doubled in the last 50 years, there is a great vulnerability to sea level rise.

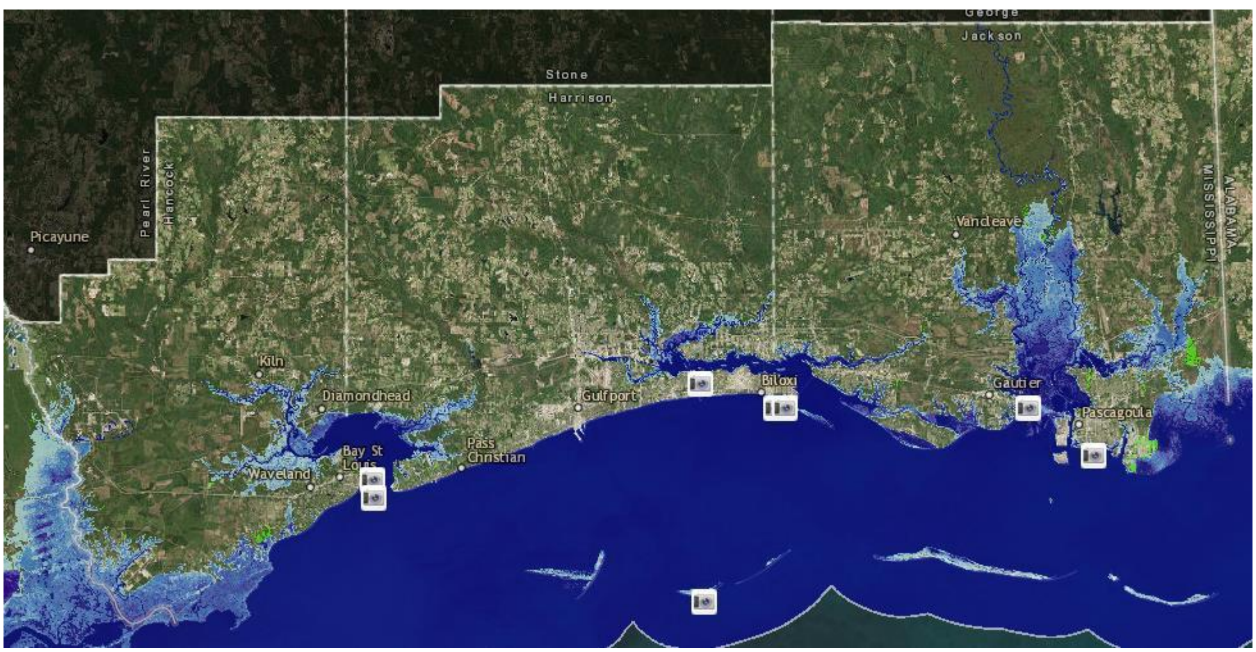
<u>Location and Spatial Extent</u>
CLIMATE CHANGE

Climate change can have direct implications on many of the other hazards addressed in this plan since it has the potential to alter the nature and frequency of hazards, including increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, strong storms (wind, hurricane). Therefore, it is assumed that the MEMA District 9 Region is uniformly exposed to this hazard.

SEA LEVEL RISE

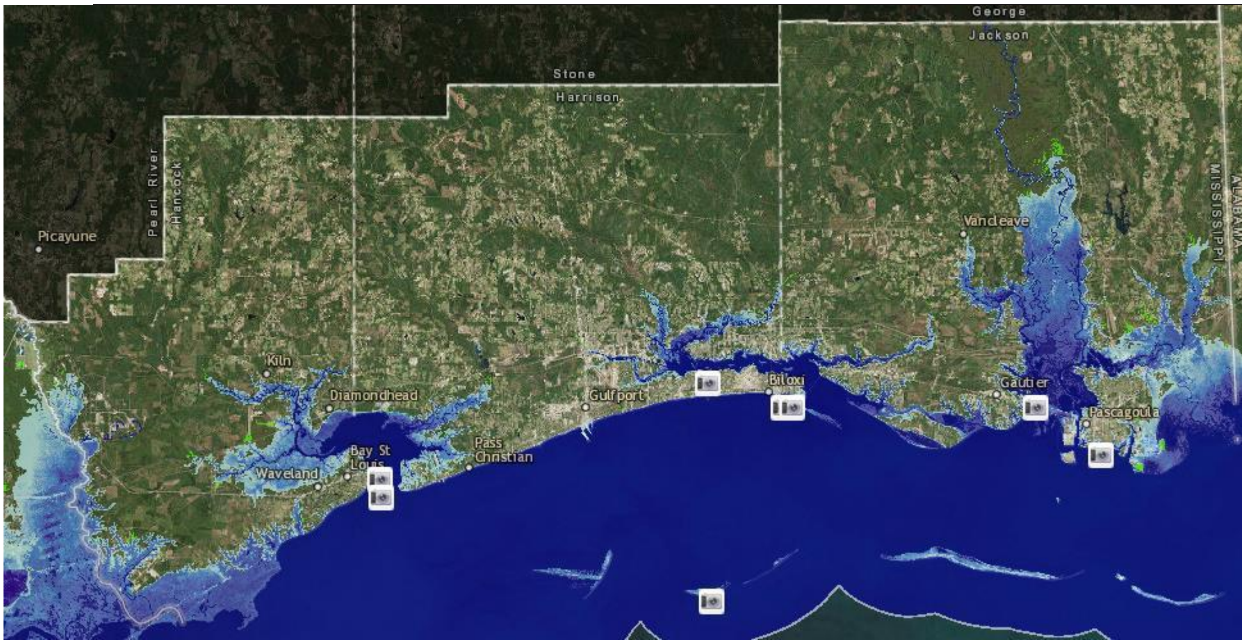
Sea level rise is occurring at a global scale. However, it does not affect areas uniformly and will be more severe in some places. Figure 5.26 identifies areas in MEMA District 9 that would be inundated by water as a result of three feet in sea level rise as per projections by NOAA. The highest level of sea level rise projected by NOAA is shown in Figure 5.27. This figure shows the inundation areas in the case of six feet of sea level rise. This demonstrates the additional areas that would be impacted beyond the three feet scenario.

Figure 38 THREE FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

Figure 41 SIX FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

Historical Occurrences

CLIMATE CHANGE

According to the National Climate Assessment, there have been increasing numbers of days above 95ºF and nights above 75ºF, and decreasing numbers of extremely cold days since 1970 in the Southeast. Daily and five-day rainfall intensities have also increased and summers have been either increasingly dry or extremely wet. The number of Category 4 and 5 hurricanes in the Atlantic basin has increased substantially since the early 1980s compared to the historic record that dates back to the mid-1880s. This can be attributed to both natural variability and climate change.

SEA LEVEL RISE

Sea level rise is a slow-onset hazard and specific events/occurrences are not possible to determine.

Probability of Future Occurrences

CLIMATE CHANGE

According to the National Climate Assessment, temperatures across the Southeast are expected to increase during this century, with shorter-term (year-to-year and decade-to-decade) fluctuations over time due to natural climate variability. Major consequences of warming include significant increases in the number of hot days (95ºF or above) and decreases in freezing events. Regional average increases are in the range of 4ºF to 8ºF by the year 2100.

Projections of future precipitation patterns are less certain than projections for temperature increases. Because the Southeast is located in the transition zone between projected wetter conditions to the north and drier conditions to the southwest, many of the model projections show only small changes relative to natural variations. Additionally, projections further suggest that warming will cause tropical storms to be fewer in number globally, but stronger in force, with more Category 4 and 5 storms, and substantial further increases in extreme precipitation are projected as this century progresses.

Overall, future climate change is considered likely (between 10 and 100 percent annual probability).

SEA LEVEL RISE

There is still much debate regarding the probability of future occurrence of sea level rise. This section will be updated as more information becomes available. Future sea level rise is considered likely (between 10 and 100 percent annual probability).

HAZARDOUS MATERIALS INCIDENT/TRAIN DERAILMENT

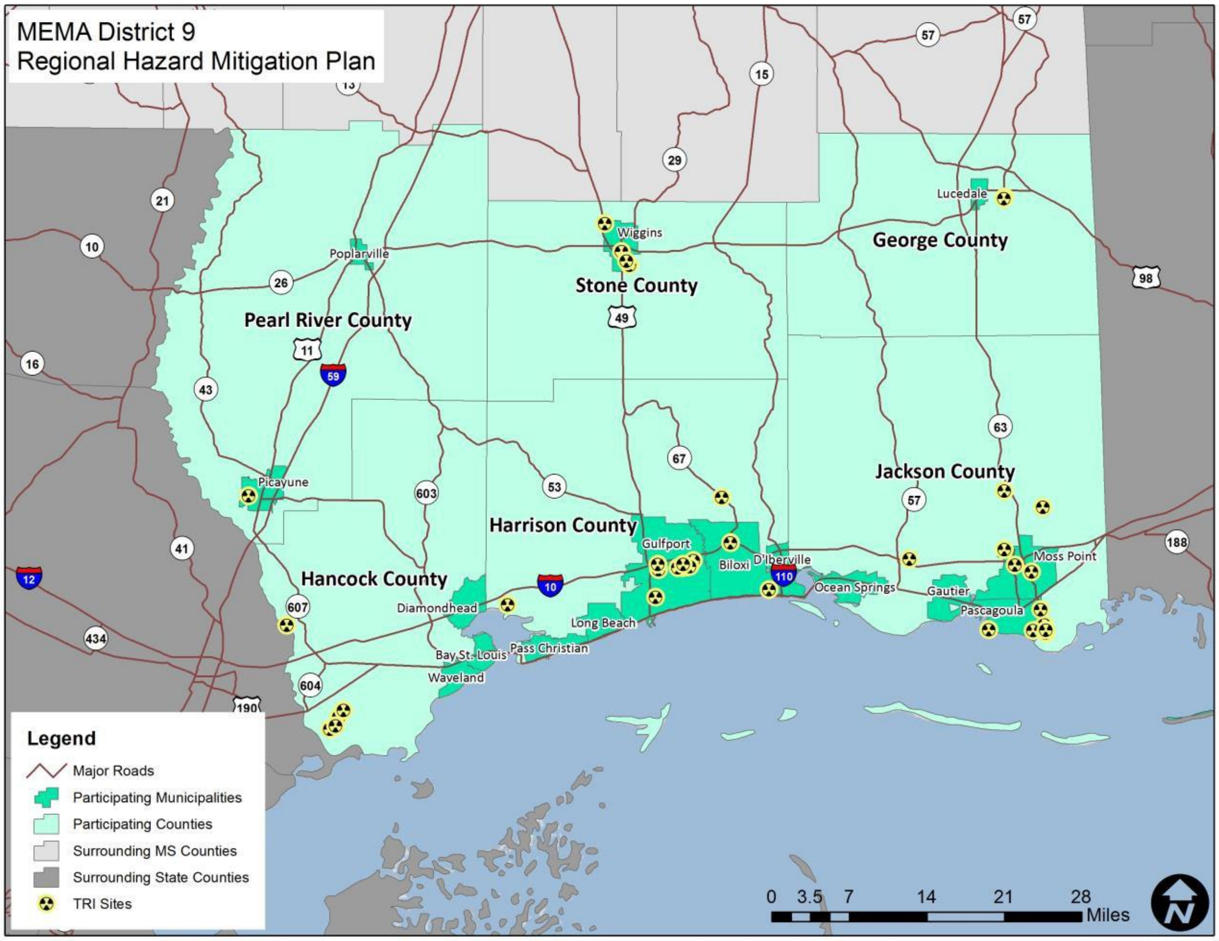
Background
Hazardous materials can be found in many forms and quantities that can potentially cause death; serious injury; long-lasting health effects; and damage to buildings, homes, and other property in varying degrees. Such materials are routinely used and stored in many homes and businesses and are also shipped daily on the nation's highways, railroads, waterways, and pipelines. This subsection on the hazardous material hazard is intended to provide a general overview of the hazard, and the threshold for identifying fixed and mobile sources of hazardous materials is limited to general information on rail, highway, and fixed HAZMAT sites determined to be of greatest significance as appropriate for the purposes of this plan.

Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation- related accidents in the air, by rail, on the nation's highways, and on the water. Approximately 6,774 HAZMAT events occur each year, 5,517 of which are highway incidents, 991 are railroad incidents, and 266 are due to other causes. In essence, HAZMAT incidents consist of solid, liquid, and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and possibly wildlife as well.

Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace with respect to claims which such persons may assert against the employer of such persons; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel or pipeline pumping station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and
(4) the normal application of fertilizer.

Location and Spatial Extent
As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the Environmental Protection Agency provides public information on hazardous materials. One facet of this program is to collection information from industrial facilities on the releases and transfers of certain toxic agents. This information is then reported in the Toxic Release Inventory (TRI). TRI sites indicate where such activity is occurring. The MEMA District 9 Region has 38 TRI sites. These sites are shown in Figure 5.28.

Figure 42 TOXIC RELEASE INVENTORY(TRI) SITES IN THE MEMA DISTRICT 9 REGION



Source: Environmental Protection Agency

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the region via roadways and railways. Many roads and railways in the region are subject to hazardous materials transport and all roads and railways that permit hazardous material transport are considered potentially at risk to an incident.

<u>Historical Occurrences</u>

The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) lists historical occurrences throughout the nation. A "serious incident" is a hazardous materials incident that involves:

- a fatality or major injury caused by the release of a hazardous material,
- the evacuation of 25 or more persons as a result of release of a hazardous material or exposure to fire,
- a release or exposure to fire which results in the closure of a major transportation artery,
- the alteration of an aircraft flight plan or operation,
- the release of radioactive materials from Type B packaging,t
- the release of over 11.9 galls or 88.2 pounds of a severe marine pollutant, or
- the release of a bulk quantity (over 199 gallons or 882 pounds) of a hazardous material.

However, prior to 2002, a hazardous materials "serious incident" was defined as follows:

- a fatality or major injury due to a hazardous material,
- closure of a major transportation artery or facility or evacuation of six or more persons due to the presence of hazardous material, or
- a vehicle accident or derailment resulting in the release of a hazardous material.

There have been a total of 473 recorded HAZMAT incidents in the MEMA District 9 Region since 1971. These events resulted in over $2.1 million in property damage as well as 5 fatalities and 21 injuries. Table 5.31 summarizes the HAZMAT incidents in the MEMA District 9 Region as reported by PHMSA. Detailed information on these events is presented in the county-specific annexes.

Table 40: SUMMARY OF HAZMAT INCIDENTS IN THE MEMA DISTRICT 9 REGION

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
George County	11	0/0	$101,050	$3,866
Lucedale	6	0/0	$10,174	$231
Unincorporated Area	5	0/0	$90,876	$3,635
Hancock County	25	0/4	$274,757	$8,313
Bay St. Louis	6	0/0	$101,364	$2,599
Diamondhead	2	0/0	$57	$2
Waveland	6	0/1	$131,053	$4,680
Unincorporated Area	11	0/3	$42,283	$1,031
Harrison County	226	5/1	$327,215	$11,489
Biloxi	28	5/0	$53,210	$1,182
D’Iberville	0	0/0	$0	$0
Gulfport	182	0/1	$94,524	$2,148
Long Beach	7	0/0	$0	$0
Pass Christian	4	0/0	$179,481	$8,158
Unincorporated Area	5	0/0	$0	$0
Jackson County	176	0/15	$1,032,007	$25,777
Gautier	10	0/0	$5,556	$142
Moss Point	31	0/3	$509,186	$13,762
Ocean Springs	13	0/5	$231,373	$5,509
Pascagoula	119	0/7	$284,357	$6,319
Unincorporated Area	3	0/0	$1,535	$45
Pearl River County	25	0/1	$315,368	$7,961
Picayune	11	0/1	$142,745	$3,660
Poplarville	1	0/0	$14,168	$616
Unincorporated Area	13	0/0	$158,455	$3,685
Stone County	10	0/0	$83,926	$2,997
Wiggins	8	0/0	$26	$1
Unincorporated Area	2	0/0	$83,900	$2,996
MEMA DISTRICT 9 REGIONAL TOTAL	473	5/21	$2,134,323	$60,403

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

<u>Probability of Future Occurrence</u>

Given the location of almost 40 toxic release inventory sites in the MEMA District 9 Region and prior roadway and railway incidents, it is highly likely (100 percent annual probability) that a hazardous material incident may occur in the region. County and city officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

INFECTIOUS DISEASE

Background

Communicable, or infectious, diseases are conditions that result in clinically evident illness which are transmissible directly from one person to another or indirectly through vectors such as insects, air, water, blood, or other objects. The impact of communicable disease can range from the mild effects of the common cold to the extreme lethality of pneumonic plague or anthrax. The public health system in the United States was developed in large part as a response to the often urgent need to respond to or prevent outbreaks of communicable diseases. Through public health methods of disease reporting, vaccinations, vector control, and effective treatments, most communicable diseases are well controlled in the United States and the MEMA District 9 Region. However, control systems can fail and when people come together from locations outside of the county, state, and the country, outbreaks can occur, even in the most modern of communities. In this section, some of the more significant potential communicable disease concerns are described.

The threats discussed in this section usually do not occur on a regular basis, though some are more frequent. The diseases described herein do not originate from intentional exposure (such as through terrorist actions) but do present significant issues and concerns for the public health community. There are numerous infectious diseases that rarely, if ever, occur in the MEMA District 9 Region, such as botulism or bubonic plague. Some highly dangerous diseases which could potentially be used as biological weapons, such as anthrax, pneumonic plague, and smallpox, are safely housed and controlled in laboratory settings such as at the Center for Disease Control and Prevention (CDC). Other diseases have not (yet) mutated into a form that can infect humans, or otherwise lie dormant in nature.

There have been several significant viral outbreaks from emerging diseases in recent years of both national and international importance. The Zika virus and West Nile virus are viruses that are typically passed to humans or animals by mosquitoes and made major news as emergent disease threats. Meanwhile, diseases that are spread directly between human beings such as Severe Acute Respiratory Syndrome (SARS) and Ebola have also been identified as serious threats. While each of these conditions caused a great deal of public health concern when they were first identified, SARS has virtually disappeared, West Nile virus occurs with low frequency and causes serious disease in only a very small percentage of cases, Ebola has been more or less contained and a vaccine is in development, and many people infected with Zika will not experience symptoms from the disease.

Other communicable diseases pose a much more frequent threat to the residents of the MEMA District 9 Region. Some of the infectious diseases of greatest concern include influenza, particularly in a pandemic form, as well as norovirus, and multiple antibiotic-resistant tuberculosis. Even in one of its normal year-to-year variants, influenza (commonly referred to as “flu”) can result in serious illness and even death in young children, the elderly and immune-compromised persons. But there is always the potential risk of the emergence of influenza in one of the pandemic H1N1 forms, such as in the “Spanish Flu” outbreak of 1918-19, which killed over 50 million people worldwide. Every year, the MEMA District 9 Region sees hundreds of cases of influenza, leading to hundreds of hours of lost productivity in businesses due to sick employees. Of note, a vaccine for influenza is produced every year and, according to the CDC, is highly effective in preventing the disease.

Norovirus is recognized as the leading cause of foodborne-disease outbreaks in the United States. The virus can cause diarrhea, vomiting, and stomach pain, and is easily spread from person to person through contaminated food or water and by surface to surface contact. Especially vulnerable populations to this virus include those living or staying in nursing homes and assisted living facilities and other healthcare facilities such as hospitals. Norovirus could also be a threat in the event of large public gatherings such as sporting events, concerts, festivals, and so forth. The MEMA

District 9 Region and the State of Mississippi often experience norovirus outbreaks on an annual basis. No vaccine or treatment exists for the Norovirus, making it especially dangerous for the public in the event of an outbreak.

Public health threats can occur at any time and can have varying impacts. Discussions between public health professionals, planning officials, and first response agencies are essential in order to facilitate safe, effective, and collaborative efforts toward outbreaks.

The Coronavirus (COVID-19) global pandemic impacted MEMA District 9 in many of the same ways that it impacted the entire world, with devastating impacts to health and safety along with severe interruptions to daily life. Table 41 provides a summary of impacts from the number of cases and reported deaths associated with the pandemic.

Table 41:14 SUMMARY OF COVID-19 CASES/DEATHS IN THE MEMA DISTRICT 9 REGION

Location	Number of Cases	Deaths
George County	8,780	92
Hancock County	14,973	163
Harrison County	66,104	714
Jackson County	45,938	503
Pearl River County	17,821	289
Stone County	6,731	82
MEMA District 9	**160,347**	**1,843**

Source: Johns Hopkins University

Location and Spatial Extent

Due to the nature of a public health/emerging disease threat, it is difficult to identify a precise location where this type of event would occur. Moreover, a large-scale event would have impacts that spread throughout the region. Therefore, all areas in the MEMA District 9 Region are considered equally susceptible to infectious diseases.

Occurrences Historical

Mosquito-borne illness in Mississippi include West Nile virus, Chikungunya virus, and Zika virus. These illnesses affect birds, animals, and humans, causing flu-like symptoms in people who are bitten by infected mosquitoes. Occasionally illness can be severe, leading to meningitis or encephalitis. According to the Mississippi State Department of Health (MSDH), there have been two reported cases of West Nile Virus and two reported cases of Zika in the MEMA District 9 Region as of November 2016 but none of these cases resulted in death. Table 42 summarizes the mosquito-borne illnesses in humans reported in the region.

Table 42: SUMMARY OF MOSQUITO-BORNE ILLNESSES IN THE MEMA DISTRICT 9 REGION

Location	West Nile Virus	Chikungunya	Zika	Other*	Deaths
George County	1	0	0	0	0
Hancock County	0	0	0	0	0
Harrison County	0	0	2	0	0
Jackson County	1	0	0	0	0
Pearl River County	0	0	0	0	0
Stone County	0	0	0	0	0
MEMA DISTRICT 9 REGION TOTAL	2	0	2	0	0

*Other mosquito-borne illnesses include La Crosse encephalitis, St. Louis encephalitis, and Eastern Equine encephalitis.
Source: Mississippi State Department of Health

As stated previously, diseases like influenza and norovirus are regularly occurring health issues in the MEMA District 9 Region. These conditions are not legally reportable to county or state public health agencies, so data on disease incidence is not readily available. MSDH relies upon selected sentinel health practitioners across the state to report the percentage and total patient visits consistent with an influenza-like illness (ILI): fever of 100°F or higher and cough or sore throat. Reports are used to estimate the state's ILI rate and the magnitude of state's influenza activity on a weekly basis. Reports represent only the distribution of flu in the state, not an actual count of all flu cases statewide.

Probability of Future Occurrences

Due to some recent incidents that have been recorded across the State of Mississippi and in the MEMA District 9 Region, future occurrences are considered possible (between 1 and 10 percent annual probability).

CONCLUSIONS ON HAZARD RISK

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

Hazard Extent

Table 43 describes the extent of each hazard identified for the MEMA District 9 Region. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

Dam and	

Flood-related Hazards	
Dam and Levee Failure	classifications which include Low, Significant, and High. Seven dams are classified as high- hazard in the MEMA District 9 Region. George County: 0 high hazard dams Hancock County: 1 high hazard dam Harrison County: 1 high hazard dam Jackson County: 1 high hazard dam Pearl River County: 3 high hazard dams Stone County: 1 high hazard dam

Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. Some areas of the barrier islands are eroding at 6 to 8 meters per year in the MEMA District 9 Region according to the USGS Coastal and Marine Geology Program's U.S. Gulf of Mexico Interactive Map.
Flood	Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest flood recorded for the region was at Jourdan River near Kiln in Hancock County. The maximum historic crest was recorded at 19.97 feet, or 9.97 feet above the major flood stage (reported on August 29, 2005). Additional historic crest heights and the corresponding flood categories are in the table below.

Location/ Jurisdiction	Date	Maximum Historic Crest (ft)	Flood categories			
			Action Stage (ft)	Flood Stage (ft)	Moderate Flood Stage (ft)	Major Flood Stage (ft)
George County						
PASCAGOULA RIVER AT MERRILL	April 1, 1900	32.50	12.5	22	25	32
ESCATAWPA RIVER NEAR AGRICOLA	n/a	n/a	16	18	n/a	n/a
Hancock County						
JOURDAN RIVER AT KILN	8/29/2005	19.97	5	6	8	10
Harrison County						
BILOXI RIVER NEAR WORTHAM	5/9/1995	28.94	16	16	18	23
WOLF RIVER NEAR LANDON	8/31/2012	31.31	26	27	28	30
BILOXI RIVER NEAR LYMAN	5/10/1995	20.95	10	12	16	18
TCHOUTACABOUFFA RIVER NEAR D IBERVILLE	9/30/1998	19.00	8	8	15	18
WOLF RIVER ABOVE GULFPORT	9/1/2012	16.50	7	8	12	15
Jackson County						
PASCAGOULA RIVER AT GRAHAM FERRY	2/28/1961	20.10	15	16	18	20
ESCATAWPA RIVER ABOVE ORANGE GROVE	9/28/1998	11.90	6	8	12	15
Pearl River County						
WEST HOBOLOCHITTO CREEK NEAR MCNEILL	7/5/1916	29.96	12	15	18	20

	EAST HOBOLOCHITTO CREEK NEAR CAESAR	9/2/2012	21.53	12	15	17	20
	Stone County						
	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Storm Surge	Storm surge can be defined by the depth of inundation which is defined by the category of hurricane/tropical storm. Since the MEMA District 9 Region could easily be impacted by a Category 3 storm, depth of inundation could be at least 9 feet in many areas.						

Drought	Drought extent is defined by the U.S. Drought Monitor classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought. According to the U.S. Drought Monitor classifications, the most severe drought condition is Exceptional. All of the participating counties have received this ranking twice over the 17-year reporting period.
Lightning	According to the Vaisala's flash density map, the MEMA District 9 Region is located in an area that experiences 4 to 12 and up lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Wildfire	Wildfire data was provided by the Mississippi Forestry Commission and is reported annually by county from 2007-2022. The greatest number of fires in one year occurred in Pearl River County and the greatest number of acres burned in year occurred in Jackson County. Information on specific occurrences of wildfire and the most severe fires in each jurisdiction is not available. Analyzing the data by county indicates the following wildfire hazard extent for each county. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible. George County The greatest number of fires to occur in any year was 79 in 2007. The great number of acres to burn in a single year occurred in 2007 when 789 acres were burned. Hancock County The greatest number of fires to occur in any year was 181 in 2009. The great number of acres to burn in a single year occurred in 2011 when 3,921 acres were burned. Harrison County The greatest number of fires to occur in any year was 185 in 2011. The great number of acres to burn in a single year occurred in 2011 when 4,744 acres were burned. Jackson County The greatest number of fires to occur in any year was 161 in 2011. The great number of acres to burn in a single year occurred in 2016 when 5,020 acres were burned.

	Pearl River County The greatest number of fires to occur in any year was 199 in 2011. The great number of acres to burn in a single year occurred in 2011 when 4,118 acres were burned. Stone County The greatest number of fires to occur in any year was 58 in 2011 and 2015. The great number of acres to burn in a single year occurred in 2016 when 690 acres were burned.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale, the Modified Mercalli Intensity (MMI) scale, and the distance of the epicenter from the MEMA District 9 Region. According to data provided by the National Center for Environmental Information, the greatest earthquake to impact the region had an MMI of V (slightly strong) and a correlating Richter Scale magnitude estimated at less than 4.8 (reported on February 2, 1955). The epicenter of this earthquake was located 2.0 km away. George County: None reported Hancock County: MMI of IV; estimated magnitude less than 4.8; 57.0 km to epicenter Harrison County: MMI of V; estimated magnitude less than 4.8; 2.0 km to epicenter Jackson County: None reported Pearl River County: None reported Stone County: None reported
Wind-related Hazards	
Extreme Cold	The extent of extreme cold can be defined by the minimum temperature reached. Official long term temperature records are not kept for any locations in the MEMA District 9 Region. However, the temperature has previously ranged from 15 to 20 degrees Fahrenheit in southwest and coastal Mississippi (reported on December 18, 1996).
Extreme Heat	The extent of extreme heat can be measured by the record high temperature recorded. Official long term temperature records are not kept for any locations in the MEMA District 9 Region. However, the highest recorded temperature in Beaumont (north of the region) was 105°F and heat index values were recorded as high as 115°F (reported in July 2000).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in the MEMA District 9 Region was 3.00 inches (reported on April 19, 1965). It should be noted that future events may exceed this. George County: 2.00 inches Hancock County: 1.75 inches Harrison County: 2.75 inches Jackson County: 3.00 inches Pearl River County: 1.75 inches Stone County: 2.00 inches

Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5. The greatest classification of hurricane to traverse directly through the MEMA District 9 Region was Hurricane Camille, which was a Category 3 hurricane when it passed through the region. George County: Hurricane Frederic, Category 3 (97 knots) Hancock County: Hurricane Camille, Category 3 (100 knots) Harrison County: Hurricane Elena, Category 2 (93 knots) Jackson County: Hurricane Frederic, Category 3 (97 knots) Pearl River County: Hurricane Camille, Category 3 (100 knots)
	Stone County: Unnamed 1855 Storm, Category 2 (93 knots)
Severe Thunderstorm/ High Wind	Thunderstorm extent is defined by the wind speeds reported. The strongest recorded wind event in the MEMA District 9 Region was 85 knots (reported on June 11, 2001). It should be noted that future events may exceed these historical occurrences. George County: 85 knots Hancock County: 61 knots Harrison County: 80 knots Jackson County: 65 knots Pearl River County: 84 knots Stone County: 78 knots
Tornado	Tornado hazard extent is measured by the Fujita/Enhanced Fujita Scale. The greatest magnitude reported was an F3 (last reported on May 19, 1980). George County: F3 Hancock County: F3 Harrison County: F3 Jackson County: EF2 Pearl River County: EF3 Stone County: EF2
Winter Weather	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest snowfall reported in the MEMA District 9 Region was 6 inches (reported on December 11, 2008). George County: 3 inches Hancock County: 1-2 inches Harrison County: 1-2 inches Jackson County: 1-2 inches Pearl River County: 6 inches Stone County: 1 inch
Other Hazards	
Climate Change/Sea Level Rise	It is still uncertain what the extent of climate change will be in the future. However, increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, stronger storms (wind, hurricanes) can be expected. Sea level rise is defined by the areas impacted, but is more often associated with the amount of sea level rise that is expected to take place. Although it is difficult to predict an exact amount of rise, the Climate Change Surging Seas Report intermediate high sea level rise scenario projects 1 foot of rise locally by 2050 and 3.7 feet by 2100.

Hazardous Materials Incident/Train Derailment	According to USDOT PHMSA, the largest hazardous materials incident reported in the region was 96,000 LGA released on the railway (reported on April 13, 1980). It should be noted that larger events are possible. George County: 100 LGA Hancock County: 4,800 LGA Harrison County: 750 LGA Jackson County: 12,692 GCF Pearl River County: 96,000 LGA Stone County: 300 LGA
Infectious Disease	An infectious disease threat could have large-scale effects throughout the region and may cause illness in many people. Possible impacts from a disease threat depend largely on the impacted population, but might include anything from absenteeism and loss of productivity in the workplace to death or serious illness to humans or livestock. A serious disease threat could affect many thousands of people.

Priority Risk Index

In order to draw some meaningful planning conclusions on hazard risk for the MEMA District 9 Region, the results of the hazard profiling process were used to generate region-wide hazard classifications according to a "Priority Risk Index" (PRI). The purpose of the PRI is to categorize and prioritize all potential hazards for the MEMA District 9 Region as high, moderate, or low risk. Combined with the asset inventory and quantitative vulnerability assessment provided in the next section, the summary hazard classifications generated through the use of the PRI allows for the prioritization of those high hazard risks for mitigation planning purposes and, more specifically, the identification of hazard mitigation opportunities for the MEMA District 9 Region to consider as part of their proposed mitigation strategy.

The prioritization and categorization of identified hazards for the MEMA District 9 Region is based principally on the RI, a tool used to measure the degree of risk for identified hazards in a particular planning area. The RI is used to assist the MEMA District 9 Regional Hazard Mitigation Council in gaining consensus on the determination of those hazards that pose the most significant threat to the MEMA District 9 counties based on a variety of factors. The RI is not scientifically based, but is rather meant to be utilized as an objective planning tool for classifying and prioritizing hazard risks in the MEMA District 9 Region based on standardized criteria.

The application of the RI results in numerical values that allow identified hazards to be ranked against one another (the higher the RI value, the greater the hazard risk). RI values are assigned based on both qualitative and quantitative data analyses. The probability, Impact (magnitude) and Vulnerability factors were utilized in determining the qualitative portion of the analyses. This exercise was conducted via the in person jurisdictional workshops. The remaining elements of the RI tool were developed based on quantitative analyses throughout the planning process, the numbers were calculated based on weighted criteria defined in the full worksheet document associated with each participating county.

Priority Risk Index Results

Table 5.35 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Regional Hazard Mitigation Council. The results were then used in calculating PRI values and making final determinations for the risk assessment.

Table 25 SUMMARY OF RI RESULTS FOR MEMA DISTRICT 9 REGION

Hazard	George County Score	Hancock County	Harrison County Score	Jackson County Score	Pearl River County Score	Stone County Score	MEMA District 9 Score
Dam and Levee Failure	0	13	13	14	14	15	15
Erosion	13	69	43	56	52	28	67
Flood	77	84	84	84	84	77	84
Storm Surge	0	88	62	78	57	0	82
Drought	39	41	39	41	41	40	41
Lightning	59	64	52	67	67	59	67
Wildfire	56	65	40	57	61	39	60
Earthquake	10	11	11	11	11	11	11
Extreme Cold	16	22	27	19	38	46	38
Extreme Heat/Heat Wave	61	72	72	71	75	63	75
Hailstorm	17	30	31	30	30	27	30
Hurricane Tropical Storm	67	99	70	99	99	95	99
Severe Thunderstorm/High Wind	82	86	80	86	86	84	88
Tornado	77	89	78	85	60	58	85
Winter Weather	33	43	33	43	65	57	65
Climate Change/Sea Level Rise	11	61	19	57	57	28	57
HAZMAT/Train Derailment	18	34	17	36	17	17	17
Infectious Disease	23	28	27	27	53	51	53

For full rankings and methodologies please click the below links:

MEMAD9_District_RankingSpreadsheet.xls› GeorgeCounty_RankingSpreadsheet.xlsx HancockCounty_RankingSpreadsheet.xlsx HarrisonCounty_RankingSpreadsheet.xlsx JacksonCounty_RankingSpreadsheet.xlsx PearlRiverCounty_RankingSpreadsheet.xls› StoneCounty_RankingSpreadsheet.xlsx

FINAL DETERMINATIONS

The conclusions drawn from the hazard profiling process for the MEMA District 9 Region, including the PRI results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (Table 45). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of the MEMA District 9 Region. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately and is described in Section 6: Vulnerability Assessment. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

Table 45 CONCLUSIONS ON HAZARD RISK FOR THE MEMA DISTRICT 9 REGION

HIGH RISK	Hurricane and Tropical Storm Flood Severe Thunderstorm/High Wind Storm Surge Tornado Winter Weather Extreme Heat Erosion
MODERATE RISK	Hailstorm Extreme Cold Wildfire Drought Climate Change/Sea Level Rise Infectious Disease
LOW RISK	Lightning Hazardous Materials Incident/Train Derailment Dam and Levee Failure Erosion Earthquake

SECTION 6 VULNERABILITY ASSESSMENT

This section identifies and quantifies the vulnerability of the MEMA District 9 Region to the significant hazards identified in the previous sections (Hazard Identification and Profiles). It consists of the following subsections:

6.1 Overview
6.2 Methodology
6.3 Explanation of Data Sources
6.4 Asset Inventory
6.5 Vulnerability Assessment Results
6.6 Conclusions on Hazard Vulnerability

44 CFR Requirement
44 CFR Part 201.6(c)(2)(ii): The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. The description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; (B) An estimate of the potential losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

OVERVIEW

This section builds upon the information provided in Section 4: Hazard Identification and Section 5: Hazard Profiles by identifying and characterizing an inventory of assets in the MEMA District 9 Region. In addition, the potential impact and expected amount of damages caused to these assets by each identified hazard event is assessed. The primary objective of the vulnerability assessment is to quantify exposure and the potential loss estimates for each hazard. In doing so, the MEMA District 9 counties and their participating jurisdictions may better understand their unique risks to identified hazards and be better prepared to evaluate and prioritize specific hazard mitigation actions.

This section begins with an explanation of the methodology applied to complete the vulnerability assessment, followed by a summary description of the asset inventory as compiled for the MEMA District 9 Region. The remainder of this section focuses on the results of the assessment conducted.

METHODOLOGY

This vulnerability assessment was conducted using three distinct methodologies: (1) A stochastic risk assessment; (2) a geographic information system (GIS)-based analysis; and (3) a risk modeling software analysis. Each approach provides estimates for the potential impact of hazards by using a common, systematic framework for evaluation, including historical occurrence information provided in the Hazard Identification and Analysis sections. A brief description of the three different approaches is provided on the following pages.

Stochastic Risk Assessment

The stochastic risk assessment methodology was applied to analyze hazards of concern that were outside the scope of hazard risk models and the GIS-based risk assessment. This includes hazards that do not have geographically-definable boundaries and are therefore excluded from spatial analysis through GIS. A stochastic risk methodology was used for the following hazards:

- Erosion
- Drought
- Lightning
- Extreme Cold
- Extreme Heat
- Hailstorm
- Severe Thunderstorm/High Wind
- Tornado
- Winter Weather
- Infectious Disease

Many of the hazards listed above are considered atmospheric and thus have the potential to affect all buildings and all populations. For many of the hazards listed above, no additional analysis was performed due to an inability to differentiate particular buildings or populations that would be more vulnerable to that particular hazard. When possible, annualized loss estimates for these hazards were determined using the best available data on historical losses from sources including NOAA's National Center for Environmental Information records, previous MEMA District 9 county-level hazard mitigation plans, and local knowledge. Annualized loss is the estimated long-term weighted average value of losses to property in any single year in a specified geographic area (i.e., municipal jurisdiction or county). Annualized loss estimates were generated by totaling the amount of property damage over the period of time for which records were available, and calculating the average annual loss. Given the standard weighting analysis, losses can be readily compared across hazards providing an objective approach for evaluating mitigation alternatives.

For the erosion, drought, extreme cold, extreme heat, and infectious disease hazards no data with historical property damages was available. Therefore, annualized potential losses for these hazards are presumed to be negligible. All of the above hazards have the potential to impact the entire MEMA District 9 Region and generally cannot be well-defined geographically in terms of their impact areas. The results for these hazards are found near the end of this section in Table 6.17.

GIS-Based Analysis

Other hazards have specified geographic boundaries that permit additional using Geographic Information Systems (GIS). These hazards include:

- Dam and Levee Failure
- Flood
- Wildfire
- Climate Change/Sea Level Rise
- Hazardous Material Incident/Train Derailment

The objective of the GIS-based analysis was to determine the estimated vulnerability of critical facilities and populations for the identified hazards in the MEMA District 9 Region using best available geospatial data. Digital data was collected from local, regional, state, and national sources for hazards and buildings. Jurisdictions in the MEMA District 9 Region generally had readily available geospatial parcel or building footprint data. Despite the availability of this data for most communities, others lacked this detailed data. In these cases, the RHMC wanted to have some estimate of potential building and dollar losses, so Census block data was extracted from Hazus MH 3.2 that included building counts and estimated dollar values of property in the region. Additionally, geo-referenced point locations for identified assets (critical facilities and infrastructure, special populations, etc.) were identified from previous plans and updated by local officials. This information was used in the vulnerability analysis by overlaying spatial hazard risk data in ESRI® ArcGIS™ 10.3.1 to assess hazard vulnerability in terms of the local building data and critical assets described above.

Using these data layers, hazard vulnerability can be quantified by estimating the number and dollar value of buildings determined to be located in identified hazard areas. To estimate vulnerable populations in hazard areas, digital Census 2010 data by census tract was obtained. This was intersected with hazard areas to determine exposed. The results of the analysis provided an estimate of the amount of property and critical facilities determined to be potentially at risk to those hazards with delineable geographic hazard boundaries.

Risk Modeling Software Analysis

A risk modeling software was used for the following hazards:

- Earthquake
- Hurricane and Tropical Storm
- Storm Surge

There are several models that exist to model hazard risk. Hazus-MH was used in this vulnerability assessment to address the aforementioned hazards.

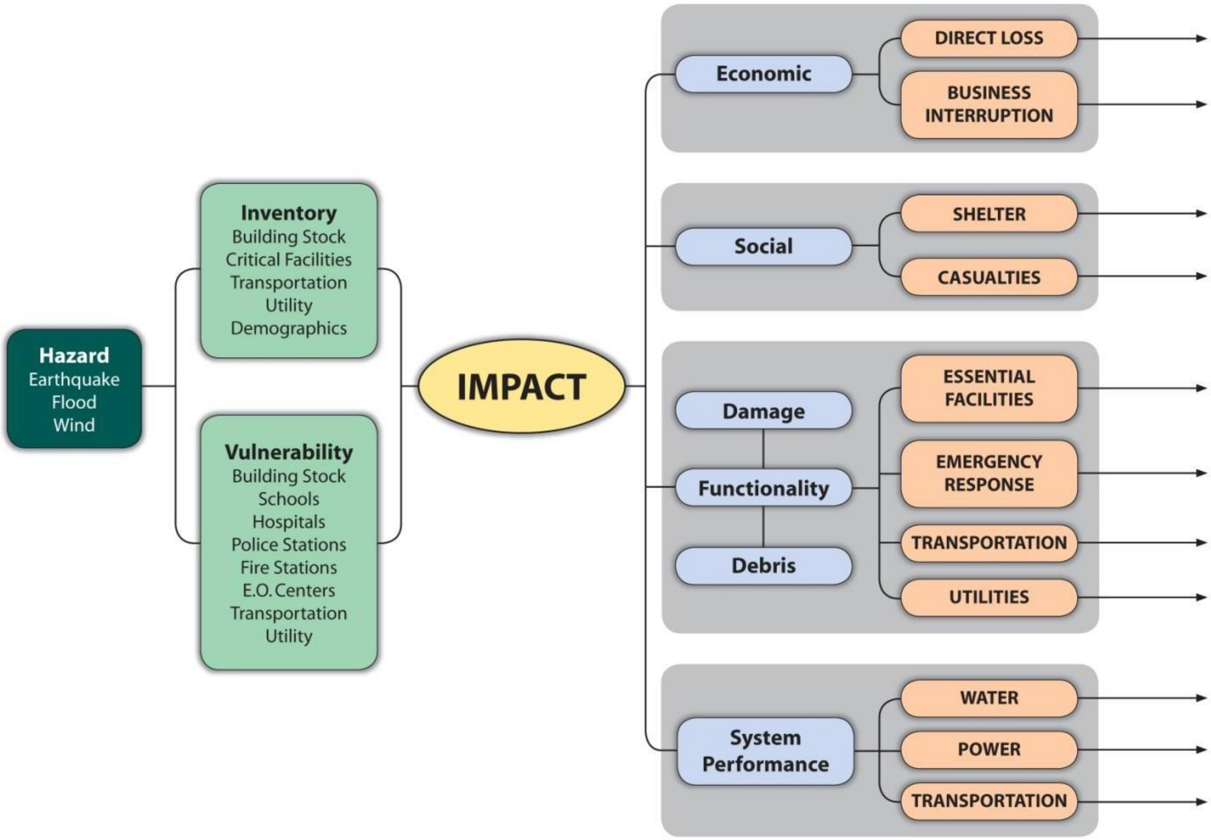
HAZUS-MH

Hazus-MH ("Hazus") is a standardized loss estimation software program developed by FEMA. It is built upon an integrated GIS platform to conduct analysis at a regional level (i.e., not on a structure-by-structure basis). The Hazus risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g., wind speed and building types) can be modeled using the software to determine the impact (i.e., damages and losses) on the built environment.

The MEMA District 9 Regional Risk Assessment utilized Hazus-MH to produce hazard damage loss estimations for hazards for the planning area. At the time this analysis was completed, Hazus-MH 3.2 was used to estimate potential damages from the hurricane winds, storm surge, and earthquake hazards using Hazus-MH methodology. Although the program can also model losses for flood, it was not used in this Risk Assessment due to availability of flood map data.

Figure 6.1 illustrates the conceptual model of the Hazus-MH methodology.

Figure 43 CONCEPTUAL MODEL OF HAZUS-MH METHODOLOGY



Hazus-MH is capable of providing a variety of loss estimation results. In order to be consistent with other hazard assessments, annualized losses are presented when possible. Some additional results based on location-specific scenarios may also be presented to provide a complete picture of hazard vulnerability.

Loss estimates provided in this vulnerability assessment are based on best available data and methodologies. The results are an approximation of risk. These estimates should be used to understand relative risk from hazards and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from approximations and simplifications that are necessary for a comprehensive analysis (e.g., incomplete inventories, non-specific locations, demographics, or economic parameters).

All conclusions are presented in “Conclusions on Hazard Vulnerability” at the end of this section.

EXPLANATION OF DATA SOURCES

FLOOD

FEMA Digital Flood Rate Insurance Maps (DFIRM) flood data was used to determine flood vulnerability. DFIRM data can be used in ArcGIS for mapping purposes, and they identify several features including floodplain boundaries and, in many cases, base flood elevations. Identified areas on the DFIRM represent some features of a Flood Insurance Rate Map including the 100-year flood areas (1.0-percent annual chance flood), the 500-year flood areas (0.2-percent annual chance flood). For the vulnerability assessment, local improved property data and critical facilities were overlaid on the 1.0-percent annual chance floodplains (ACF), 0.2-percent annual chance floodplains, and coastal VE zones for counties. It should be noted that such an analysis does not account for building elevation.

WILDFIRE

The data used to determine vulnerability to wildfire in the MEMA District 9 Region is based on GIS data called the Southern Wildfire Risk Assessment (SWRA). This data is available on the Southern Wildfire Risk Assessment website and can be downloaded and imported into ArcGIS. A specific layer, known as "Wildland Urban Interface Risk Index" (WUIRI) was used to determine vulnerability of people and property. The WUIRI is presented on a scale of 0 to -9. It combines data on housing density with the data on the impact and likelihood of a wildfire occurring in a specific area. The primary purpose of the data is to highlight areas of concern that may be conducive to wildfire impacting property. Due to assumptions made, it is not true probability. However, it does provide a comparison of risk throughout the region.

EARTHQUAKE

Hazus-MH 3.2 (as described above) was used to assess earthquake vulnerability. A level 1, probabilistic scenario to estimate average annualized loss was utilized. In this scenario, several return periods (events of varying intensities) are run to determine annualized loss. Default Hazus earthquake damage functions and methodology were used to determine the probability of damage. Results are calculated at the 2010 U.S. Census tract level in Hazus and presented at the county level.

HURRICANE AND TROPICAL STORM WIND

Hazus-MH 3.2 (as described above) was used to assess wind vulnerability. For the hurricane wind analysis, a probabilistic scenario was created to estimate the annualized loss damage in the MEMA District 9 Region. Default Hazus wind speed data, damage functions, and methodology were used in to determine the probability of damage for 100-, 500-, and 1,000-year frequency events (also known as a return period) in the scenario.

STORM SURGE

Hazus-MH 3.2 also allows for the modeling of impacts from storm surge on coastal communities along the Atlantic and Gulf Coasts. However, it should be noted that the storm surge model can only be run with a historic hurricane track model and cannot be run with the annualized loss tool. Therefore, the dollar damage estimates from storm surge modeling will not be consistent with estimates for other hazards (which are presented in terms of annualized loss). Additionally, losses from storm surge are presented by the model at an aggregate level with all other losses that are estimated for the historic event. That is to say, losses are a combination of hurricane winds and storm surge losses and could not be separated into how those losses were caused.

HAZARDOUS MATERIALS INCIDENT/TRAIN DERAILMENT

For the fixed hazardous materials incident analysis, Toxic Release Inventory (TRI) data was used. The Toxics Release Inventory is a publicly available database from the federal Environmental Protection Agency (EPA) that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded by the Pollution Prevention Act of 1990. Each year, facilities that meet certain activity thresholds must report their releases and other waste management activities for listed toxic chemicals to EPA and to their state or tribal entity. A facility must report if it meets the following three criteria:

The facility falls within one of the following industrial categories: manufacturing; metal mining; coal mining; electric generating facilities that combust coal and/or oil; chemical wholesale distributors; petroleum terminals and bulk storage facilities; RCRA Subtitle C treatment, storage, and disposal (TSD) facilities; and solvent recovery services;
Has 10 or more full-time employee equivalents; and
Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year. Persistent, bioaccumulative, and toxic (PBT) chemicals are subject to different thresholds of 10 pounds, 100 pounds, or 0.1 grams depending on the chemical.

For the mobile hazardous materials incident analysis, transportation data including major highways and railroads were obtained from the Federal Highway Administration's National Highway Planning Network and the United States Department of Transportation's Federal Railroad Administration, respectively. This data is ArcGIS compatible, lending itself to buffer analysis to determine risk.

DAM/LEVEE FAILURE

Dam inundation data was available in GIS format for several of the major dams in the region from the Mississippi Department of Environmental Quality. Although not all high hazard dams have inundation mapping, several of the major dams in the region are included in this data. With that in mind, analysis with this data should not be considered inclusive of every critical facility or structure that may be at risk to a dam or levee failure as the data is far from being complete.

CLIMATE CHANGE/SEA LEVEL RISE

The National Oceanic and Atmospheric Administration has produced sea level rise data that is available for download and which can be used for planning purposes to determine the inundation of areas along the coast based on various levels of sea level rise. These different scenarios can be used to visualize community-level impacts from coastal flooding or sea level rise (up to 6 feet above average high tides).

ASSET INVENTORY

An inventory of geo-referenced assets within the MEMA District 9 counties and jurisdictions was compiled in order to identify and characterize those properties potentially at risk to the identified hazards. By understanding the type and number of assets that exist and where they are located in relation to known hazard areas, the relative risk and vulnerability for such assets can be assessed. Under this assessment, two categories of physical assets were created and then further assessed through GIS analysis. Additionally, social assets are addressed to determine population at risk to the identified hazards. These are presented below in Section 6.4.1.

Physical and Improved Assets
The two categories of physical assets consist of:

1. Improved Property: Includes all improved properties in the MEMA District 9 Region according to parcel and building footprint data provided by the Mississippi Department of Environmental Quality through the Mississippi Digital Earth Model. The information has been expressed in terms of the number of parcels and total improved value that may be exposed to the identified hazards.

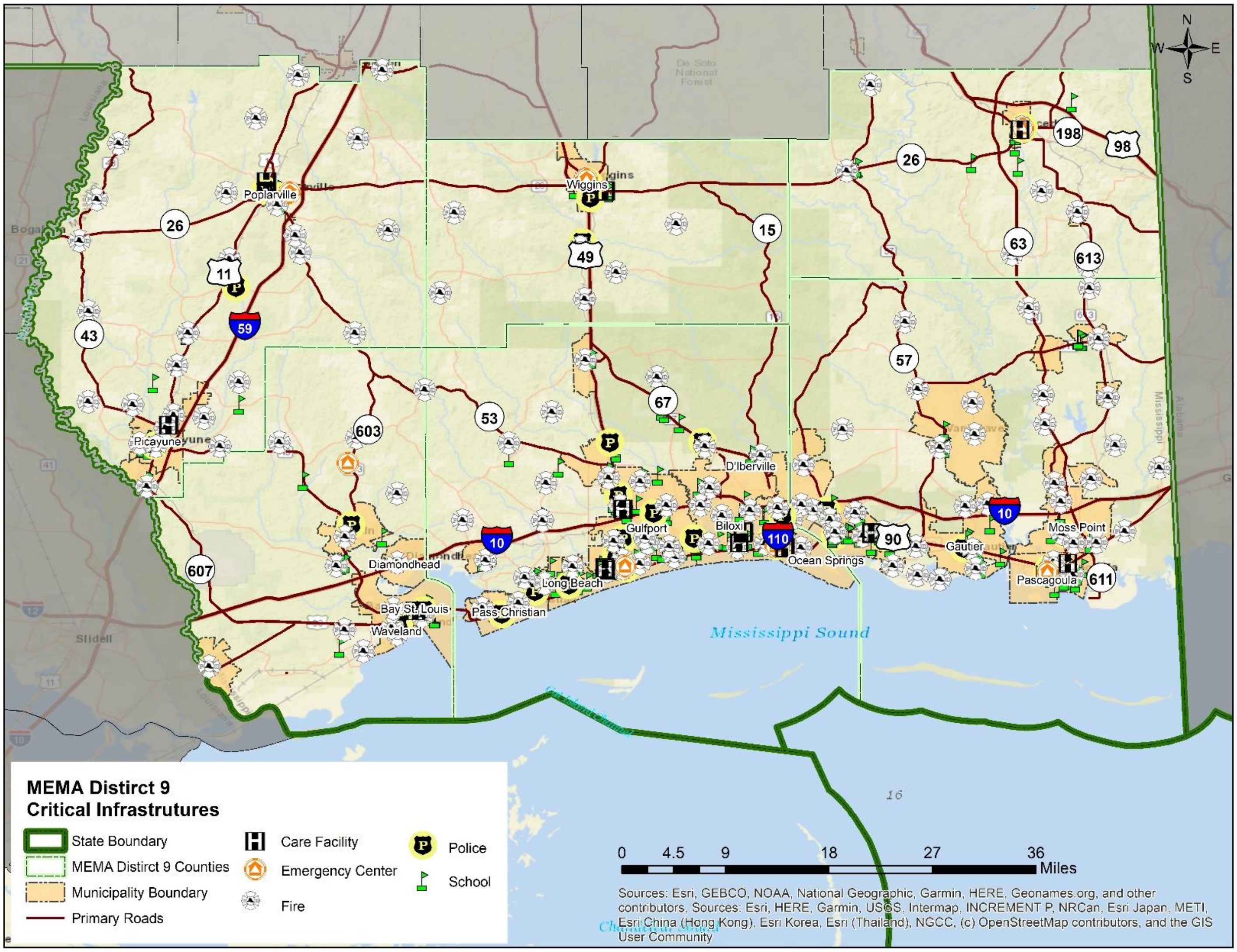
   However, it should be noted that parcel data was not available for George County. As a result, parcel counts and improved values at the Census Block level were pulled from Hazus 3.2 to estimate exposure in George County. Similarly, although parcel data was available in Pearl River County, it did not include improvement values for the parcels, so Census Block level dollar values were used to estimate exposure in Pearl River County. Further, it should be noted that these estimates often over-estimate the dollar value of properties.

In addition, building footprint data was available for all of the counties and it was used to improve the overall assessment by providing a more accurate assessment of how many buildings are located in hazard areas. However, it should be noted that building footprint data has not been updated since 2007 and the parcel data has not been updated since 2009, so these datasets likely underestimate current building counts/parcel data.

2. Critical Facilities**:** Critical facilities vary by jurisdiction. For this Vulnerability Assessment, identified facilities from past plans were updated by local governments including fire stations, police stations, medical care facilities, schools, and emergency operation centers. It should be noted that this listing is not necessarily all-inclusive for assets located in the region, but it is anticipated that it will be expanded during future plan updates as more geo-referenced data becomes available for use in GIS analysis.

Figure 6.2 shows the locations of critical facilities in the MEMA District 9 Region. A table is provided in Appendix D listing all identified critical assets within MEMA District 9 including the county/jurisdiction located along with the hazards . As noted previously, this list is not all-inclusive and only includes readily available information. Further, it should be noted that the table below may show that some counties or communities do not have any critical facilities of in certain type, when in reality, that particular type of facility may actually be located within the community. This may occur because spatial data for that facility type was not available or because the facility may have been classified under a different category type for that particular community.

Figure 44 CRITICAL FACILITY LOCATIONS IN THE MEMA DISTRICT 9 REGION



Source: Local Governments

<u>Social Vulnerability</u>
In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in the MEMA District 9 Region that are potentially at risk to these hazards.

Table 6.3 lists the population by county according to American Community Survey 2015 population estimates. The total population in the MEMA District 9 Region according to Census data is 478,849 persons. Additional population estimates are presented in Section 3: Community Profile.

Table 46 TOTAL POPULATION IN THE MEMA DISTRICT 9 REGION

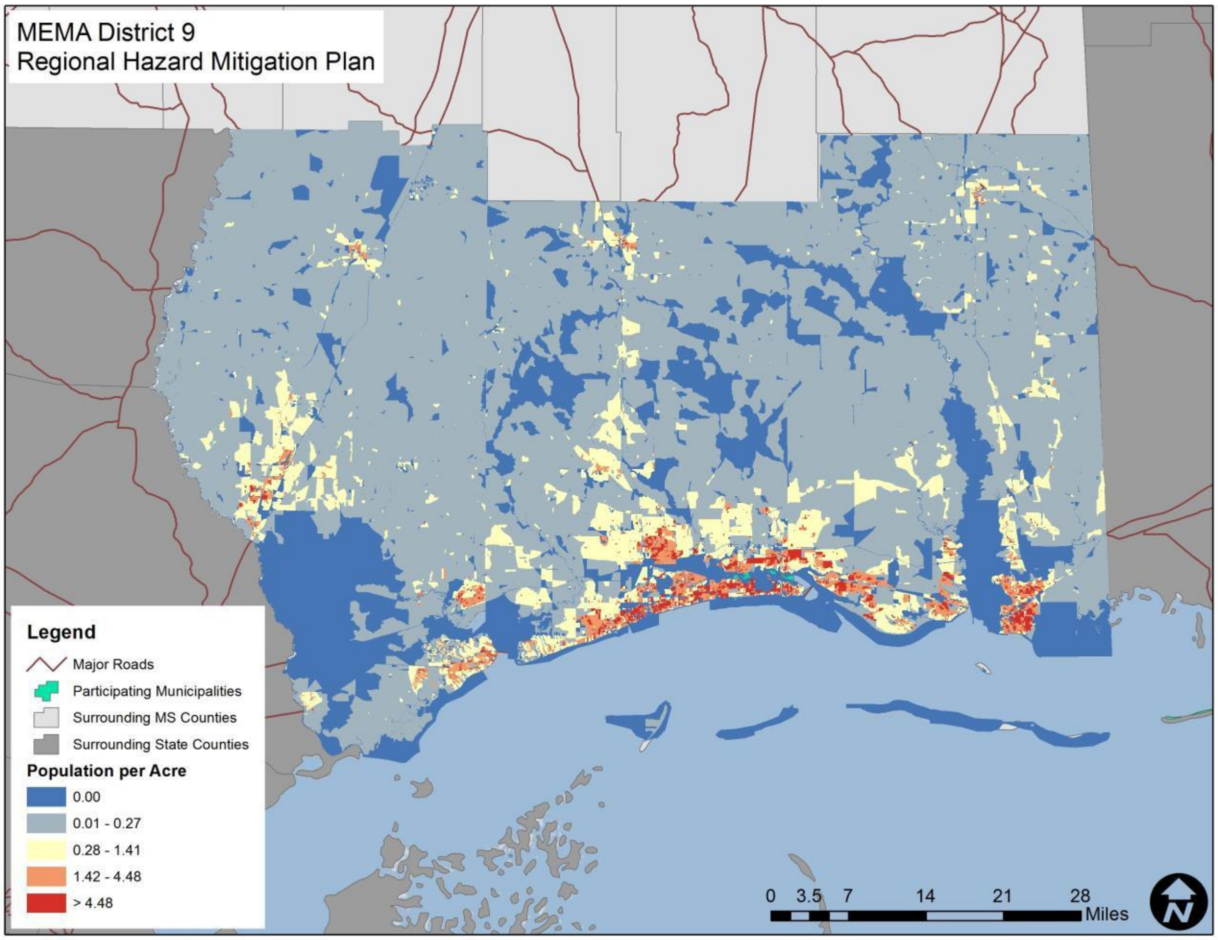
Location	Total 2015 Population
George County	24,350
Hancock County	46,053
Harrison County	208,621

Jackson County	143,252
Pearl River County	56,145
Stone County	18,333
MEMA District 9 Total	**496,754**

Source: United States Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

In addition, Figure 6.3 illustrates the population density per acre by census block as it was reported by the U.S. Census Bureau in 2010. As can be seen in the figure, the population is spread out through most of the region, with heavy concentrations in coastal communities like Gulfport, Biloxi, and Pascagoula.

Figure 45 POPULATION DENSITY IN THE MEMA DISTRICT 9 REGION



Source: United States Census Bureau, 2010 Census

<u>Development Trends and Changes in Vulnerability</u>

Since the previous local-level hazard mitigation plans were approved, the MEMA District 9 Region has experienced moderate growth and development. Table 6.4 shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

Table 47 BUILDING COUNTS FOR THE MEMA DISTRICT 9 REGION

Location	2010	2011	2012	2013	2014	2015	% Building Stock Built Post-2010
George County	9,073	9,215	9,273	9,298	9,342	9,355	3.1%
Lucedale	1,174	1,264	1,250	1,236	1,126	1,113	-5.2%
Unincorporated Area	7,899	7,951	8,023	8,062	8,216	8,242	4.3%
Hancock County	19,756	20,869	21,639	22,237	22,787	23,196	3.1%
Bay St. Louis	5,171	5,511	5,860	5,741	5,868	6,373	23.2%
Diamondhead*	--	--	--	4,330	4,113	4,104	-5.2%
Waveland	3,349	3,311	3,195	3,270	3,306	3,007	-10.2%
Unincorporated Area	15,172	15,055	15,013	10,794	10,995	10,939	-27.9%
Harrison County	80,275	83,011	85,048	86,438	87,824	88,821	10.6%
Biloxi	21,250	21,675	22,094	21,871	21,537	21,506	1.2%
D'Iberville	3,548	3,814	4,051	4,370	4,620	4,836	36.3%
Gulfport	29,619	30,293	31,556	32,092	32,878	33,421	12.8%
Long Beach	6,504	6,755	6,740	6,734	6,696	6,628	1.9%
Pass Christian	2,299	2,549	2,448	2,642	2,698	2,744	19.4%
Unincorporated Area	17,055	17,925	18,159	18,729	19,395	19,686	15.4%
Jackson County	57,995	59,216	59,811	60,237	60,649	60,889	5.0%
Gautier	7,507	7,748	7,886	8,034	8,113	8,180	9.0%
Moss Point	6,305	6,488	6,555	6,435	6,505	6,476	2.7%
Ocean Springs	7,246	7,482	7,628	7,892	7,880	7,625	5.2%
Pascagoula	10,803	10,935	10,696	10,813	10,574	10,891	0.8%
Unincorporated Area	26,134	26,563	27,046	27,063	27,577	27,717	6.1%
Pearl River County	23,692	23,877	24,068	24,135	24,282	24,423	3.1%
Picayune	5,106	4,901	4,864	4,850	4,785	4,854	-4.9%
Poplarville	937	1,108	1,095	1,063	1,021	1,006	7.4%
Unincorporated Area	17,649	17,868	18,109	18,222	18,476	18,563	5.2%
Stone County	6,881	7,048	7,087	7,144	7,192	7,216	4.9%
Wiggins	1,437	1,660	1,460	1,439	1,459	1,513	5.3%
Unincorporated Area	5,444	5,388	5,627	5,705	5,733	5,703	4.8%
MEMA DISTRICT 9 REGION TOTAL	197,672	203,236	206,926	209,489	212,076	213,900	8.2%

*Diamondhead officially incorporated into a city in 2012, so the city's first housing estimate was not available until 2013. Percent change in population is calculated from 2013 to 2015.
Source: United States Census Bureau, American Community Survey

Table 6.5 shows population growth estimates for the region from 2010 to 2015 based on the American Community Survey's annual population estimates.

Table 48 POPULATION GROWTH FOR THE MEMA DISTRICT 9 REGION

	Population Estimates	% Change

Location	2010	2011	2012	2013	2014	2015	2010-2015
George County	22,061	22,361	22,579	22,757	22,960	23,104	4.7%
Lucedale	2,934	2,936	2,943	2,959	2,978	2,993	2.0%

Location	Population Estimates						% Change 2010-2015
	2010	2011	2012	2013	2014	2015	
Unincorporated Area	19,127	19,425	19,636	19,798	19,982	20,111	5.1%
Hancock County	42,408	43,322	44,044	44,597	45,136	45,627	7.6%
Bay St. Louis	9,349	9,385	9,614	9,899	10,313	10,861	16.2%
Diamondhead*	--	--	--	8,777	8,275	8,246	-6.0%
Waveland	6,490	6,504	6,492	6,487	6,463	6,449	-0.6%
Unincorporated Area	26,569	27,433	27,938	19,434	20,085	20,071	-24.5%
Harrison County	181,791	185,120	188,110	190,756	193,642	196,268	8.0%
Biloxi	43,921	44,256	44,223	44,354	44,527	44,825	2.1%
D'Iberville	8,905	9,211	9,539	9,819	10,161	10,532	18.3%
Gulfport	66,286	67,322	68,158	69,004	69,913	70,462	6.3%
Long Beach	14,769	14,872	14,981	15,102	15,224	15,369	4.1%
Pass Christian	4,809	4,756	4,773	4,848	4,957	5,130	6.7%
Unincorporated Area	43,101	44,703	46,436	47,629	48,860	49,950	15.9%
Jackson County	137,082	138,511	139,430	139,906	140,194	140,676	2.6%
Gautier	18,088	18,344	18,502	18,539	18,581	18,563	2.6%
Moss Point	13,963	13,885	13,807	13,749	13,690	13,685	-2.0%
Ocean Springs	17,258	17,379	17,420	17,474	17,446	17,528	1.6%
Pascagoula	22,947	22,765	22,523	22,372	22,239	22,230	-3.1%
Unincorporated Area	64,826	66,138	67,178	67,772	68,238	68,670	5.9%
Pearl River County	55,923	56,042	55,886	55,569	55,293	55,196	-1.3%
Picayune	11,087	11,023	10,982	10,901	10,838	10,784	-2.7%
Poplarville	3,016	2,977	2,923	2,852	2,874	2,919	-3.2%
Unincorporated Area	41,820	42,042	41,981	41,816	41,581	41,493	-0.8%
Stone County	16,923	17,294	17,657	17,854	17,941	17,978	6.2%
Wiggins	4,281	4,237	4,399	4,446	4,463	4,487	4.8%
Unincorporated Area	12,642	13,057	13,258	13,408	13,478	13,491	6.7%
MEMA DISTRICT 9 REGION TOTAL	456,188	462,650	467,706	471,439	475,166	478,849	5.0%

*Diamondhead officially incorporated into a city in 2012, so the city's first population estimate was not available until 2013. Percent change in population is calculated from 2013 to 2015.
Source: United States Census Bureau, American Community Survey

Based on the data above, there has been a moderate rate of residential development and population growth in the region since 2010, and the majority of incorporated jurisdictions have experienced slight increases in population and housing development, resulting in an increased number of structures and people that are vulnerable to the potential impacts of the identified hazards. However, Diamondhead, Moss Point, Pascagoula, Picayune, and Poplarville have all experienced a slight decline in population since 2010 according to estimates. Additionally, there has been a slight decline in housing development since 2010 in Lucedale, Diamondhead, Waveland, and Picayune. Therefore, development and population growth have impacted the region's vulnerability since the previous local hazard mitigation plans were approved and there has been an increase in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains or other identified areas of high risk.

VULNERABILITY ASSESSMENT RESULTS

As noted earlier, only hazards with a specific geographic boundary, available modeling tool, or sufficient historical data allow for further analysis in this section. All other hazards are assumed to impact the entire planning region (e.g., drought) or, due to lack of data, analysis would not lead to credible results (e.g., infectious disease). The total region exposure, and thus risk to these hazards, was presented in Table 6.1.

The hazards to be further analyzed in this section include: flood, wildfire, earthquake, hurricane and tropical storm winds and storm surge, hazardous materials incident, dam and levee failure, and sea level rise.

The annualized loss estimate for all hazards is presented near the end of this section in Table 6.17.

Flood

Historical evidence indicates that the MEMA District 9 Region is susceptible to flood events. A total of 168 flood events have been reported by the National Center for Environmental InformationNational Center for Environmental Information resulting in around $12.2 million (2016 dollars) in property damage as well as 1 fatality. On an annualized level, these damages amounted to $787,125 for the MEMA District 9 Region.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with improved property records for each of the MEMA District 9 Counties. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified floodplain.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table 49 shows the results of the analysis.

Table 49 ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

Location	1.0-percent ACF		0.2-percent ACF		VE Zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
George County*	6,339	$1,033,054,000	88	$16,456,000	0	$0
Lucedale	316	$69,124,000	0	$0	0	$0
Unincorporated Area	6,023	$963,930,000	88	$16,456,000	0	$0
Hancock County	15,299	$253,871,546	6,346	$162,854,221	1,160	$16,819,674

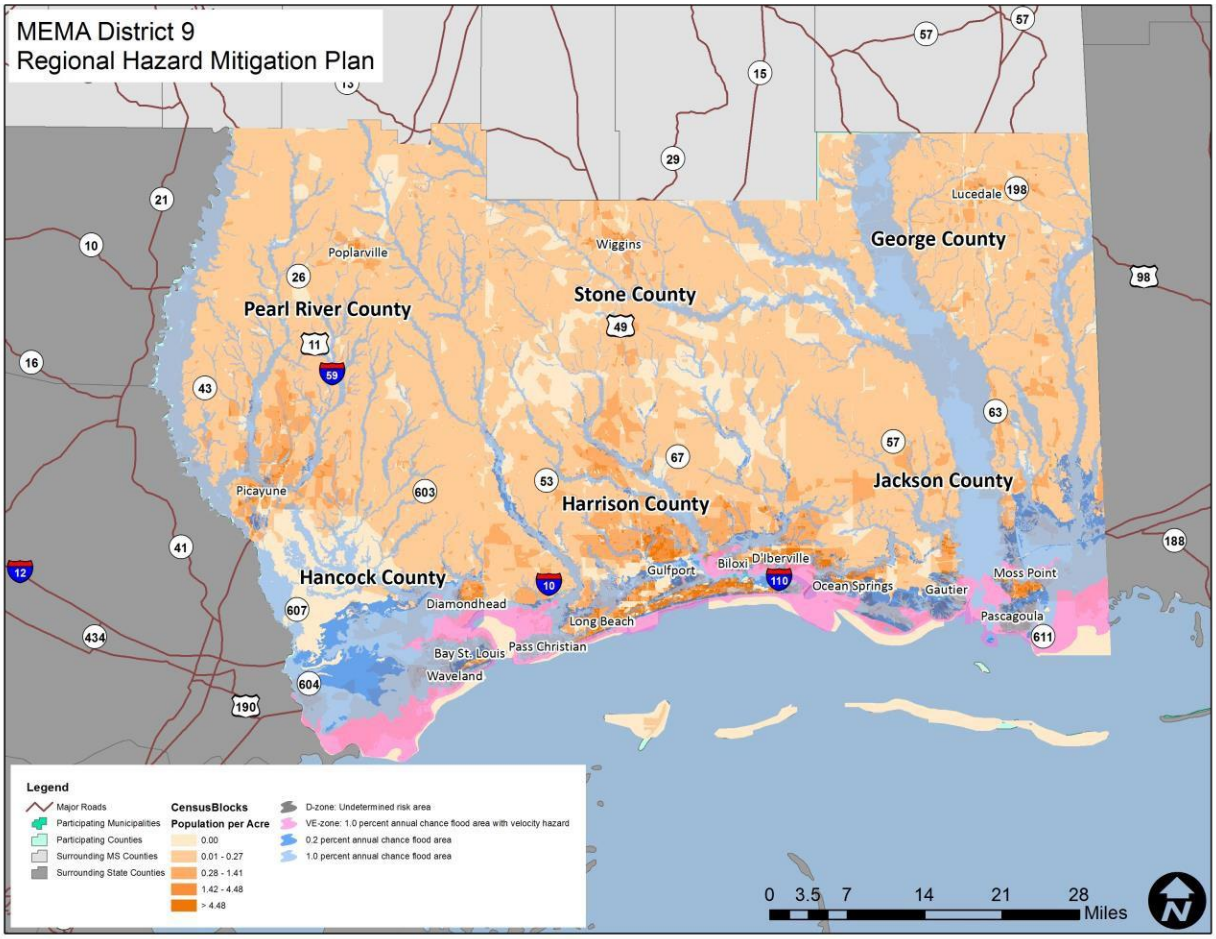
Location	1.0-percent ACF		0.2-percent ACF		VE Zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Bay St. Louis	1,047	$30,854,870	3,527	$77,458,001	123	$2,438,213
Diamondhead	676	$47,769,318	410	$36,591,925	39	$1,809,468
Waveland	2,698	$51,863,509	1,653	$38,060,990	200	$2,741,359
Unincorporated Area	10,878	$123,383,849	756	$10,743,305	798	$9,830,634
Harrison County	18,616	$1,079,262,581	17,040	$1,379,486,361	1,024	$716,263,348
Biloxi	6,417	$365,510,696	4,539	$407,939,146	222	$116,507,908
D'Iberville	1,230	$49,867,008	1,343	$116,368,166	52	$2,113,769
Gulfport	5,127	$379,135,841	7,802	$658,083,931	117	$82,687,105
Long Beach	863	$64,152,921	1,383	$92,278,737	40	$1,523,995
Pass Christian	2,534	$108,363,854	452	$22,954,189	199	$13,772,487
Unincorporated Area	2,445	$112,232,261	1,521	$81,862,192	394	$499,658,084
Jackson County	29,696	$1,529,616,550	24,391	$1,765,432,520	1,033	$84,580,080
Gautier	2,316	$118,332,200	4,728	$281,124,330	84	$7,279,640
Moss Point	3,119	$130,471,550	2,572	$132,822,500	55	$5,563,840
Ocean Springs	1,226	$154,955,040	5,987	$571,123,770	94	$12,202,880
Pascagoula	12,248	$644,004,050	2,804	$243,751,930	171	$13,956,290
Unincorporated Area	10,787	$481,853,710	8,300	$536,609,990	629	$45,577,430
Pearl River County*	3,856	$1,689,761,000	1,407	$603,178,000	0	$0
Picayune	576	$549,169,000	629	$394,185,000	0	$0
Poplarville	0	$0	0	$0	0	$0
Unincorporated Area	3,280	$1,140,592,000	778	$208,993,000	0	$0
Stone County	211	$4,120,088	0	$0	0	$0
Wiggins	12	$873,286	0	$0	0	$0
Unincorporated Area	199	$3,246,802	0	$0	0	$0
MEMA DISTRICT 9 REGION TOTAL	74,017	$5,589,685,765	49,272	$3,927,407,102	3,217	$817,663,102

* As noted above, building footprints and parcel data were not available for George County and parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.
Source: Federal Emergency Management Agency DFIRM, MDEQ, Hazus MH 3.2 Data

SOCIAL VULNERABILITY

Figure 6.4 is presented to gain a better understanding of at-risk population by evaluating census block level population data against mapped floodplains. There are areas of concern in several of the municipal population centers in this region including all of the coastal communities. Indeed, nearly every incorporated municipality is potentially at risk of being impacted by flooding in some areas of its jurisdiction. Therefore, there is significant population vulnerability to flooding.

Figure 46 POPULATION DENSITY NEAR FLOODPLAINS IN THE MEMA DISTRICT 9 REGION



Source: Federal Emergency Management Agency DFIRM, United States Census 2010

CRITICAL FACILITIES

The critical facility analysis revealed that there are 58 facilities located in one of the identified floodplain zones. (Please note, as previously indicated, this analysis does not consider building elevation, which may negate risk.)
For assets and specific hazard vulnerabilities please click the following spreadsheet: A full list of critical facilities is located in Appendix D of the plan.

MEMA_District9_Hazard_TabularData.xlsx

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in the MEMA District 9 Region, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. Such site- specific vulnerability determinations are outside the scope of this assessment but may be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

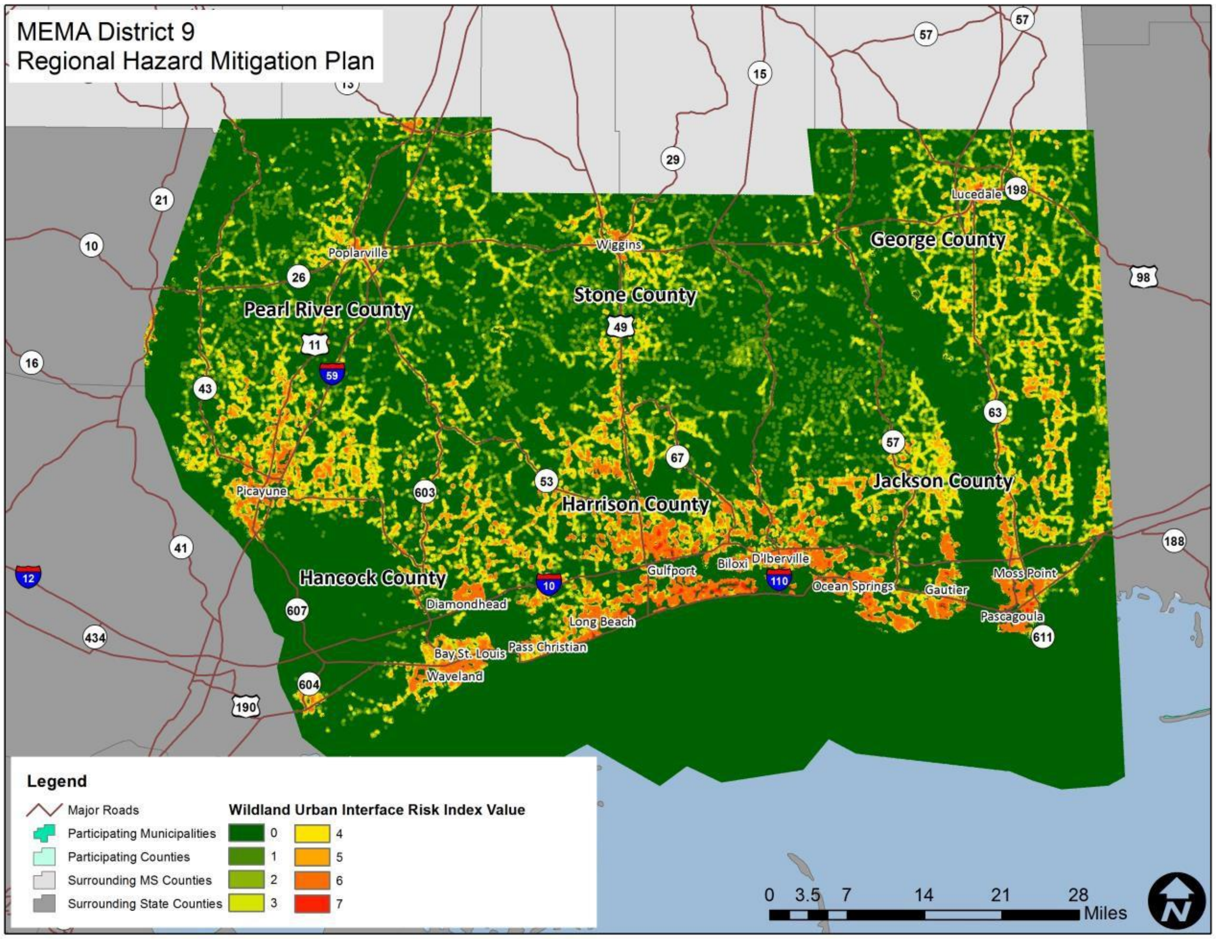
Wildfire

Although historical evidence indicates that the MEMA District 9 Region is susceptible to wildfire events, there are few reports which include information on historic dollar losses. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered relatively low, though it should be noted that a single event could result in significant damages throughout the region.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones. For the critical facility analysis, areas of concern were intersected with critical facility locations.

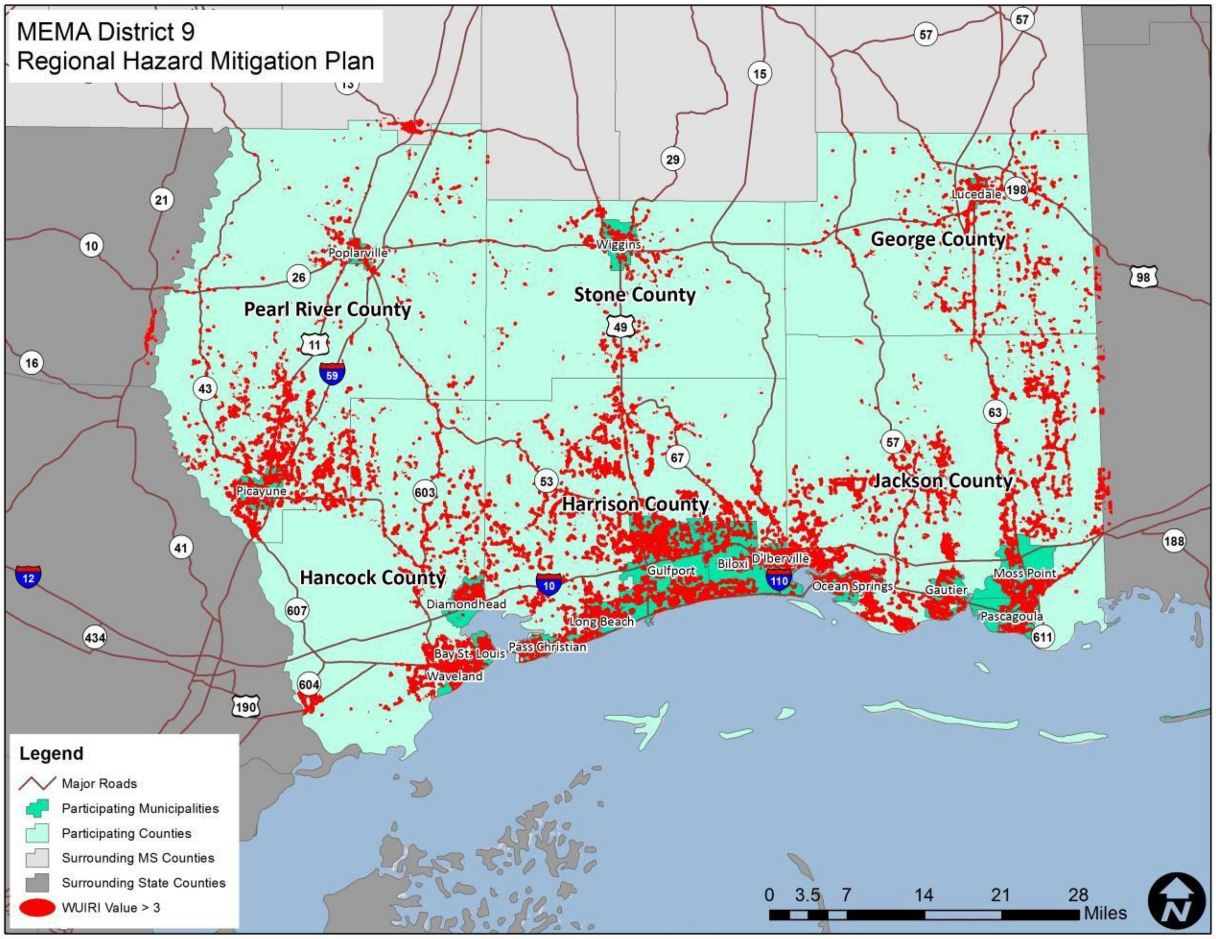
Figure 47 shows the Wildland Urban Interface Risk Index (WUIRI) data, which is a data layer that shows a rating of the potential impact of a wildfire on people and their homes. The key input, Wildland Urban Interface (WUI), reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the WUI and rural areas is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, it was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to 7 with higher values being most severe (as noted previously, this is only a measure of relative risk). Figure 6.6 shows the areas of analysis where any grid cell is less than 3. Areas with a value below 3 were chosen to be displayed as areas of risk because this showed the upper echelon of the scale and the areas at highest risk.

Figure 47 WUI RISK INDEX AREAS IN THE MEMA DISTRICT 9 REGION



Source: Southern Wildfire Risk Assessment Data

Figure 48 WILDFIRE RISK AREAS IN THE MEMA DISTRICT 9 REGION



Source: Southern Wildfire Risk Assessment Data

Table 50 EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE RISK AREAS

Location	Wildfire Risk	
	Approx. Number of Buildings	Approx. Improved Value
George County*	9,548	$1,664,239,000
Lucedale	1,538	$335,976,000
Unincorporated Area	8,010	$1,328,263,000
Hancock County	29,075	$793,624,454
Bay St. Louis	4,266	$104,713,588
Diamondhead	4,438	$376,562,919
Waveland	4,601	$91,012,766
Unincorporated Area	15,770	$221,335,181
Harrison County	87,586	$4,359,508,991
Biloxi	14,782	$990,187,787
D'Iberville	4,036	$173,907,350
Gulfport	30,805	$1,630,516,790

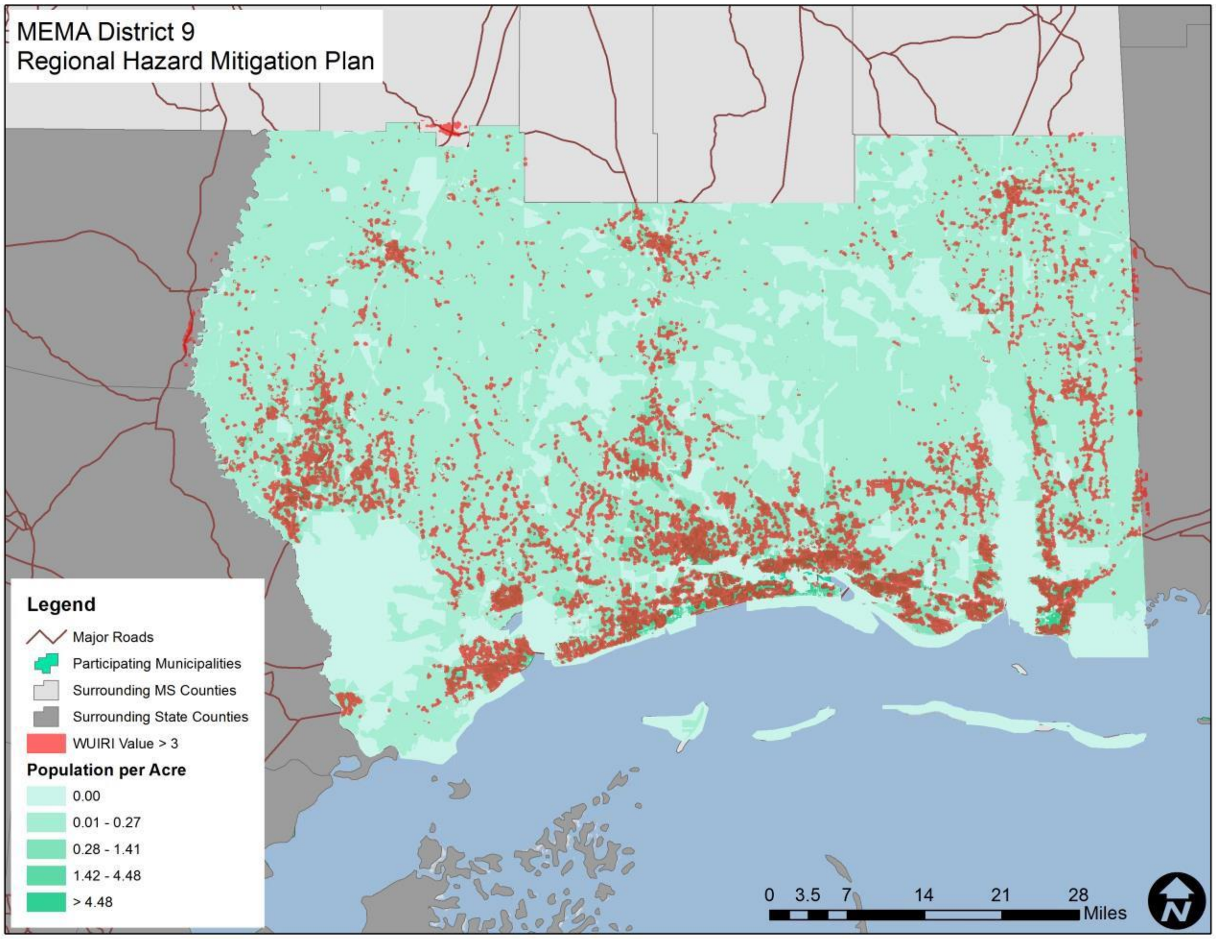
Location	Wildfire Risk	
	Approx. Number of Buildings	Approx. Improved Value
Long Beach	7,348	$392,572,180
Pass Christian	3,413	$164,858,285
Unincorporated Area	27,202	$1,007,466,599
Jackson County	75,257	$3,977,525,960
Gautier	6,767	$362,594,440
Moss Point	9,227	$342,127,140
Ocean Springs	9,622	$850,642,070
Pascagoula	9,231	$541,505,990
Unincorporated Area	40,410	$1,880,656,320
Pearl River County*	29,749	$4,352,141,000
Picayune	6,411	$1,357,763,000
Poplarville	1,846	$319,907,000
Unincorporated Area	21,492	$2,674,471,000
Stone County	6,746	$192,683,090
Wiggins	2,664	$104,838,031
Unincorporated Area	4,082	$87,845,059
MEMA DISTRICT 9 REGION TOTAL	237,961	$15,339,722,495

* As noted above, building footprints and parcel data were not available for George County and parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.
Source: SWRA, MDEQ, Hazus MH 3.2 Data

SOCIAL VULNERABILITY

Given some level of susceptibility across the entire MEMA District 9 Region, it is assumed that the total population is at risk to the wildfire hazard. Figure 6.7 shows an overlay of the wildfire risk areas identified above with the population density by census block. This shows that many of the areas of high population concentration are susceptible to wildfire because of their proximity to the wildland urban interface.

Figure 49 WILDFIRE RISK AREAS IN THE MEMA DISTRICT 9 REGION



Source: Southern Wildfire Risk Assessment Data; United States Census

Earthquake

As the Hazus-MH model suggests below, and historical occurrences confirm, any earthquake activity in the area is likely to inflict only minor to moderate damage to the planning area. Hazus-MH 3.2 estimates a total annualized loss of $187,000 which includes buildings, contents, and inventory throughout the planning area.

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the average annualized loss2 for the region on a county by county basis. The results of the analysis are generated at the Census Tract level within Hazus-MH and then aggregated to the county level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to structure failure, building loss, contents damage, and inventory loss. They do not include losses to business interruption, lost income, or relocation. Table 6.8 summarizes the findings with results rounded to the nearest thousand.

Table 51 AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Structural Damage	Non-Structural Damage	Contents Damage	Inventory Loss	Total Annualized Loss
George County	$2,000	$5,000	$1,000	$0	$8,000
Hancock County	$4,000	$9,000	$2,000	$0	$15,000
Harrison County	$21,000	$51,000	$15,000	$0	$87,000
Jackson County	$12,000	$29,000	$8,000	$0	$49,000
Pearl River County	$5,000	$12,000	$3,000	$0	$20,000
Stone County	$2,000	$5,000	$1,000	$0	$8,000
MEMA D9 REGION TOTAL	$46,000	$111,000	$30,000	$0	$187,000

Source: Hazus-MH 3.2

SOCIAL VULNERABILITY

It can be assumed that all existing and future populations are at risk to the earthquake hazard.

CRITICAL FACILITIES

The Hazus-MH probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in the MEMA District 9 Region. The Hazus-MH scenario indicates that minimal to moderate damage is expected from an earthquake occurrence. While the MEMA District 9 Region may not experience a large earthquake, localized damage is possible with an occurrence. A list of specific critical facilities and their associated risk can be found in Table 6.18 at the end of this section. ***Hurricane and Tropical Storm***

Historical evidence indicates that the MEMA District 9 Region has very significant risk to the hurricane and tropical storm hazard. There have been 12 disaster declarations due to hurricanes or tropical storms (Hurricanes Betsy, Camille, Frederic, Elena, Georges, Ivan, Dennis, Katrina, Gustav, and Isaac, as well as Tropical Storms Allison and Isidore). A large number tracks have come near or traversed through the MEMA District 9 Region, as shown and discussed in Section 5: Hazard Profiles. Hazus-MH 3.2 estimates a total annualized loss of $307,250,000 which includes buildings, contents, and inventory throughout the planning area.

HURRICANE WINDS

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and storm surge and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore, only these two aspects of hurricane losses are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to hurricane and tropical storm wind hazard. Hazus-MH 3.2 was used to determine average annualized losses3 for the region as shown below in Table 6.9. Only losses to buildings, inventory, and contents are included in the results.

Table 152 AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
George County	$4,776,000	$1,959,000	$16,000	$6,751,000
Hancock County	$13,931,000	$5,455,000	$37,000	$19,423,000
Harrison County	$111,346,000	$50,844,000	$461,000	$162,651,000
Jackson County	$70,481,000	$31,767,000	$307,000	$102,555,000
Pearl River County	$7,495,000	$3,020,000	$26,000	$10,541,000
Stone County	$3,629,000	$1,683,000	$17,000	$5,329,000
MEMA D9 REGION TOTAL	$211,658,000	$94,728,000	$864,000	$307,250,000

Source: Hazus-MH 3.2

STORM SURGE

In addition, although it was treated as a separate hazard throughout this plan, storm surge is most often associated with hurricanes and tropical storms. Indeed, Hazus incorporates the storm surge model for estimating damage from storm surge as part of the hurricane model. The storm surge model can only be run as part of a historic hurricane model run and not as part of an annualized loss model. Unfortunately, in this model, storm surge impacts are calculated as part of the total damage from the historic event and thus could not be separated out and evaluated solely in terms of storm surge loss. As such, the estimated losses presented below are combined losses from hurricane winds and storm surge. The historic Hurricane Katrina model was utilized as this was certainly one of the most impactful storms in the region and therefore estimates the potential losses that are possible from a large hurricane event.
Table 6.10 presents the losses from this modeled event.

Table 53 POTENTIAL LOSS ESTIMATIONS FOR LARGE HURRICANE EVENT

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
George County	$33,209,000	$10,744,000	$73,000	$44,026,000
Hancock County	$279,895,000	$95,284,000	$600,000	$375,779,000
Harrison County	$2,064,136,000	$862,483,000	$7,187,000	$2,933,806,000
Jackson County	$381,792,000	$142,547,000	$605,000	$524,944,000
Pearl River County	$205,561,000	$75,831,000	$628,000	$282,020,000
Stone County	$88,416,000	$39,047,000	$495,000	$127,958,000
MEMA D9 REGION TOTAL	$3,053,009,000	$1,225,936,000	$9,588,000	$4,288,533,000

Source: Hazus-MH 3.2

SOCIAL VULNERABILITY

Given equal susceptibility across the entire MEMA District 9 Region, it is assumed that the total population, both current and future, is at risk to the hurricane and tropical storm wind hazard. In terms of social vulnerability to storm surge, coastal populations are at much higher risk than inland populations. Since large concentrations of population are located along the coast of the MEMA District 9 Region, there is significant social vulnerability to storm surge in the region.

CRITICAL FACILITIES

Given equal vulnerability across the MEMA District 9 Region, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among factors. Determining individual building response to wind and storm surge is beyond the scope of this plan. However, this plan will consider mitigation action for especially vulnerable structures and/or critical facilities to mitigate against the effects of the hurricane hazard. A list of specific critical facilities can be found in Table 6.18 at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in the MEMA District 9 Region.

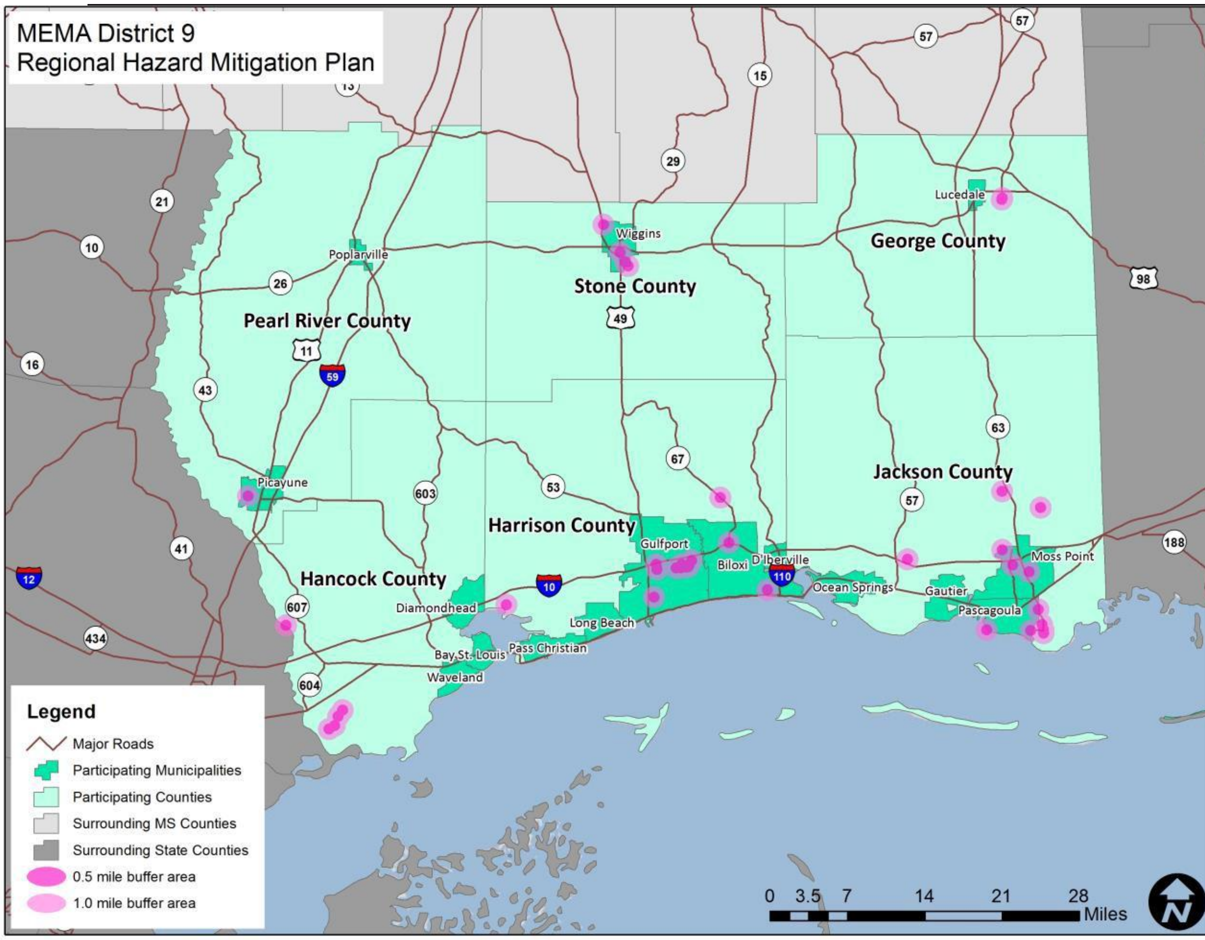
Hazardous Materials Incident

Historical evidence indicates that the MEMA District 9 Region is susceptible to hazardous materials events. A total of 473 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration, resulting in $2,134,323 (2016 dollars) in property damage as well as 5 deaths and 21 injuries. On an annualized level, these damages amount to $47,429 for the region.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities, and cause affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and building footprints/parcels where available and Census block data where footprints/parcels were not available. In both scenarios, two sizes of buffers—0.5-mile and 1.0-mile— were used. These areas are assumed to represent the different levels of effect: immediate (primary) and secondary. Primary and secondary impact zones were selected based on guidance from the PHMSA Emergency Response Guidebook. For the fixed site analysis, geo-referenced TRI sites in the region, along with buffers, were used for analysis as shown in Figure 6.8. For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. Figure 6.9 shows the areas used for mobile road toxic release buffer analysis and Figure 6.10 shows the areas used for the mobile railroad toxic release buffer analysis. The results indicate the approximate number of improved properties and improved value, as shown in Table 6.11 (fixed sites), Table 6.12 (mobile roads), and Table 6.13 (mobile railroads).

Figure 50 TRI SITES WITH BUFFERS IN THE MEMA DISTRICT 9 REGION



Source: Environmental Protection Agency

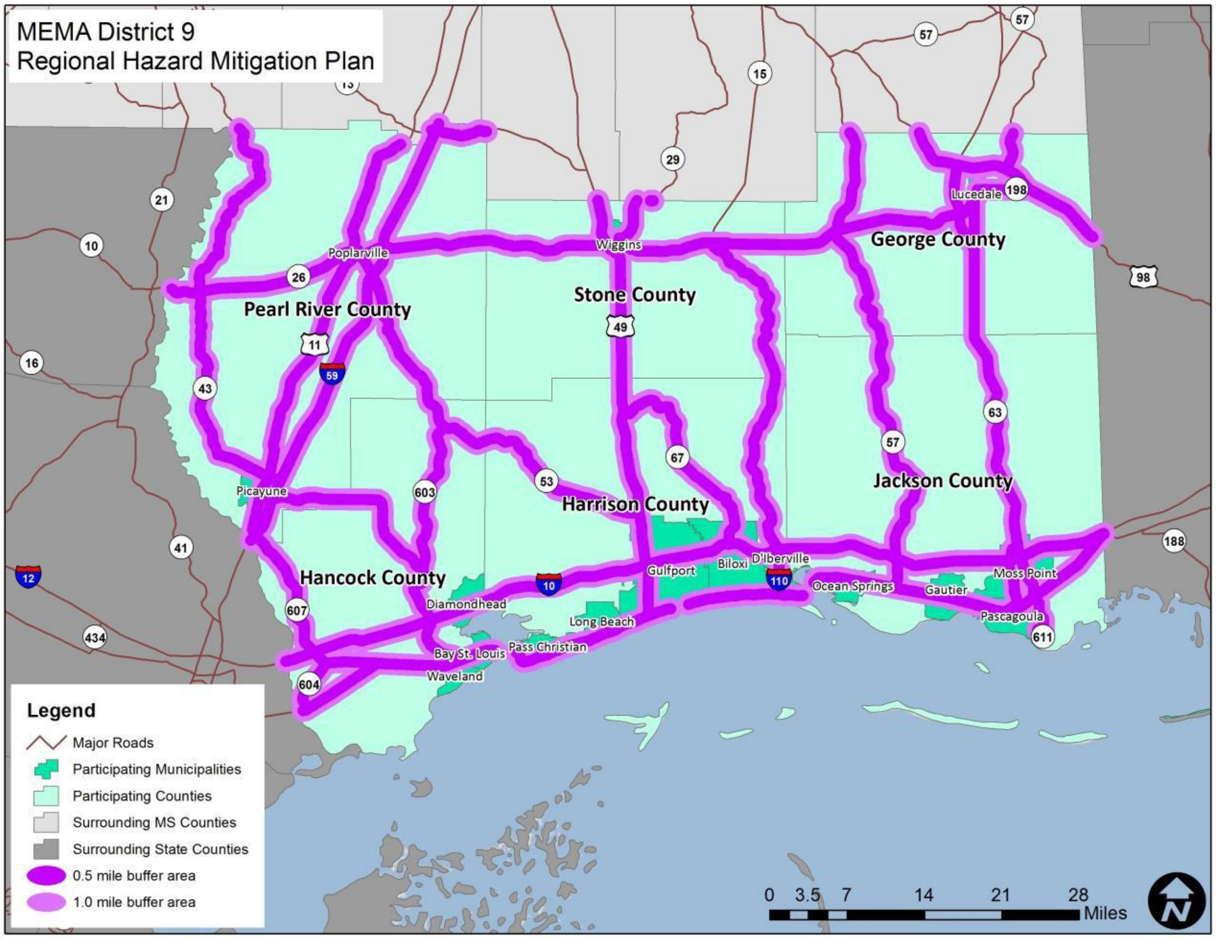
Table 54 EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
George County*	83	$22,552,000	361	$72,153,000
Lucedale	0	$0	99	$18,341,000
Unincorporated Area	83	$22,552,000	262	$53,812,000
Hancock County†	209	$2,679,000	351	$21,265,000
Bay St. Louis	0	$0	0	$0
Diamondhead	0	$0	0	$0
Waveland	0	$0	0	$0
Unincorporated Area	209	$2,679,000	351	$21,265,000
Harrison County	3,184	$181,369,604	12,319	$703,940,495
Biloxi	921	$26,148,977	3,512	$110,705,101
D'Iberville	0	$0	0	$0
Gulfport	1,901	$110,382,535	8,125	$531,451,341

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Long Beach	0	$0	0	$0
Pass Christian	0	$0	0	$0
Unincorporated Area	362	$44,838,092	682	$61,784,053
Jackson County	2,554	$89,327,840	8,251	$322,232,380
Gautier	0	$0	0	$0
Moss Point	583	$19,614,990	1,818	$74,425,480
Ocean Springs	0	$0	0	$0
Pascagoula	1,003	$39,815,600	3,902	$180,770,120
Unincorporated Area	968	$29,897,250	2,531	$67,036,780
Pearl River County*	489	$106,765,000	2,265	$412,547,000
Picayune	489	$106,765,000	2,196	$399,979,343
Poplarville	0	$0	0	$0
Unincorporated Area	0	$0	69	$12,567,657
Stone County	467	$21,538,732	1,859	$70,803,546
Wiggins	387	$17,016,665	1,349	$56,455,906
Unincorporated Area	80	$4,522,067	510	$14,347,640
MEMA DISTRICT 9 REGION TOTAL	6,986	$424,232,176	25,406	$1,602,941,421

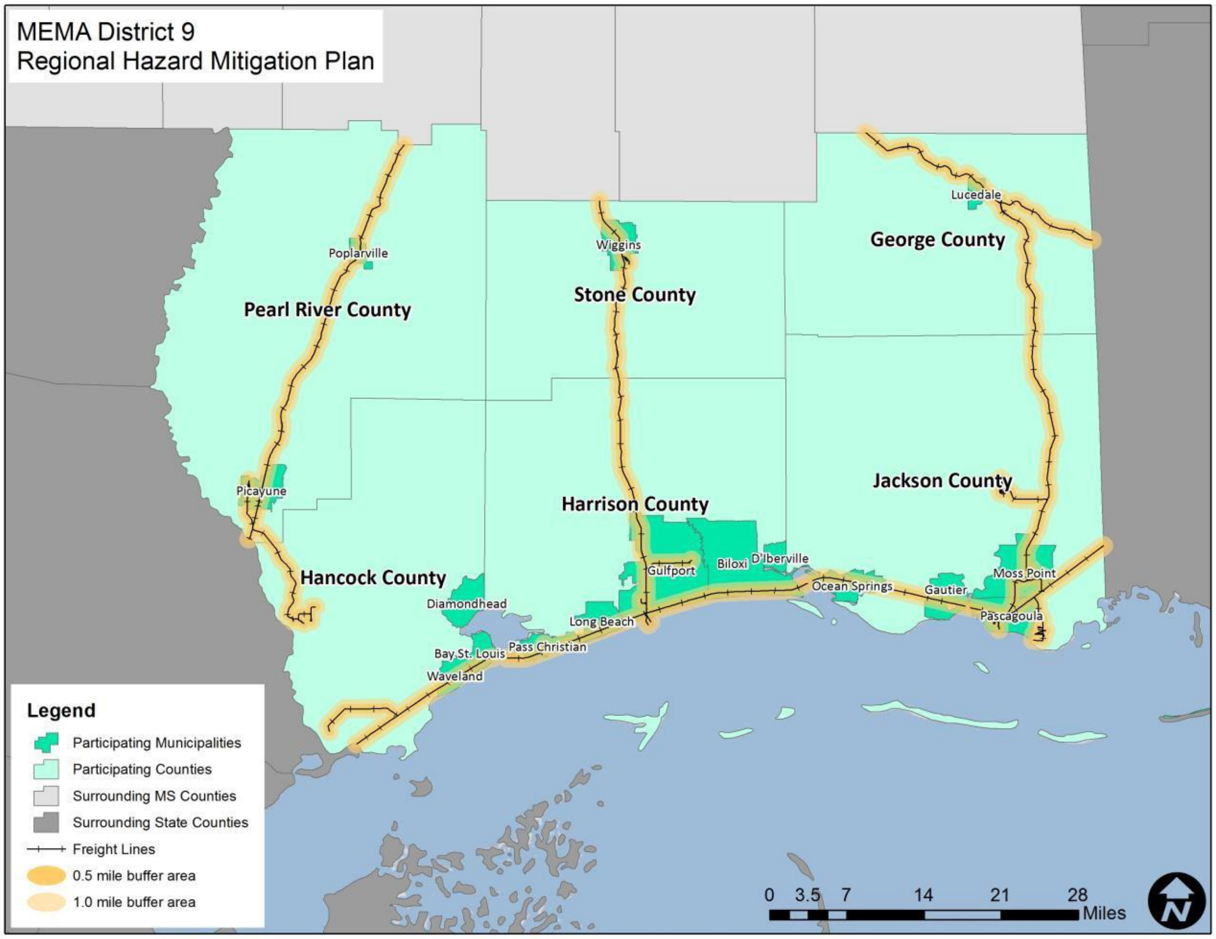
* As noted above, building footprints and parcel data were not available for George County and parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.
†A small area of the Hancock County parcel data does not contain dollar values. Upon examination of the data, these parcels do have structures located on them. As such, Census Block estimates for values were used in this case.
Source: EPA, MDEQ, Hazus MH 3.2 Data

Figure 51 MOBILE (ROAD) HAZMAT BUFFERS IN THE MEMA DISTRICT 9 REGION



Source: Federal Highway Administration National Highway Planning Network

Figure 52 MOBILE (RAIL) HAZMAT BUFFERS IN THE MEMA DISTRICT 9 REGION



Source: U.S. Department of Transportation Federal Railroad Administration

Figure 53: HAZMAT Scenario

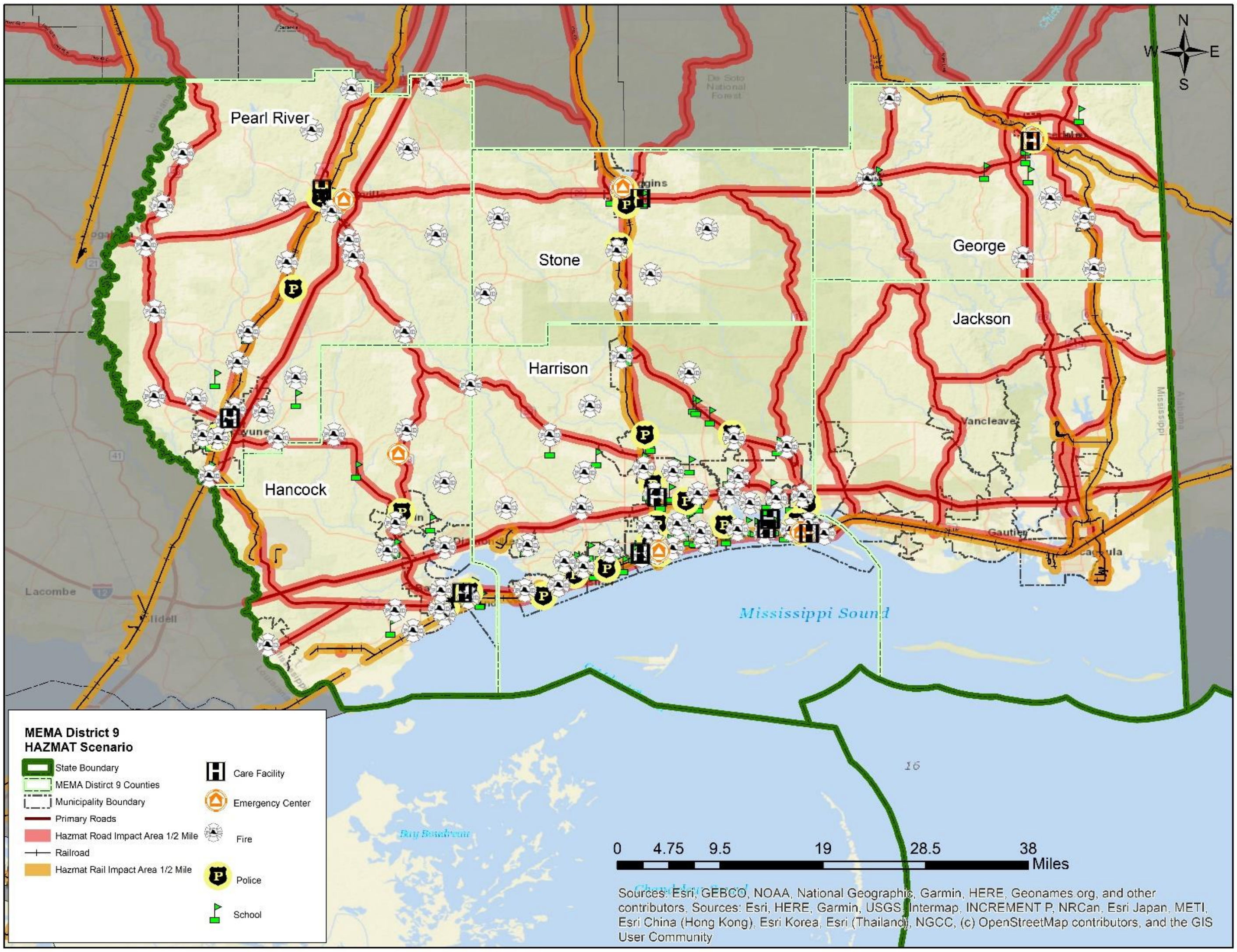


Table 55 EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
George County*	5,153	$987,684,000	6,279	$1,175,140,000
Lucedale	1,351	$306,348,000	1,538	$335,976,000

Unincorporated Area	3,802	$681,336,000	4,741	$839,164,000
Hancock County	14,905	$316,655,664	24,394	$593,991,975
Bay St. Louis	3,091	$73,331,871	5,153	$115,765,377
Diamondhead	1,144	$94,088,219	2,515	$232,470,277
Waveland	1,553	$26,881,381	2,902	$57,568,580
Unincorporated Area	9,117	$122,354,193	13,824	$188,187,741
Harrison County	39,552	$2,649,073,410	71,896	$4,093,838,350
Biloxi	8,799	$682,254,259	15,629	$1,016,578,586

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
D'Iberville	3,119	$166,129,238	4,714	$228,825,255
Gulfport	14,873	$858,010,293	27,596	$1,412,706,984
Long Beach	2,056	$104,404,162	4,838	$226,495,377
Pass Christian	1,761	$78,050,457	3,009	$128,363,439
Unincorporated Area	8,944	$760,225,001	16,110	$1,080,868,709
Jackson County	30,471	$1,710,795,370	53,653	$2,859,260,310
Gautier	2,038	$128,322,620	3,973	$231,157,040
Moss Point	6,704	$250,007,730	10,082	$360,729,220
Ocean Springs	6,109	$560,929,950	9,412	$825,611,110
Pascagoula	4,913	$365,649,400	9,604	$599,308,610
Unincorporated Area	10,707	$405,885,670	20,582	$842,454,330
Pearl River County*	20,861	$3,111,426,000	30,502	$3,632,518,000
Picayune	4,438	$1,133,195,000	5,927	$1,244,649,000
Poplarville	1,941	$315,740,000	1,964	$321,992,000
Unincorporated Area	14,482	$1,662,491,000	22,611	$2,065,877,000
Stone County	6,348	$178,594,920	8,927	$243,035,752
Wiggins	2,630	$106,292,189	3,183	$126,862,624
Unincorporated Area	3,718	$72,302,731	5,744	$116,173,128
MEMA DISTRICT 9 REGION TOTAL	117,290	$8,954,229,364	195,651	$12,597,784,387

* As noted above, building footprints and parcel data were not available for George County and parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.

Source: NHPN, MDEQ, Hazus MH 3.2 Data

Table 166 EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
George County*	2,497	$464,854,000	3,409	$646,775,000
Lucedale	457	$115,711,000	864	$210,193,000
Unincorporated Area	2,040	$349,143,000	2,545	$436,582,000
Hancock County	5,779	$97,328,276	9,363	$165,995,878

Bay St. Louis	2,602	$50,395,193	4,125	$81,202,156
Diamondhead	0	$0	0	$0
Waveland	2,093	$41,357,755	3,346	$70,790,946
Unincorporated Area	1,084	$5,575,328	1,892	$14,002,776

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Harrison County	32,551	$2,011,623,453	52,255	$2,011,623,453
Biloxi	8,278	$464,061,769	12,404	$464,061,769
D'Iberville	0	$0	0	$0
Gulfport	15,657	$873,267,174	26,556	$873,267,174
Long Beach	4,006	$183,255,865	5,514	$183,255,865
Pass Christian	2,484	$96,055,588	3,079	$96,055,588
Unincorporated Area	2,126	$394,983,057	4,702	$394,983,057
Jackson County	22,962	$1,317,989,340	41,658	$2,279,194,530
Gautier	2,105	$96,599,920	4,241	$229,056,300
Moss Point	4,380	$143,660,210	8,047	$285,876,040
Ocean Springs	5,349	$502,955,290	9,255	$811,896,650
Pascagoula	5,903	$415,698,900	11,166	$649,874,460
Unincorporated Area	5,225	$159,075,020	8,949	$302,491,080
Pearl River County*	10,128	$1,651,755,000	15,569	$2,253,555,000
Picayune	3,863	$855,158,000	5,742	$1,159,817,000
Poplarville	1,163	$189,638,000	1,704	$287,734,000
Unincorporated Area	5,102	$606,959,000	8,123	$806,004,000
Stone County	3,396	$98,682,350	5,074	$154,641,393
Wiggins	1,729	$62,551,284	2,535	$102,100,359
Unincorporated Area	1,667	$36,131,066	2,539	$52,541,034
MEMA DISTRICT 9 REGION TOTAL	77,313	$5,642,232,419	127,328	$7,511,785,254

* As noted above, building footprints and parcel data were not available for George County and parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.
Source: USDOT FRA, MDEQ, Hazus MH 3.2 Data

SOCIAL VULNERABILITY

Given high susceptibility across the entire MEMA District 9 Region, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

CRITICAL FACILITIES

Fixed Site Analysis:
The critical facility analysis for fixed TRI sites revealed that there are 103 facilities located in a fixed HAZMAT risk zone. Of these, 28 facilities are in the primary (0.5 mile) risk area including 1 fire station, 1 medical, 1 police station, 5 power/gas, 4 private/non-profit, 3 public facilities, 4 schools, 3 special populations, and 6 water/wastewater. A list of specific critical facilities and their associated risk can be found in Table 6.18 at the end of this section.

Mobile Analysis:
The critical facility analysis for transportation corridors revealed that there are 707 facilities located in the primary and secondary road HAZMAT buffer areas. There were 514 critical facilities located in the primary risk zone.

For the rail line buffer areas, there were a total of 560 critical facilities located in primary and secondary buffer areas. Of these, 371 facilities are located within the primary buffer area.

A list of specific critical facilities and their associated risk can be found in Table 6.18 at the end of this section.

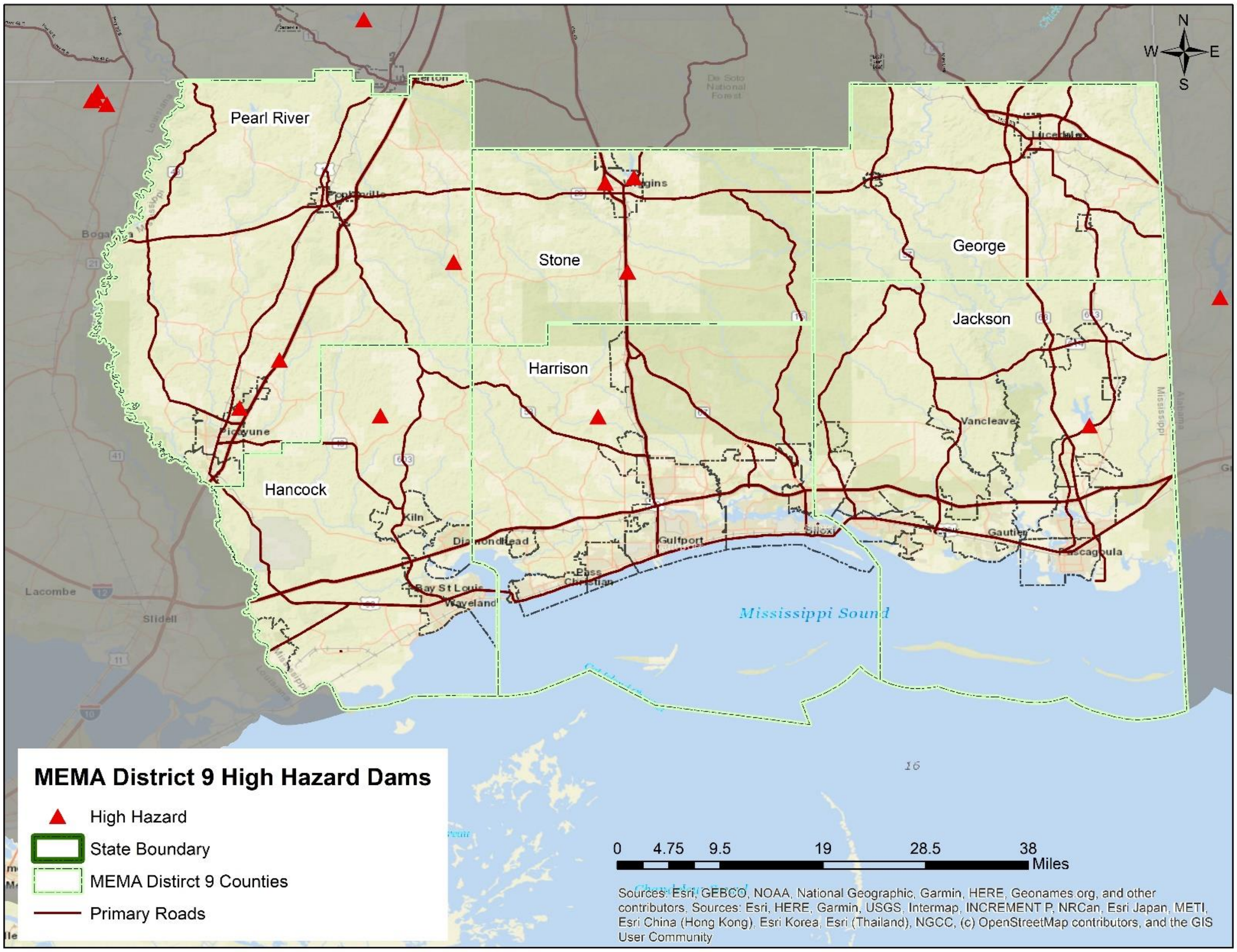
In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in the MEMA District 9 Region. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in condition that could alter the impact area (i.e., direction and speed of wind, volume of release, etc.).

Dam/Levee Failure
In order to assess risk to a dam or levee failure, a GIS-based analysis was used to estimate exposure to one of the areas delineated by the Mississippi Department of Environmental Quality as a potential inundation area in the event of a failure. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified inundation area. As mentioned previously, this type of inundation mapping has not been completed for every dam/levee in the region, so the results of this analysis likely underestimate the overall vulnerability to a dam or levee failure. However, the analysis is still useful as a sort of baseline minimum of property that is potentially at-risk. The identified inundation areas can be found in Figure 6.11.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table 6.14 presents the potential at-risk property. Both the number of buildings and the approximate improved value are presented.

Figure 54 High Hazard Dams in MEMA DISTRICT 9



Source: United State Corps of Engineers (USACE)

Table 57 Estimated Exposure of Improvements to the Dam/Levee Failure Hazard

Location	Dam Inundation Area	
	Approx. Number of Buildings	Approx. Improved Value
George County*	0	$0
Lucedale	0	$0
Unincorporated Area	0	$0
Hancock County	92	$1,852,055
Bay St. Louis	0	$0
Diamondhead	0	$0

Waveland	0	$0
Unincorporated Area	92	$1,852,055
Harrison County	0	$0
Biloxi	0	$0
D'Iberville	0	$0
Gulfport	0	$0

Location	Dam Inundation Area	
	Approx. Number of Buildings	Approx. Improved Value
Long Beach	0	$0
Pass Christian	0	$0
Unincorporated Area	0	$0
Jackson County†	1	$0
Gautier	0	$0
Moss Point	0	$0
Ocean Springs	0	$0
Pascagoula	0	$0
Unincorporated Area	1	$0
Pearl River County*	86	$70,289,000
Picayune	0	$0
Poplarville	0	$0
Unincorporated Area	86	$70,289,000
Stone County	29	$1,150,188
Wiggins	18	$808,698
Unincorporated Area	11	$341,490
MEMA DISTRICT 9 REGION TOTAL	208	$73,291,243

As noted above, building footprints and parcel data were not available for George County and parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.

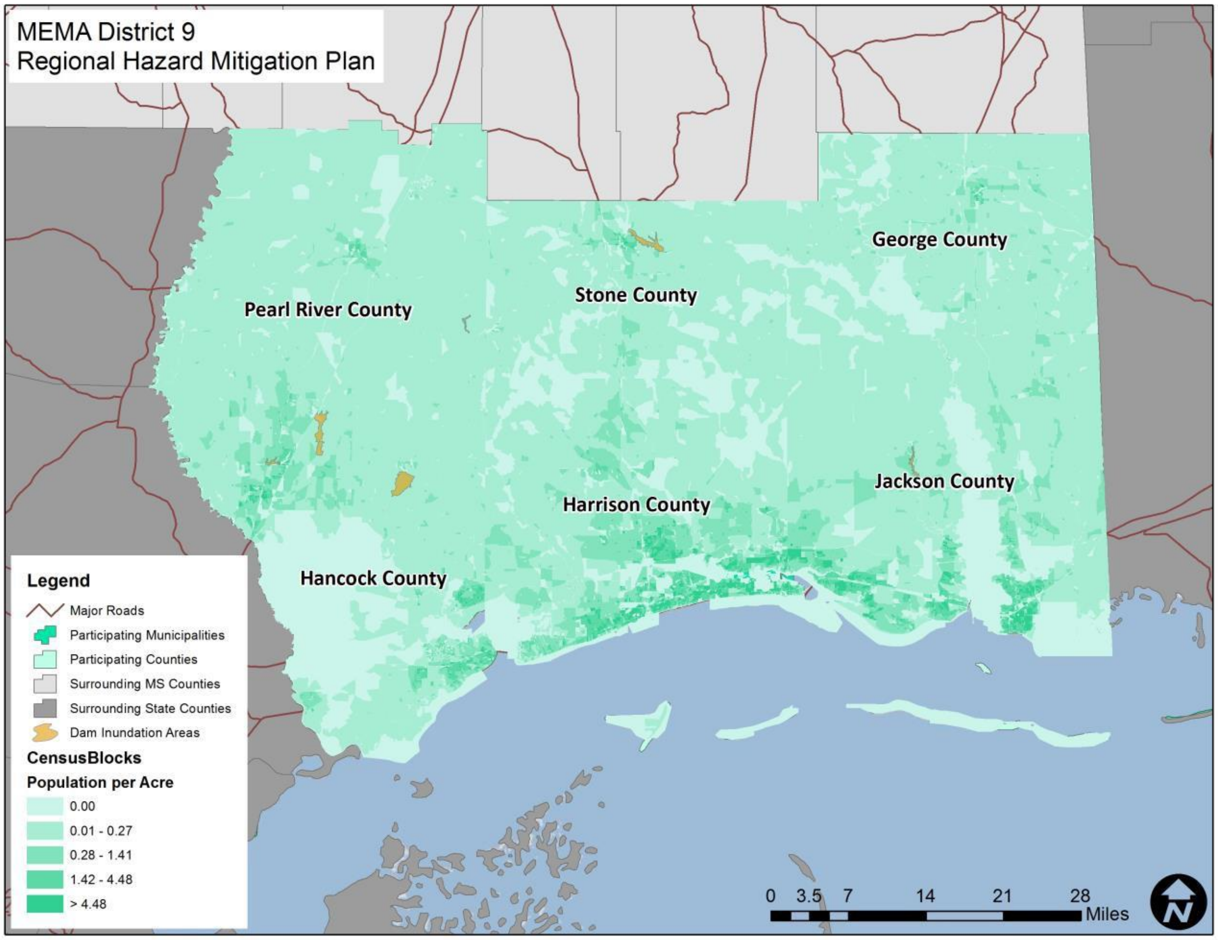
†This does not include areas that would be inundated by the Big Creek Lake Dam, located in Alabama as geospatial data for the inundation area was not available.

Source: MDEQ, Hazus 3.2

SOCIAL VULNERABILITY

Figure 6.12 is presented to gain a better understanding of at-risk population by evaluating census block level population data against dam inundation areas. There are areas of concern in several of the counties in this region, although it should be noted that most of the population of the region is not at risk to a dam/levee failure.

Figure 56 POPULATION DENSITY NEAR DAM INUNDATION AREAS IN THE MEMA District 9 Region



Source: MDEQ, United States Census 2010

CRITICAL FACILITIES

The critical facility analysis revealed that there are 2 facilities located in dam inundation areas. One of these facilities is a dam itself in Stone County, so it is not surprising that it is located in the inundation area. The other facility is a fire station in Pearl River County. A list of specific critical facilities and their associated risk can be found in Table 6.18 at the end of this section.

In conclusion, a dam has the potential to impact a number of existing and future buildings, facilities, and populations in the MEMA District 9 Region, though this analysis is not all-encompassing in terms of risk to a dam or levee failure because inundation mapping is not available for all dams in the region.

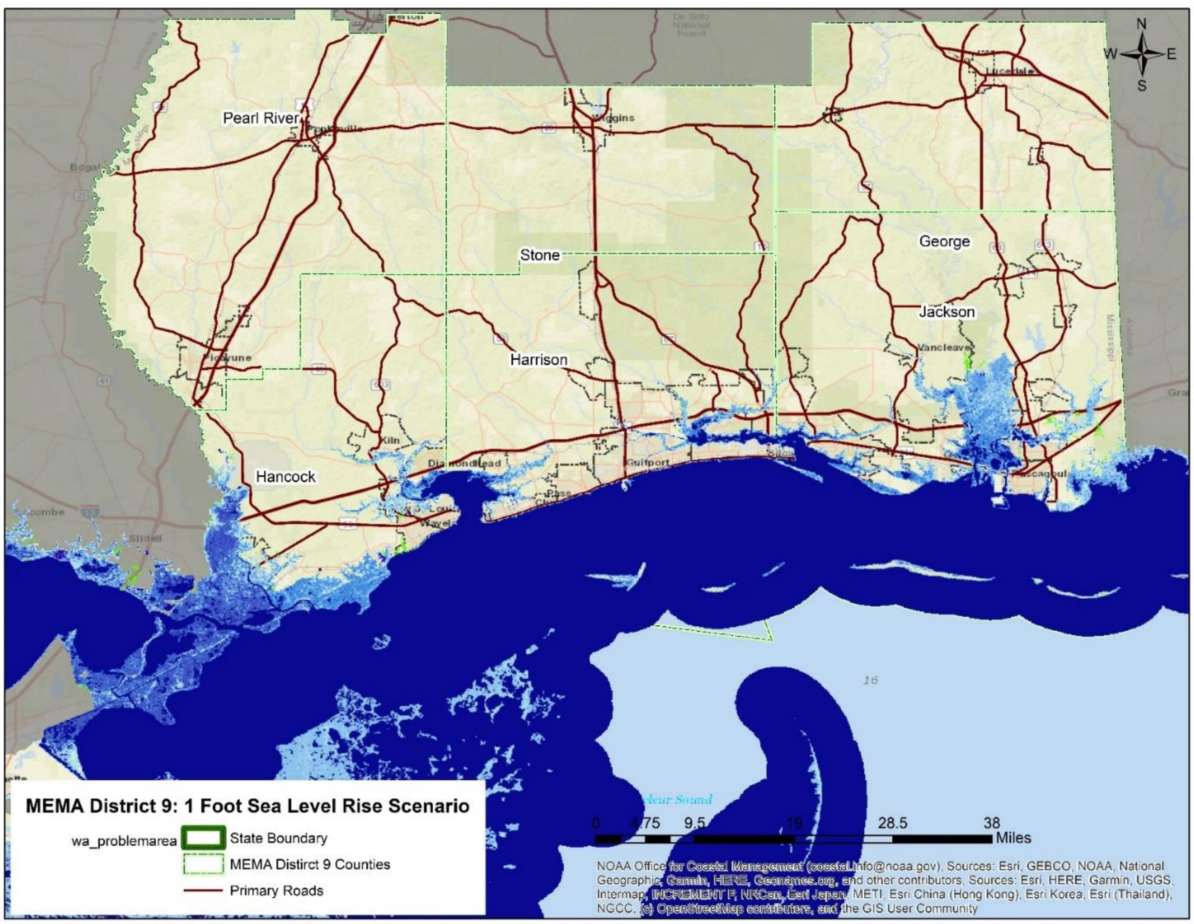
Climate Change/Sea Level Rise

Most assessments carried out across the globe have concluded that climate change is a phenomenon that will impact our planet in the foreseeable future. Among others, the National Climate Assessment, International Panel on Climate Change, and National Oceanic and Atmospheric Administration all project that climate change will impact the United States and will have a major impact on coastal communities due to the effects of sea level rise. As such, projections concerning sea level rise are important to incorporate into planning efforts in order to identify people and property that may be impacted.

In order to assess sea level rise risk, a GIS-based analysis was used to estimate exposure to future projections of sea level rise using data produced by the National Oceanic and Atmospheric Administration in combination with improved property records for each of the MEMA District 9 Counties. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within the inundation zone that would be created in the event of 1 foot, 3 feet, and 6 feet of sea level rise. A number of different sea level rise scenarios were available via NOAA (from 1 foot to 6 feet, at 1 foot intervals), however these scenarios were selected to demonstrate a range of potential sea level rise scenarios from low to moderate to high projections. These scenarios can be found in Figure 6.13, Figure 6.14, and Figure 6.15.

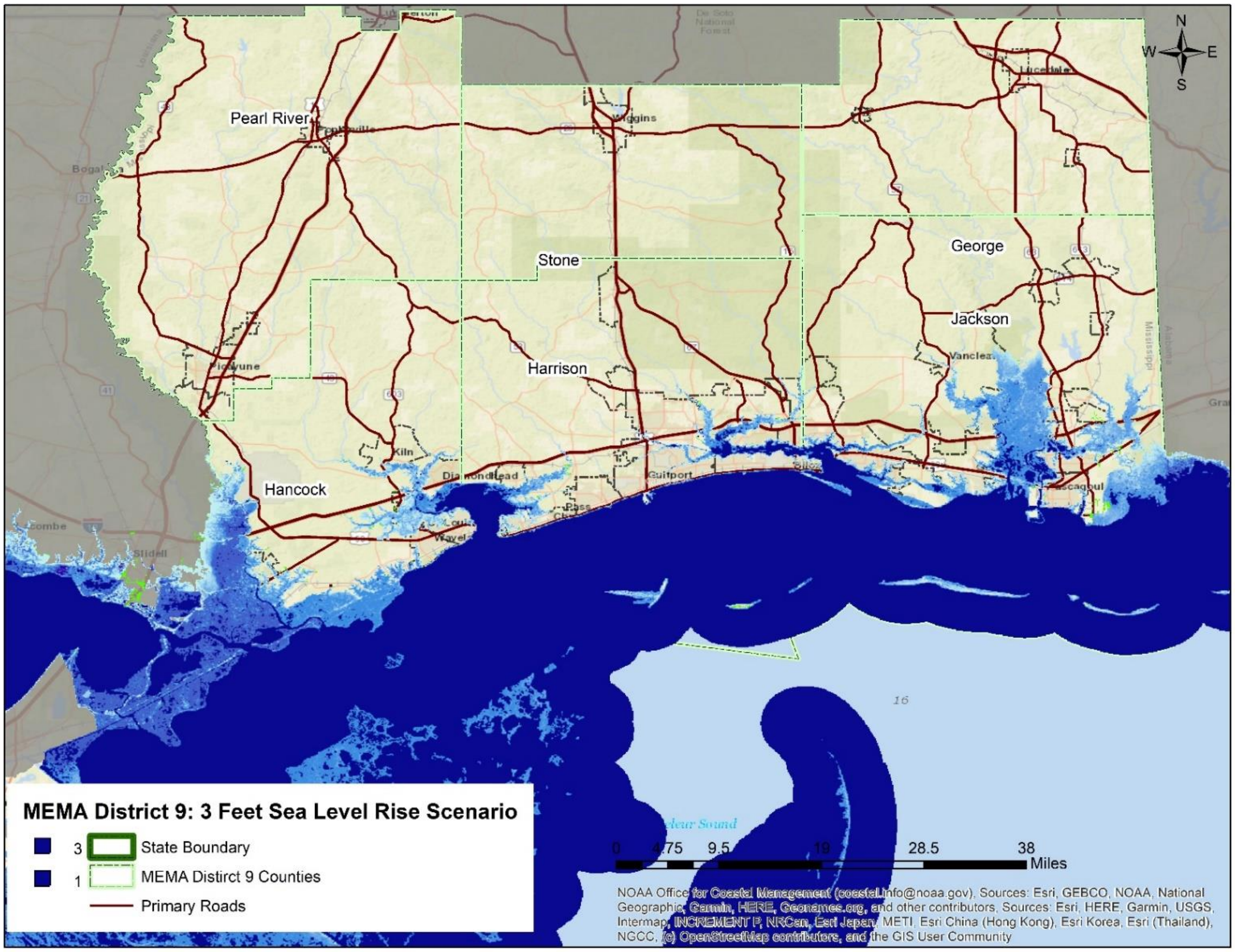
Table 6.15 presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

Figure 57 1 FOOT SEA LEVEL RISE SCENARIO IN THE MEMA DISTRICT 9 REGION



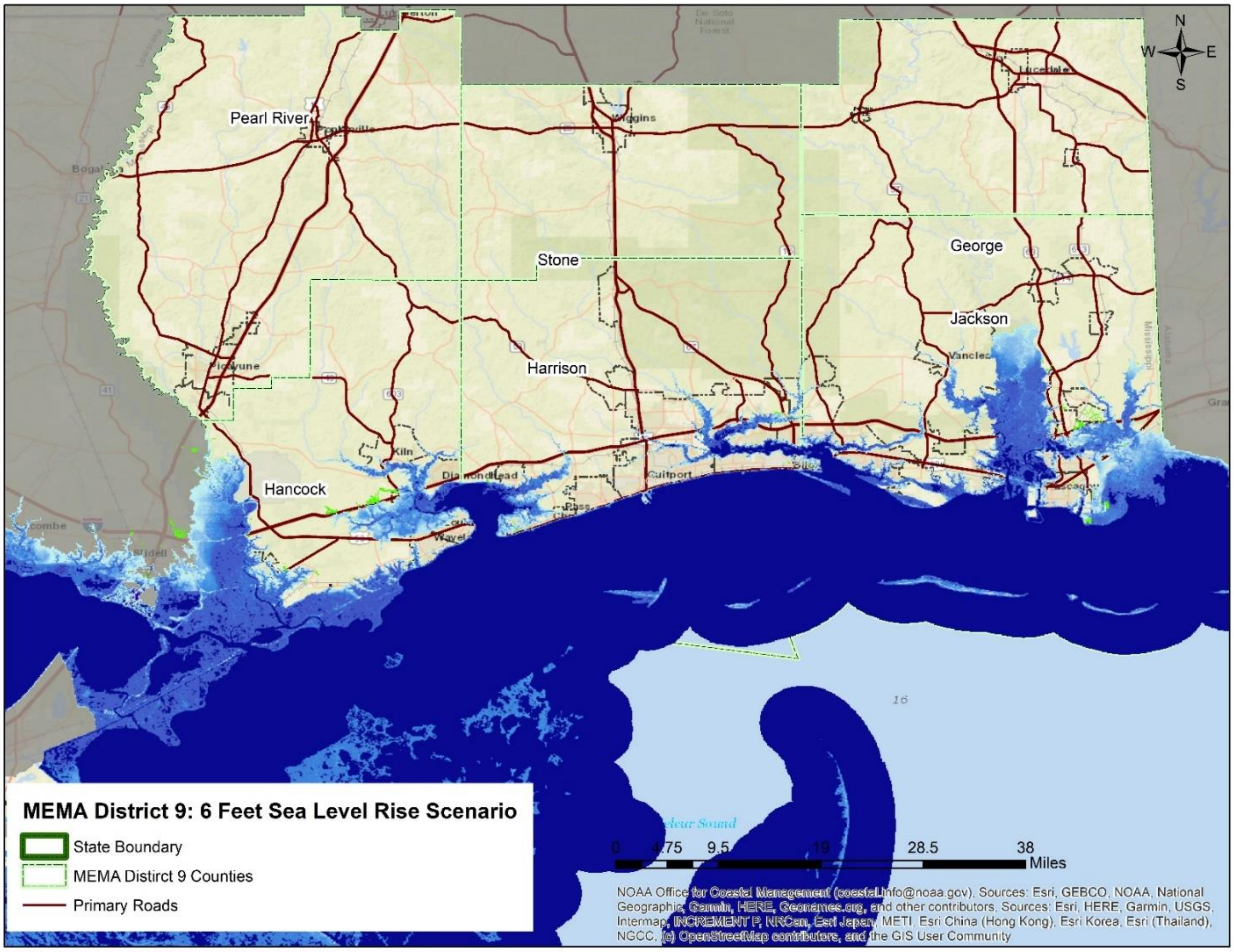
Source: NOAA

Figure 58 3 FEET SEA LEVEL RISE SCENARIO IN THE MEMA DISTRICT 9 REGION



Source: NOAA

Figure 59 6 FEET SEA LEVEL RISE SCENARIO IN THE MEMA DISTRICT 9 REGION



Source:

source: NOAA

Table 58 ESTIMATED EXPOSURE OF PARCELS TO THE SEA LEVEL RISE HAZARD

Location	1.0 foot		3.0 feet		6.0 feet	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
George County*	11	$2,708,000	11	$2,708,000	11	$2,708,000
Lucedale	0	0	0	0	0	0
Unincorporated Area	11	$2,708,000	11	$2,708,000	11	$2,708,000
Hancock County	248	$6,391,403	2,755	$43,175,392	5,357	$78,630,485
Bay St. Louis	0	$0	7	$282,410	61	$1,200,443
Diamondhead	30	$2,087,223	52	$3,752,217	115	$8,691,488
Waveland	0	$0	0	$0	36	$264,371

Unincorporated Area	248	$6,391,403	2,748	$42,892,982	5,296	$77,430,042
Harrison County	406	$628,588,092	740	$658,601,989	2,446	$838,354,843
Biloxi	141	$152,875,152	217	$160,571,178	574	$253,581,853

Location	1.0 foot		3.0 feet		6.0 feet	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
D'Iberville	3	$88,805	3	$88,805	37	$3,062,657
Gulfport	104	$13,795,779	202	$20,682,997	542	$52,554,190
Long Beach	0	$0	0	$0	0	$0
Pass Christian	36	$3,060,166	122	$11,788,951	701	$46,934,462
Unincorporated Area	265	$475,712,940	523	$498,030,811	1,872	$584,772,990
Jackson County	919	$63,575,980	2,417	$174,291,150	7,501	$374,562,550
Gautier	110	$8,651,090	371	$29,086,520	773	$49,712,830
Moss Point	71	$5,883,400	244	$17,686,870	1,550	$56,765,010
Ocean Springs	49	$12,727,870	118	$24,058,690	278	$47,884,160
Pascagoula	65	$6,319,600	245	$28,427,260	1,102	$73,423,870
Unincorporated Area	809	$54,924,890	2,046	$145,204,630	6,728	$324,849,720
Pearl River County*	0	$0	0	$0	0	$0
Picayune	0	$0	0	$0	0	$0
Poplarville	0	$0	0	$0	0	$0
Unincorporated Area	0	$0	0	$0	0	$0
Stone County	0	$0	0	$0	0	$0
Wiggins	0	$0	0	$0	0	$0
Unincorporated Area	0	$0	0	$0	0	$0
MEMA DISTRICT 9 REGION TOTAL	1,584	$701,263,475	5,923	$878,776,531	$15,315	$1,294,255,878

* As noted above, building footprints and parcel data were not available for George County and parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.

Source: NOAA, MDEQ, Hazus MH 3.2 Data

Table 59 SUMMARY OF CLIMATE PROJECTIONS FOR A 70 YEAR TIME RANGE MEMA DISTRICT 9 REGION

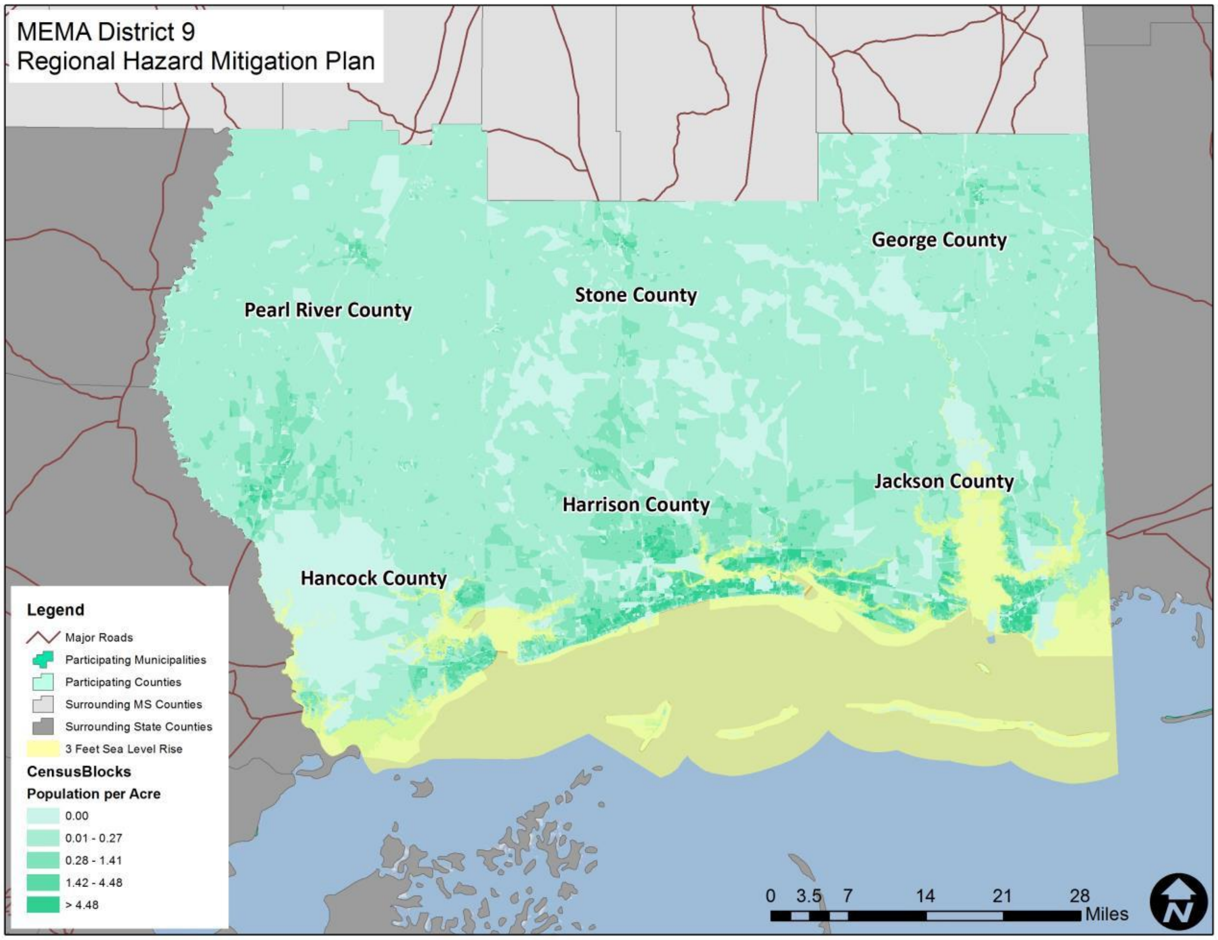
Jurisdiction	Days per year above 95 degrees	Average Annual Temperature	Days per year with precipitation above 1”	Average Annual Precipitation
George County	82 more days	+6	0.2 more days	0.6” decrease
Hancock County	81 more days	+6	0.09 more days	1.5” decrease
Harrison County	82 more days	+6	0.19 more days	1.1” decrease
Jackson County	82 more days	+6	0.3 more days	0.3” decrease
Pearl River County	80 more days	+6	0.09 more days	1.2” decrease
Stone County	81 more days	+6	0.11 more days	1.1” decrease
MEMA District 9	**81.3 more days**	**+6**	**0.16 more days**	**0.97” decrease**

Neighborhoods at Risk (headwaterseconomics.org)

SOCIAL VULNERABILITY

Figure 6.16 is presented to gain a better understanding of at-risk population by evaluating census block level population data against the 3 feet sea level rise scenario. The three feet scenario was selected since this is a moderate level projection. Based on this analysis, a significant part of the coastal population in the region is vulnerable to sea level rise.

Figure 60 POPULATION DENSITY WITH 3 FEET SEA LEVEL RISE IN THE



Source: NOAA, United States Census 2010

CRITICAL FACILITIES

The critical facility analysis revealed that there are 23 facilities located in the 3 feet of sea level rise scenario inundation area. As mentioned above, this scenario was selected as it is a mid-range projection for sea level rise based on a number of studies. The 23 facilities include 3 private/non-profit, 4 public facilities, 1 special population, 10 transportation, and 5 water/wastewater. A list of specific critical facilities and their associated risk can be found in Table 6.18 at the end of this section.

CONCLUSIONS ON HAZARD VULNERABILITY

The results of this vulnerability assessment are useful in at least three ways:

- Improving our understanding of the risk associated with the hazards in the MEMA District 9 Region through better understanding of the complexities and dynamics of risk, how levels of risk can be measured and compared, and the myriad of factors that influence risk. An understanding of these relationships is critical in making balanced and informed decisions on managing the risk.

- Providing a baseline for policy development and comparison of mitigation alternatives. The data used for this analysis presents a current picture of risk in the MEMA District 9 Region. Updating this risk "snapshot" with future data will enable comparison of the changes in risk with time. Baselines of this type can support the objective analysis of policy and program options for risk reduction in the region.

- Comparing the risk among the hazards addressed. The ability to quantify the risk to all these hazards relative to one another helps in a balanced, multi-hazard approach to risk management at each level of governing authority. This ranking provides a systematic framework to compare and prioritize the very disparate hazards that are present in the MEMA District 9 Region. This final step in the risk assessment provides the necessary information for local officials to craft a mitigation strategy to focus resources on only those hazards that pose the most threat to the MEMA District 9 counties.

Exposure to hazards can be an indicator of vulnerability. Economic exposure can be identified through values for improvements (buildings), and social exposure can be identified by estimating the population exposed to each hazard. This information is especially important for decision-makers to use in planning for evacuation or other public safety related needs.

The types of assets included in these analyses include all building types in the participating jurisdictions. Specific information about the types of assets that are vulnerable to the identified hazards is included in each hazard subsection (for example all building types are considered at risk to the winter weather hazard).

Table 6.16 presents an overall summary of the community's vulnerability for each jurisdiction. This summary provides key problem statements and identifies the community's greatest vulnerabilities that will be addressed in the mitigation strategy.

Table 60 SUMMARY OF VULNERABILITY FOR THE MEMADISTRICT 9 REGION

	Key Problem Statements
George County	George County and Lucedale have a large amount of timber, open, and agriculture land, creating an enhanced risk to wildfires across the county. The county is also more vulnerable to drought which can damage crop yields or reduce stock and crop production in the agricultural sector, resulting in economic loss.
Hancock County	Hancock County, Bay St. Louis, Diamondhead, and Waveland have many low-lying neighborhoods and streets that are especially vulnerable to coastal flooding and storm surge. Vulnerable and at- risk populations including low-income, minority, elderly, or disabled persons disproportionately live in flood prone areas. Additionally, many employers like casinos, resorts, and hotels are located in these vulnerable locations. Disruption or loss of these employers and facilities can result in significant unemployment, economic loss, and migration from the county and cities.

	Key Problem Statements
Harrison County	Harrison County, Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian have many low-lying neighborhoods and streets that are especially vulnerable to coastal flooding and storm surge. Vulnerable and at-risk populations including low-income, minority, elderly, or disabled persons disproportionately live in flood prone areas. Additionally, many employers like casinos, resorts, and hotels are located in these vulnerable locations. Disruption or loss of these employers and facilities can result in significant unemployment, economic loss, and migration from the county and cities.
Jackson County	Jackson County, Gautier, Moss Point, Ocean Springs, and Pascagoula have many low-lying neighborhoods and streets that are especially vulnerable to coastal flooding and storm surge. Vulnerable and at-risk populations including low-income, minority, elderly, or disabled persons disproportionately live in flood prone areas. Additionally, many employers like casinos, resorts, and hotels are located in these vulnerable locations. Disruption or loss of these employers and facilities can result in significant unemployment, economic loss, and migration from the county and cities.
Pearl River County	Pearl River, Picayune, and Poplarville have a large amount of timber, open, and agriculture land, creating an enhanced risk to wildfires across the county. The county is also more vulnerable to drought which can damage crop yields or reduce stock and crop production in the agricultural sector, resulting in economic loss.
Stone County	Stone County and Wiggins have a large amount of timber, open, and agriculture land, creating an enhanced risk to wildfires across the county. The county is also more vulnerable to drought which can damage crop yields or reduce stock and crop production in the agricultural sector, resulting in economic loss.

Table 61 presents a summary of annualized loss for each hazard in the MEMA District 9 Region. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported from historical occurrences at the county level. These values should be used as an additional planning tool or measure of risk for determining hazard mitigation strategies throughout the region.

It should also be noted that many of these estimates are based on incomplete data and likely underestimate the historic dollar damage sustained in each county. Especially for hazards such as extreme cold, extreme heat, hail, lightning, and winter weather, it is very likely that more damage occurred historically than has been identified.

TABLE 61: ANNUALIZED LOSS FOR THE MEMADISTRICT 9 REGION

Hazard	George County	Hancock County	Harrison County	Jackson County	Pearl River County	Stone County
Flood-related Hazards						
Dam and Levee Failure	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Erosion	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Flood	$97,859	$49,864	$138,210	$170,879	$178,517	$10,263
Storm Surge	$0	$174,355,148	$289,917,711	$115,769,853	$0	$0
Fire-related Hazards						
Drought	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Lightning	$7,722	$15,481	$15,400	$12,909	$5,115	$4,538
Wildfire	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Geologic Hazards						
Earthquake†	$2,000	$4,000	$21,000	$12,000	$5,000	$2,000
Wind-related Hazards						
Extreme Cold	$0	$0	$0	$7,675	$0	$0
Extreme Heat/Heat Wave	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Hailstorm	$12	$0	$0	$5	$0	$0
Hurricane and Tropical Storm	$2,476,877	$97,894,098	$208,420,678	$101,235,648	$76,274,291	$19,180,679
Severe Thunderstorm/ High Wind	$18,092	$7,937	$18,867	$7,514	$119,474	$19,273
Tornado	$88,811	$1,128,251	$4,084,317	$133,610	$144,022	$26,082
Winter Weather	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Other Hazards						
Climate Change/Sea Level Rise	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Hazardous Materials Incident/Train Derailment	$3,866	$8,313	$11,489	$25,777	$7,961	$2,997
Infectious Disease	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available

†Historic dollar damage was not available for this hazard, but since estimated annualized losses from Hazus were available, those numbers were used in this table.

*In this table, the term "Not Available" is used to indicate that no records of dollar losses for the particular hazard were recorded. This could be the case either because there were no events that caused dollar damage or because documentation of that particular type of event is not well kept.

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to impacts from atmospheric hazards such as drought and hailstorm. Some buildings may be more vulnerable to some of these hazards based on locations, construction, and building type. In addition, all populations are vulnerable to hazards like infectious disease which could presumably impact any segment of the population without regard to geographic location. Table 6.18 shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an “X”).

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SECTION 7

SECTION 7 CAPABILITY ASSESSMENT

This section of the Plan discusses the capability of the MEMA District 9 Region to implement hazard mitigation activities. It consists of the following four subsections:

WHAT IS A CAPABILITY ASSESSMENT?

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects.1 As in any planning process, it is important to try to establish which goals, objectives, and/or actions are feasible based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. A capability assessment helps to determine which mitigation actions are practical, and likely to be implemented over time, given a local government's planning and regulatory framework, level of administrative and technical support, amount of fiscal resources, and current political climate.

A capability assessment has two primary components: 1) an inventory of a local jurisdiction's relevant plans, ordinances, or programs already in place and 2) an analysis of its capacity to carry them out. Careful examination of local capabilities will detect any existing gaps, shortfalls, or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. A capability assessment also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts.

The capability assessment completed for the MEMA District 9 Region serves as a critical planning step and an integral part of the foundation for designing an effective hazard mitigation strategy. Coupled with the Risk Assessment, the Capability Assessment helps identify and target meaningful mitigation actions for incorporation in the Mitigation Strategy portion of the Hazard Mitigation Plan. It not only helps establish the goals and objectives for the region to pursue under this Plan, but it also ensures that those goals and objectives are realistically achievable under given local conditions.

1 While the Final Rule for implementing the Disaster Mitigation Act of 2000 does not require a local capability assessment to be completed for local hazard mitigation plans, it is a critical step in developing a mitigation strategy that meets the needs of the region while taking into account their own unique abilities. The Rule does state that a community's mitigation strategy should be "based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools" (44 CFR, Part 201.6(c)(3)).

CONDUCTING THE CAPABILITY ASSESSMENT

In order to facilitate the inventory and analysis of local government capabilities within the MEMA District 9 counties, a detailed Capability Assessment Survey was completed for each of the participating jurisdictions based on the information found in existing hazard mitigation plans and local government websites. The survey questionnaire compiled information on a variety of “capability indicators” such as existing local plans, policies, programs, or ordinances that contribute to and/or hinder the region’s ability to implement hazard mitigation actions. Other indicators included information related to the region’s fiscal, administrative, and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes. The current political climate, an important consideration for any local planning or decision making process, was also evaluated with respect to hazard mitigation.

At a minimum, survey results provide an extensive inventory of existing local plans, ordinances, programs, and resources that are in place or under development in addition to their overall effect on hazard loss reduction. However, the survey instrument can also serve to identify gaps, weaknesses, or conflicts that counties and local jurisdictions can recast as opportunities for specific actions to be proposed as part of the hazard mitigation strategy.

The information collected in the survey questionnaire was incorporated into a database for further analysis. A general scoring methodology was then applied to quantify each jurisdiction’s overall capability. According to the scoring system, each capability indicator was assigned a point value based on its relevance to hazard mitigation.

Using this scoring methodology, a total score and an overall capability rating of “high,” “moderate,” or “limited” could be determined according to the total number of points received. These classifications are designed to provide nothing more than a general assessment of local government capability. The results of this capability assessment provide critical information for developing an effective and meaningful mitigation strategy.

CAPABILITY ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this Plan to provide insight into the relevant capacity of the MEMA District 9 Region to implement hazard mitigation activities. All information is based upon the review of existing hazard mitigation plans and local government websites through the Capability Assessment Survey and input provided by local government officials during meetings of the MEMA District 9 Region Hazard Mitigation Council.

Planning and Regulatory Capability

Planning and regulatory capability is based on the implementation of plans, ordinances, and programs that demonstrate a local jurisdiction’s commitment to guiding and managing growth, development, and redevelopment in a responsible manner while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning, and transportation planning; the enforcement of zoning or subdivision ordinances and building codes that regulate how land is developed and structures are built; as well as protecting environmental, historic, and cultural resources in the community. Although some conflicts can arise, these planning initiatives generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools and programs that are in place or under development for the MEMA District 9 Region along with their potential effect on loss reduction. This information will help identify opportunities to address existing gaps, weaknesses, or conflicts with other initiatives in addition to integrating the implementation of this Plan with existing planning mechanisms where appropriate.

Table 7.1 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for the MEMA District 9 Region. An x (x) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. A dagger (†) indicates that the given item is administered for that municipality by the county. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the MEMA District 9 Regional Hazard Mitigation Plan.

TABLE 7.1: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning/Regulatory Tool	GEORGE COUNTY	Lucedale	HANCOCK COUNTY	Bay St. Louis	Diamondhead	Waveland	HARRISON COUNTY	Biloxi	D'Iberville	Gulfport	Long Beach	Pass Christian	JACKSON COUNTY	Gautier	Moss Point	Ocean Springs	Pascagoula	PEARL RIVER COUNTY	Picayune	Poplarville	STONE COUNTY	Wiggins
Hazard Mitigation Plan		x	x	x	†	x	x	x	x	x	x	x	x	†	x	x	x	x	†	†	x	†
Threat and Hazard Identification and Risk Assessment (THIRA)																						
Comprehensive Land Use Plan	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Floodplain Management Plan/Flood Mitigation Plan			x		†		x	x		x	x	x										
Open Space Management Plan (Parks & Rec/Greenway Plan)			x				x							x			x					
Stormwater Management Plan/Ordinance			x	x	x	x	x	x	x	x	x	x	x	x		x	x					
Natural Resource Protection Plan			x	†		†	x	†		†	†	†										
Flood Response Plan							x															
Emergency Operations Plan	x	†	x	†	†	†	x	x	x	x	x	x	x	x	x	x	x	x	x	†	x	†
Emergency Management Accreditation Program (EMAP Accreditation)																						
Continuity of Operations Plan									x													
Evacuation Plan			x	†	†	†	x	†	†	†	†	†	x	†	†	†	†					

Planning/Regulatory Tool	GEORGE COUNTY	Lucedale	HANCOCK COUNTY	Bay St. Louis	Diamondhead	Waveland	HARRISON COUNTY	Biloxi	D'Iberville	Gulfport	Long Beach	Pass Christian	JACKSON COUNTY	Gautier	Moss Point	Ocean Springs	Pascagoula	PEARL RIVER COUNTY	Picayune	Poplarville	STONE COUNTY	Wiggins
Disaster Recovery Plan							x														x	x
Capital Improvements Plan					x	x					x	x		x					x		x	
Economic Development Plan	x	†	x	†	†	†	x	†	†	†	†	†	x	†	†	†	†	x	†	†	x	†
Historic Preservation Plan																						
Flood Damage Prevention Ordinance	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Zoning Ordinance	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x		x
Subdivision Ordinance	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Unified Development Ordinance								x						x		x	x					x
Post-Disaster Redevelopment/ Reconstruction Plan/Ordinance																						
Building Code		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Fire Code	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
National Flood Insurance Program (NFIP)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
NFIP Community Rating System (CRS Program)				x		x	x	x	x	x	x	x	x	x		x	x	x	x		x	

A more detailed discussion on the region's planning and regulatory capability follows.

Emergency Management

Hazard mitigation is widely recognized as one of the four primary phases of emergency management. The three other phases include preparedness, response, and recovery. In reality, each phase is interconnected with hazard mitigation, as Figure 7.1 suggests. Opportunities to reduce potential losses through mitigation practices are most often implemented before disaster strikes, such as the elevation of flood prone structures or the continuous enforcement of policies that prevent and regulate development that is vulnerable to hazards due to its location, design, or other characteristics. Mitigation opportunities will also be presented during immediate preparedness or response activities, such as installing storm shutters in advance of a hurricane, and certainly during the long-term recovery and redevelopment process following a hazard event.

FIGURE 7.1: THE FOUR PHASES OF EMERGENCY MANAGEMENT

Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions. As a result, the Capability Assessment Survey asked several questions across a range of emergency management plans in order to assess the MEMA District 9 Region's willingness to plan and their level of technical planning proficiency.

Hazard Mitigation Plan: A hazard mitigation plan represents a community's blueprint for how it intends to reduce the impact of natural and human-caused hazards on people and the built environment. The essential elements of a hazard mitigation plan include a risk assessment, capability assessment, and mitigation strategy.

- Each of the 6 counties participating in this multi-jurisdictional plan has previously adopted a hazard mitigation plan. Several participating municipalities were included in their respective county's plan, including the cities of Diamondhead, Gautier, Picayune, Poplarville, and Wiggins. Each of the remaining participating municipalities has previously adopted a municipal-level hazard mitigation plan.

Threat and Hazard Identification and Risk Assessment (THIRA): A THIRA is a comprehensive risk assessment process that helps a community understand its risks and estimate capability requirements. Outputs of the THIRA process can inform a variety of disaster preparedness and emergency management efforts, including emergency operations planning, mutual aid agreements, and hazard mitigation planning.

- None of the counties or municipalities participating in this multi-jurisdictional plan has completed a THIRA process. The counties should consider conducting a THIRA process to improve their understanding of risks and the resources required to prepare for those risks.

Disaster Recovery Plan: A disaster recovery plan serves to guide the physical, social, environmental, and economic recovery and reconstruction process following a disaster. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans with the intent of capitalizing on opportunities to break the cycle of repetitive disaster losses. Disaster recovery plans can also lead to the preparation of disaster redevelopment policies and ordinances to be enacted following a hazard event.

Harrison County and Stone County are the only two counties participating in this multi- jurisdictional plan that have adopted a disaster recovery plan. The City of Wiggins is included in the Stone County plan.

Emergency Operations Plan: An emergency operations plan outlines responsibilities and the means by which resources are deployed during and following an emergency or disaster.

- Each of the six counties participating in this multi-jurisdictional plan maintains an emergency operations plan through their respective County Emergency Management Agency. Each participating municipality in George County, Hancock County, Pearl River County (with the exception of the City of Picayune), and Stone County is also covered by its respective county's plan.

- Each of the remaining participating municipalities that is not included in a county plan has adopted a municipal-level emergency operations plan.

Continuity of Operations Plan: A continuity of operations plan establishes a chain of command, line of succession, and plans for backup or alternate emergency facilities in case of an extreme emergency or disaster event.

- The City of D'Iberville is the only participating jurisdiction that has adopted a continuity of operations plan.

Flood Response Plan: A flood response plan establishes procedures for responding to a flood emergency including coordinating and facilitating resources to minimize the impacts of flood.

- Harrison County is the only participating jurisdiction that has adopted a flood response plan.

Emergency Management Accreditation Program (EMAP): EMAP is the voluntary standards, assessment, and accreditation program for disaster preparedness programs. It provides emergency management programs the opportunity to be recognized for compliance with industry standards, to demonstrate accountability, and to focus attention on areas and issues where resources are needed.

- None of the counties or municipalities participating in this multi-jurisdictional plan has earned EMAP accreditation.

General Planning

The implementation of hazard mitigation activities often involves agencies and individuals beyond the emergency management profession. Stakeholders may include local planners, public works officials, economic development specialists, and others. In many instances, concurrent local planning efforts will help to achieve or complement hazard mitigation goals, even though they are not designed as such. Therefore, the Capability Assessment Survey also asked questions regarding general planning capabilities and the degree to which hazard mitigation is integrated into other on-going planning efforts in the MEMA District 9 Region.

Comprehensive Land Use Plan: A comprehensive land use plan establishes the overall vision for what a community wants to be and serves as a guide for future governmental decision making. Typically, a comprehensive plan contains sections on demographic conditions, land use, transportation elements, and community facilities. Given the broad nature of the plan and its regulatory standing in many communities, the integration of hazard mitigation measures into the comprehensive plan can enhance the likelihood of achieving risk reduction goals, objectives, and actions.

- Each of the six counties participating in this multi-jurisdictional plan has adopted a county comprehensive land use plan.

- All of the participating municipalities have also adopted a municipal-level comprehensive plan.

Capital Improvements Plan: A capital improvements plan guides the scheduling of spending on public improvements. A capital improvements plan can serve as an important mechanism for guiding future development away from identified hazard areas. Limiting public spending in hazardous areas is one of the most effective long-term mitigation actions available to local governments.

- Stone County is the only county participating in this multi-jurisdictional plan that has adopted a capital improvements plan.

- Several of the municipalities participating in this multi-jurisdictional plan have adopted capital improvements plans, including the cities of Diamondhead, Waveland, Long Beach, Pass Christian, Gautier, and Picayune.

Historic Preservation Plan: A historic preservation plan is intended to preserve historic structures or districts within a community. An often overlooked aspect of the historic preservation plan is the assessment of buildings and sites located in areas subject to natural hazards and the identification of ways to reduce future damages. This may involve retrofitting or relocation techniques that account for the need to protect buildings that do not meet current building standards or are within a historic district that cannot easily be relocated out of harm’s way.

- None of the counties or municipalities participating in this multi-jurisdictional plan has a historic preservation plan. However, the cities of Bay St. Louis, Biloxi, Gulfport, Pass Christian, Gautier, Ocean Springs, and Pascagoula have adopted historic preservation ordinances.

Zoning Ordinance: Zoning represents the primary means by which land use is controlled by local governments. As part of a community’s police power, zoning is used to protect the public health, safety, and welfare of those in a given jurisdiction that maintains zoning authority. A zoning ordinance is the mechanism through which zoning is typically implemented. Since zoning regulations enable municipal governments to limit the type and density of development, a zoning ordinance can serve as a powerful tool when applied in identified hazard areas.

- George County, Hancock County, Harrison County, and Jackson County have each adopted a zoning ordinance.
- All of the participating municipalities have also adopted zoning ordinances. The cities of Biloxi, Gautier, Ocean Springs, Pascagoula, and Wiggins include zoning regulations as part of their local unified development ordinance. The remaining municipalities have adopted stand-alone zoning ordinances.

Subdivision Ordinance: A subdivision ordinance is intended to regulate the development of residential, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Subdivision design that accounts for natural hazards can dramatically reduce the exposure of future development.

- Each of the counties participating in this multi-jurisdictional plan has adopted a subdivision ordinance.

- All of the participating municipalities have also adopted subdivision ordinances. The cities of Biloxi, Gautier, Ocean Springs, Pascagoula, and Wiggins include subdivision regulations as part of their local unified development ordinance. The remaining municipalities have adopted stand- alone subdivision ordinances.

Building Codes, Permitting, and Inspections: Building codes regulate construction standards. In many communities, permits, and inspections are required for new construction. Decisions regarding the adoption of building codes (that account for hazard risk), the type of permitting process required both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk faced by a community.

- Effective August 1, 2014, the State of Mississippi has adopted as a minimum any of the last three editions (2009, 2012, 2015) of the International Building Code and any additional codes as adopted by the Mississippi Building Code Council. Jurisdictions had 120 days to opt out of adoptions. Additionally, all state buildings, leased or owned, must meet the requirements set forth in the 2012 International Building Code.

- After Hurricane Katrina, Mississippi Legislature mandated the adoption of the International Building Code and International Residential Code in five coastal counties: Hancock County, Harrison County, Jackson County, Pearl River County, and Stone County. As a result, George County is the only participating county that has not adopted a building code.

- All of the participating municipalities have also adopted building codes.

The adoption and enforcement of building codes by local jurisdictions is routinely assessed through the Building Code Effectiveness Grading Schedule (BCEGS) program developed by the Insurance Services Office, Inc. (ISO). In Mississippi, the Mississippi State Rating Bureau assesses the building codes in effect in a particular community and how the community enforces its building codes with special emphasis on mitigation of losses from natural hazards. The results of BCEGS assessments are routinely provided to ISO's member private insurance companies, which in turn may offer ratings credits for new buildings constructed in communities with strong BCEGS classifications. The concept is that communities with well-enforced, up-to-date codes should experience fewer disaster-related losses and, as a result, should have lower insurance rates.

In conducting the assessment, ISO collects information related to personnel qualification and continuing education as well as the number of inspections performed per day. This type of information combined with local building codes is used to determine a grade for that jurisdiction. The grades range from 1 to 10 with a BCEGS grade of 1 representing exemplary commitment to building code enforcement and a grade of 10 indicating less than minimum recognized protection.

Specific BCEGS rating for the participating jurisdictions can be obtained by contacting the department for building inspections within that jurisdiction.

Floodplain Management

Flooding represents the greatest natural hazard facing the nation. At the same time, the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards such as education, outreach, and the training of local officials, the National Flood Insurance Program (NFIP) contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments; however, program participation is strongly encouraged by FEMA as a first step for implementing and sustaining an effective hazard mitigation program. It is therefore used as part of this assessment as a key indicator for measuring local capability.

In order for a county or municipality to participate in the NFIP, they must adopt a local flood damage prevention ordinance that requires jurisdictions to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings will be protected from damage by a 100-year flood event and that new development in the floodplain will not exacerbate existing flood problems or increase damage to other properties.

A key service provided by the NFIP is the mapping of identified flood hazard areas. Once completed, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices, and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials, and the private sector about the likelihood of flooding in their community.

Table 7.2 provides NFIP policy and claim information for each participating jurisdiction in the MEMA District 9 Region. Each of the jurisdictions that are participating in the development of this plan that also participate in the NFIP are committed to maintaining and enforcing their floodplain management ordinances and regulating new development in floodplains.

TABLE 7.2: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
GEORGE COUNTY†	08/16/88	09/19/12	112	$14,459,000	42	$385,792
Lucedale	04/15/86	09/19/12	10	$2,430,500	1	$11,000
HANCOCK COUNTY†	09/09/70	09/27/19	4,265	$1,097,650,600	5,929	$404,676,960
Bay St. Louis	09/11/70	10/16/09	2,240	$647,565,200	1,244	$148,880,718
Diamondhead	05/22/12		14	$3,275,000	0	$0
Waveland	09/11/70	10/16/09	1,795	$489,605,500	1,385	$183,867,798
HARRISON COUNTY†	06/15/78	12/21/17	2,640	$729,495,100	3,224	$261,560,972

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
Biloxi	09/11/70	12/21/17	5,206	$1,397,946,300	2,293	$253,008,756
D'Iberville	11/14/88	06/16/09	515	$146,053,100	27	$1,939,357
Gulfport	09/11/70	12/21/17	5,267	$1,410,675,000	3,078	$285,499,409
Long Beach	09/11/70	06/16/09	1,735	$482,745,600	1,505	$152,511,425
Pass Christian	05/26/70	06/16/09	2,093	$541,527,600	2,550	$323,619,220
JACKSON COUNTY†	04/03/78	12/21/17	5,996	$1,507,783,300	3,810	$303,874,274
Gautier	11/13/86	12/21/17	1,724	$434,030,100	681	$59,663,535
Moss Point	09/18/70	03/16/09	1,131	$238,909,100	886	$28,225,055
Ocean Springs	09/18/70	03/16/09	2,622	$749,420,700	823	$86,224,366
Pascagoula	09/18/70	03/16/09	4,944	$1,164,782,600	2,763	$221,292,452
PEARL RIVER COUNTY†	05/17/90	09/27/19	732	$154,033,900	374	$9,905,285
Picayune	03/04/80	09/27/19	255	$56,011,200	194	$3,579,193
Poplarville	11/08/07	09/27/19	2	$700,000	0	$0
STONE COUNTY†	09/01/87	06/16/11	31	$7,553,000	11	$115,205
Wiggins	06/16/11	06/16/11	5	$939,600	0	$0

†Includes unincorporated areas of county only
(NSFHA) – No Special Flood Hazard Area – All Zone C
Source: NFIP Community Status information as of 7/01/2023; NFIP claims and policy information as of 10/31/2016. Official NFIP claims information was not available/provided via FEMA during the 2023 plan update process.

All jurisdictions listed above that are participants in the NFIP will continue to comply with all required provisions of the program and will work to adequately comply in the future utilizing a number of strategies. For example, the jurisdictions will coordinate with NCEM and FEMA to develop maps and regulations related to special flood hazard areas within their jurisdictional boundaries and, through a consistent monitoring process, will design and improve their floodplain management program in a way that reduces the risk of flooding to people and property.

During the 2023 HMP update process updated NFIP/Repetitive and Severe Repetitive Loss updated data was unavailable through FEMA requests. The Natural Resource Defense Council (NRDC) provided unofficial updated information considered as the best available data for the HMP update process. The following table provides the unofficial total NFIP and SRL claims information by county.

	Total # of NFIP Claims	Total NFIP Payments	Total # of SRLs	Total SRL Claim Payments
George County	76	$432,809	0	0
Hancock County	9,666	$718,949,437	138	24,840,002
Harrison County	15,268	$1,257,933,379	325	65,306,183
Jackson County	10,784	$693,978,296	190	48.044,517
Pearl River County	765	$15,723,136	18	2,310,224
Stone County	33	$504,132	0	0
MEMA District 9 Total	*36,592*	*$2,687,521,189*	*671*	*92,456,409*

Source: https://www.nrdc.org/resources/losing-ground-flood-visualization-tool

Community Rating System: An additional indicator of floodplain management capability is the active participation of local jurisdictions in the Community Rating System (CRS). The CRS is an incentive-based program that encourages counties and municipalities to undertake defined flood mitigation activities that go beyond the minimum requirements of the NFIP by adding extra local measures to provide protection from flooding. All of the 18 creditable CRS mitigation activities are assigned a range of point values. As points are accumulated and reach identified thresholds, communities can apply for an improved CRS class rating. Class ratings, which range from 10 to 1, are tied to flood insurance premium reductions as shown in Table 7.3. As class rating improves (the lower the number the better), the percent reduction in flood insurance premiums for NFIP policyholders in that community increases.

TABLE 7.3: CRS PREMIUM DISCOUNTS, BY CLASS

CRS Class	Premium Reduction
1	45%
2	40%
3	35%
4	30%
5	25%
6	20%
7	15%
8	10%
9	5%
10	0

Source: Federal Emergency Management Agency

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10. The CRS application process has been greatly simplified over the past several years based on community comments. Changes were made with the intent to make the CRS more user-friendly and make extensive technical assistance available for communities who request it.

- Harrison County (Class 6), Jackson County (Class 8), Pearl River County (Class 8), and Stone County (Class 10) as well as the cities of Bay St. Louis (Class 7), Waveland (Class 7), Biloxi (Class 5), D'Iberville (Class 7), Gulfport (Class 8), Long Beach (Class 8), Pass Christian (Class 8), Gautier (Class 8), Ocean

Springs (Class 8), Pascagoula (Class 8), and Picayune (Class 9) participate in the CRS. Participation in the CRS program should be considered as a mitigation action by the other counties and municipalities. The program would be most beneficial to Hancock County and the City of Moss Point which have 4,265 and 1,131 NFIP policies in force, respectively.

Flood Damage Prevention Ordinance: A flood damage prevention ordinance establishes minimum building standards in the floodplain with the intent to minimize public and private losses due to flood conditions.

- All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. All counties and municipalities participating in this multi-jurisdictional plan also participate in the NFIP and they all have adopted flood damage prevention regulations

Floodplain Management Plan: A floodplain management plan (or a flood mitigation plan) provides a framework for action regarding corrective and preventative measures to reduce flood-related impacts.

- Hancock County and Harrison County have both adopted floodplain management plans to help prevent damages associated with flooding and flood loss. The City of Diamond is also included in the Hancock County plan.
- Several of the municipalities participating in this multi-jurisdictional plan have adopted floodplain management plans, including the cities of Biloxi, Gulfport, Long Beach, and Pass Christian.

Open Space Management Plan: An open space management plan is designed to preserve, protect, and restore largely undeveloped lands in their natural state and to expand or connect areas in the public domain such as parks, greenways, and other outdoor recreation areas. In many instances, open space management practices are consistent with the goals of reducing hazard losses, such as the preservation of wetlands or other flood-prone areas in their natural state in perpetuity.

- Hancock County has adopted a county greenways plan and Harrison County has adopted a county parks and recreation master plan as well as a heritage trails blueways/greenways plan.
- The cities of Gautier and Pascagoula each have a municipal parks and recreation master plan in place.

Stormwater Management Plan: A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of more frequently occurring minor urban flooding.

- Jackson County and the cities of Diamondhead, Waveland, D'Iberville, Gulfport, Long Beach, and Gautier have adopted a stormwater management plan.
- Hancock County and Harrison County and the cities of Bay of St. Louis, Biloxi, D'Iberville, Long Beach, Pass Christian, Gautier, Ocean Springs, and Pascagoula have adopted local stormwater management ordinances.

Administrative and Technical Capability

The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.

Technical capability can generally be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using Geographic Information Systems (GIS) to analyze and assess community hazard vulnerability. The Capability Assessment Survey was used to capture information on administrative and technical capability through the identification of available staff and personnel resources.

Table 7.4 provides a summary of the Capability Assessment Survey results for the MEMA District 9 Region with regard to relevant staff and personnel resources. An x (x) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill. A dagger (†) indicates a county-level staff member(s) provides the specified knowledge or skill to that municipality.

TABLE 7.4: RELEVANT STAFF/PERSONNEL RESOURCES

Staff/Personnel Resource	GEORGE COUNTY	Lucedale	HANCOCK COUNTY	Bay St. Louis	Diamondhead	Waveland	HARRISON COUNTY	Biloxi	D'Iberville	Gulfport	Long Beach	Pass Christian	JACKSON COUNTY	Gautier	Moss Point	Ocean Springs	Pascagoula	PEARL RIVER COUNTY	Picayune	Poplarville	STONE COUNTY	Wiggins
Planners with knowledge of land development/land management practices			x		x		x	x	x	x	x	x	x	x		x	x	x	x	†	x	x
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Planners or engineers with an understanding of natural and/or human-caused hazards		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Emergency Manager	x	†	x	†	x	x	x	x	†	x	x	†	x	†	†	†	x	x	†	†	x	†
Floodplain Manager	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Land Surveyors							x															
Scientists familiar with the hazards of the community	x	†	x	†	†	†	x	†	†	†	†	†	x	†	†	†	†	x	†	†	x	†
Staff with education or expertise to assess the community's vulnerability to hazards	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Personnel skilled in GIS and/or Hazus			x	x	x	x	x	x	x	x	†	†	x	x	†		x	x	†	†	x	
Resource development staff or grant writers			x	x	x	x					x		x	x		x	x	x	x	x		

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

Fiscal Capability

The ability of a local government to take action is often closely associated with the amount of money available to implement policies and projects. This may take the form of outside grant funding awards or locally-based revenue and financing. The costs associated with mitigation policy and project implementation vary widely. In some cases, policies are tied primarily to staff time or administrative costs associated with the creation and monitoring of a given program. In other cases, direct expenses are linked to an actual project, such as the acquisition of flood-prone homes, which can require a substantial commitment from local, state, and federal funding sources.

The Capability Assessment Survey was used to capture information on the region's fiscal capability through the identification of locally available financial resources.

Table 7.5 provides a summary of the results for the MEMA District 9 Region with regard to relevant fiscal resources. An x (x) indicates that the given fiscal resource has previously been used to implement hazard mitigation actions. A dagger (†) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

TABLE 7.5: RELEVANT FISCAL RESOURCES

Fiscal Tool/Resource	GEORGE COUNTY	Lucedale	HANCOCK COUNTY	Bay St. Louis	Diamondhead	Waveland	HARRISON COUNTY	Biloxi	D'Iberville	Gulfport	Long Beach	Pass Christian	JACKSON COUNTY	Gautier	Moss Point	Ocean Springs	Pascagoula	PEARL RIVER COUNTY	Picayune	Poplarville	STONE COUNTY	Wiggins
Capital Improvement Programming			†	†	†	†	†	†		†			†	†	†		†	†	†			
Community Development Block Grants (CDBG)	†		†	†	†	†	†			†	†				x	x	†	x	x	x	†	†
Special Purpose Taxes (or taxing districts)			†		†	†	†			†	†				†			†	†	†		
Gas/Electric Utility Fees			†		†	†	†								†		†	†	†			
Water/Sewer Fees			†		†	†						†			†	†	†	†	†	†		
Stormwater Utility Fees																						
Development Impact Fees																						
General Obligation, Revenue, and/or Special Tax Bonds			†		†	†	†								†		†	†	†	†		
Partnering Arrangements or Intergovernmental Agreements	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†
Other: HMGP and other federal, state, and private grants/resources	†	x	x	†	†	x	x	x	†	x	x	x	x	x	x	x	x	x	x	x	†	†

Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to reduce the impact of future hazard events. Hazard mitigation may not be a local priority or may conflict with or be seen as an impediment to other goals of the community, such as growth and economic development. Therefore, the local political climate must be considered in designing mitigation strategies as it could be the most difficult hurdle to overcome in accomplishing their adoption and implementation.

The Capability Assessment Survey was used to capture information on political capability of the MEMA District 9 Region. Previous hazard mitigation plans were reviewed for general examples of local political capability, such as guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (i.e., building codes, floodplain management, etc.).

- The previous hazard mitigation plans identified existing ordinances that address natural hazards or are related to hazard mitigation, such as stormwater management, drainage, erosion and sediment control, zoning, subdivision regulations, and flood damage prevention ordinances.

- During the months immediately following a disaster, local public opinion in the region is more likely to shift in support of hazard mitigation efforts.

Table 7.6 provides a summary of the results for the MEMA District 9 Region with regard to political capability. An x (x) indicates the expected degree of political support by local elected officials in terms of adopting/funding information.

TABLE 7.6: LOCAL POLITICAL SUPPORT

Political Support	GEORGE COUNTY	Lucedale	HANCOCK COUNTY	Bay St. Louis	Diamondhead	Waveland	HARRISON COUNTY	Biloxi	D'Iberville	Gulfport	Long Beach	Pass Christian	JACKSON COUNTY	Gautier	Moss Point	Ocean Springs	Pascagoula	PEARL RIVER COUNTY	Picayune	Poplarville	STONE COUNTY	Wiggins
Limited																						
Moderate	x	x			x										x					x		x
High			x	x		x	x	x	x	x	x	x	x	x		x	x	x	x		x	

CONCLUSIONS ON LOCAL CAPABILITY

In order to form meaningful conclusions on the assessment of local capability, a quantitative scoring methodology was designed and applied to the results of the Capability Assessment Survey. The maximum number of points possible (one, two, or three) was assigned to each plan, ordinance, program, or resource based on its relevance to hazard mitigation. If a plan, ordinance, program, or resource was under development or administered for a municipality at the county-level, one point became the highest score possible. The maximum total number of points possible under the scoring methodology is 86, and three categories were established to classify capability level as limited (0-24 points), moderate (25-49 points), or high (50-86 points). This methodology, further described in Appendix B, attempts to assess the overall level of capability of the MEMA District 9 Region to implement hazard mitigation actions.

The overall capability to implement hazard mitigation actions varies among the participating jurisdictions. For planning and regulatory capability, the jurisdictions range from limited to moderate to high. The administrative and technical capabilities vary among the jurisdictions with larger jurisdictions generally having greater staff and technical resources. All of the jurisdictions are in the limited to moderate range for fiscal capability.

Table 7.7 shows the results of the capability assessment using the designed scoring methodology. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. This information was reviewed by all jurisdictions and each jurisdiction provided feedback on the information included in the capability assessment. Local government input was vital to identifying capabilities. According to the assessment, the average local capability score for all jurisdictions is 44.9, which falls into the moderate capability ranking.

TABLE 7.7: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
GEORGE COUNTY	30	Moderate
Lucedale	31	Moderate
HANCOCK COUNTY	55	High
Bay St. Louis	42	Moderate
Diamondhead	44	Moderate
Waveland	49	Moderate
HARRISON COUNTY	61	High
Biloxi	49	Moderate
D'Iberville	43	Moderate
Gulfport	50	High
Long Beach	51	High
Pass Christian	48	Moderate
JACKSON COUNTY	46	Moderate
Gautier	46	Moderate
Moss Point	41	Moderate
Ocean Springs	46	Moderate
Pascagoula	52	High
PEARL RIVER COUNTY	47	Moderate
Picayune	46	Moderate
Poplarville	35	Moderate
STONE COUNTY	42	Moderate
Wiggins	34	Moderate

As previously discussed, one of the reasons for conducting a Capability Assessment is to examine local capabilities to detect any existing gaps or weaknesses within ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. These gaps or weaknesses have been identified for each jurisdiction in the tables found throughout this section. The participating jurisdictions used the Capability Assessment as part of the basis for the Mitigation Actions that are identified in Section 9; therefore, each jurisdiction addresses their ability to expand on and improve their existing capabilities through the identification of their Mitigation Actions.

Linking the Capability Assessment with the Risk Assessment and the Mitigation Strategy
The conclusions of the Risk Assessment and Capability Assessment serve as the foundation for the development of a meaningful hazard mitigation strategy. During the process of identifying specific mitigation actions to pursue, the RHMC considered not only each jurisdiction's level of hazard risk, but also their existing capability to minimize or eliminate that risk.

SECTION 8

SECTION 8 MITIGATION STRATEGY

This section of the Plan provides the blueprint for the participating jurisdictions in the MEMA District 9 Region to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Council (RHMC) and the findings and conclusions of the Capability Assessment and Risk Assessment. It consists of the following five subsections:

INTRODUCTION

The intent of the Mitigation Strategy is to provide the communities in the MEMA District 9 Region with the goals that will serve as guiding principles for future mitigation policy and project administration, along with an analysis of mitigation techniques deemed available to meet those goals and reduce the impact of identified hazards. It is designed to be comprehensive, strategic, and functional in nature:

- In being *comprehensive*, the development of the strategy includes a thorough review of all hazards and identifies extensive mitigation measures intended to not only reduce the future impacts of high risk hazards, but also to help the region achieve compatible economic, environmental, and social goals.
- In being *strategic*, the development of the strategy ensures that all policies and projects proposed for implementation are consistent with pre-identified, long-term planning goals.
- In being *functional*, each proposed mitigation action is linked to established priorities and assigned to specific departments or individuals responsible for their implementation with target completion deadlines. When necessary, funding sources are identified that can be used to assist in project implementation.

The first step in designing the Mitigation Strategy includes the identification of mitigation goals. Mitigation goals represent broad statements that are achieved through the implementation of more specific mitigation actions. These actions include both hazard mitigation policies (such as the regulation of land in known hazard areas through a local ordinance) and hazard mitigation projects that seek to address specifically targeted hazard risks (such as the acquisition and relocation of a repetitive loss structure).

The second step involves the identification, consideration, and analysis of available mitigation measures to help achieve the identified mitigation goals. This is a long-term, continuous process sustained through the development and maintenance of this Plan. Alternative mitigation measures will continue to be considered as future mitigation opportunities are identified, as data and technology improve, as mitigation funding becomes available, and as this Plan is maintained over time.

The third and last step in designing the Mitigation Strategy is the selection and prioritization of specific mitigation actions for the communities in the MEMA District 9 Region (provided separately in Section 9: Mitigation Action Plan). Each county and participating jurisdiction has its own Mitigation Action Plan (MAP) that reflects the needs and concerns of that jurisdiction. The MAP represents an unambiguous and functional plan for action and is considered to be the most essential outcome of the mitigation planning process.

The MAP includes a prioritized listing of proposed hazard mitigation actions (policies and projects) for the MEMA District 9 counties and jurisdictions to complete. Each action has accompanying information, such as those departments or individuals assigned responsibility for implementation, potential funding sources, and an estimated target date for completion. The MAP provides those departments or individuals responsible for implementing mitigation actions with a clear roadmap that also serves as an important tool for monitoring success or progress over time. The cohesive collection of actions listed in the MAP can also serve as an easily understood menu of mitigation policies and projects for those local decision makers who want to quickly review the recommendations and proposed actions of the Regional Hazard Mitigation Plan.

In preparing each Mitigation Action Plan for the MEMA District 9 Region, officials considered the overall hazard risk and capability to mitigate the effects of hazards as recorded through the risk and capability assessment process in addition to meeting the adopted mitigation goals and unique needs of the community.

<u>Mitigation Action Prioritization</u>
Prioritization of the proposed mitigation actions was based on the following six factors:

- Effect on overall risk to life and property
- Ease of implementation
- Political and community support
- A general economic cost/benefit review1
- Funding availability
- Continued compliance with the NFIP

The point of contact for each county helped coordinate the prioritization process by reviewing each action and working with the lead agency/department responsible to determine a priority for each action using the six factors listed above. When considering each factor, a scoring range of 1-3 was utilized for each, the total scores for each action were calculated and scored from low to high. Scores from 1-6 are low, 7-12 Medium and 13-18 High.

Using these criteria, actions were classified as high, moderate, or low priority by the participating jurisdiction officials.

MITIGATION GOALS

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

The primary goal of all local governments is to promote the public health, safety, and welfare of its citizens. In keeping with this standard, the MEMA District 9 counties and the participating municipalities have developed nine goal statements for local hazard mitigation planning in the region. In developing these goals, the previous county and municipal hazard mitigation plans were reviewed to determine areas of consistency. The project consultant reviewed the goals from each of the existing plans that were combined to form this regional plan. Many of the goals were similar and, therefore, regional goals were formulated based on commonalities found between the goals in each plan. The overarching themes identified in the previous goals included loss of life and property damage, critical facilities and infrastructure, public education and awareness, mitigation capabilities, emergency services, and economic development, quality of life, and the environment.

As a result of reviewing the existing goals, nine proposed regional goals were presented to the Hazard Mitigation Council for their consideration. The proposed goals were reviewed, voted on, and accepted by the RHMC at their second meeting. This process of combining goals from the previous plans served to highlight the planning process that had occurred in each county and municipality prior to joining this regional planning effort. Each goal, purposefully broad in nature, serves to establish parameters that were used in developing more mitigation actions. The MEMA District 9 Regional Mitigation Goals are presented in Table 8.1. Consistent implementation of actions over time will ensure that community goals are achieved.

TABLE 8.1: MEMA DISTRICT 9 REGIONAL MITIGATION GOALS

	Goal
Goal #1	Minimize risk and vulnerability of the community to hazards. Objective 1: Improve understanding of hazard risks through monitoring and assessment projects.
Goal #2	Minimize loss of life, injury, and damages to property, the economy, and the environment. *Objective 1:* Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment. *Objective 2:* Improve hazard assessment information to make recommendations for encouraging higher standards for safer development in areas vulnerable to natural and technological hazards. *Objective 3*: Implement sustainable activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resilient to natural and technological hazards.
Goal #3	Minimize loss to critical facilities and infrastructure, utilities, and services. *Objective 1:* Prioritize mitigation projects for critical facilities, services, and infrastructure.
Goal #4	Improve, expand, and enhance public education, awareness, and preparedness. *Objective 1:* Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.
Goal #5	Build and enhance local mitigation capabilities to improve the region’s ability to prepare for, respond to, and recover. *Objective 1:* Strengthen communication and coordinate participation among and within public agencies, community members, non-profit organizations, business, and industry to gain a vested interest in implementation.
Goal #6	Enter into partnerships with neighboring jurisdictions, federal and state agencies, and others to share information and develop a more hazard resistant community. *Objective 1:* Encourage leadership within the public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.
Goal #7	Enhance response procedures and emergency management capabilities.

	Objective 1: Coordinate and integrate natural and technological hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
Goal #8	Reduce economic losses, minimize social disruptions, and maintain quality of life. *Objective 1*: Reduce losses and repetitive damages for hazard events while promoting insurance coverage for catastrophic hazards.
Goal #9	Protect the environment and natural resources. *Objective 1:* Preserve, rehabilitate, re-establish, and enhance natural systems to serve natural hazard mitigation functions.

IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

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

In formulating the Mitigation Strategy for the MEMA District 9 Region, a wide range of activities were considered to help achieve the established mitigation goals, in addition to addressing any specific hazard concerns. These activities were discussed during the MEMA District 9 Regional Hazard Mitigation Planning meetings. In general, all activities considered by the RHMC can be classified under one of the following six (6) broad categories of mitigation techniques: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, and Public Awareness and Education. These are discussed in detail below.

PREVENTION

Preventative activities are intended to keep hazard problems from getting worse, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are built. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- Planning and zoning
- Building codes
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance
- Capital improvements programming
- Riverine/fault zone setbacks

PROPERTY PROTECTION

Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (e.g., windproofing, floodproofing, seismic design techniques, etc.)
- Safe rooms, shutters, shatter-resistant glass
- Insurance

NATURAL RESOURCE PROTECTION

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, steep slopes, and sand dunes. Parks, recreation, or conservation agencies and organizations often implement these protective measures.

Examples include:

- Floodplain protection
- Watershed management
- Riparian buffers
- Forest and vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.)
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

STRUCTURAL PROJECTS

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by public works staff. The lead agency will utilize assessments and studies to prioritize hazards for a risk-informed decision-making process. Examples include:

- Reservoirs
- Dams/levees/dikes/floodwalls
- Diversions/detention/retention
- Channel modification
- Storm sewers

EMERGENCY SERVICES

Although not typically considered a “mitigation” technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Emergency response training and exercises
- Sandbagging for flood protection
- Installing temporary shutters for wind protection

PUBLIC EDUCATION AND AWARENESS

Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series/demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children educational programs
- Hazard expositions

SELECTION OF MITIGATION TECHNIQUES FOR THE MEMA DISTRICT 9 REGION

In order to determine the most appropriate mitigation techniques for the communities in the MEMA District 9 Region, the RHMC members thoroughly reviewed and considered the findings of the Capability Assessment and Risk Assessment to determine the best activities for their respective communities. Other considerations included the effect of each mitigation action on overall risk to life and property, its ease of implementation, its degree of political and community support, its general cost-effectiveness, and funding availability (if necessary).

PLAN UPDATE REQUIREMENT

In keeping with FEMA requirements for plan updates, the Mitigation Actions identified in the previous MEMA District 9 county and municipal hazard mitigation plans were evaluated to determine their 2023 implementation status. Updates on the implementation status of each action are provided. The mitigation actions provided in Section 9: Mitigation Action Plan include the mitigation actions from the previous plans as well as any new mitigation actions proposed through the 2017 planning process.

SECTION 9 MITIGATION ACTION PLAN

This section includes the listing of the mitigation actions proposed by the participating jurisdictions in MEMA District 9. It consists of the following two subsections:

9.1 Overview
9.2 Mitigation Action Plans

44 CFR Requirement
44 CFR Part 201.6(c)(3)(iii): The mitigation strategy shall include an action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction.

OVERVIEW

As described in the previous section, the Mitigation Action Plan, or MAP, provides a functional plan of action for each jurisdiction. It is designed to achieve the mitigation goals established in Section 8: Mitigation Strategy and will be maintained on a regular basis according to the plan maintenance procedures established in Section 10: Plan Maintenance.

Each proposed mitigation action has been identified as an effective measure (policy or project) to reduce hazard risk for the communities in the MEMA District 9 Region. Each action is listed in the MAP in conjunction with background information such as hazard(s) addressed and relative priority. Other information provided in the MAP includes potential funding sources to implement the action should funding be required (not all proposed actions are contingent upon funding). Most importantly, implementation mechanisms are provided for each action, including the designation of a lead agency or department responsible for carrying the action out as well as a timeframe for its completion. These implementation mechanisms ensure that the MEMA District 9 Regional Hazard Mitigation Plan remains a functional document that can be monitored for progress over time. The proposed actions are not listed in priority order, though each has been assigned a priority level of “high,” “moderate,” or “low” as described below and in Section 8 (page 8.2).

The Mitigation Action Plan is organized by mitigation strategy category (Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, or Public Education and Awareness). The following are the key elements described in the Mitigation Action Plan:

- Hazard(s) Addressed—Hazard which the action addresses.
- Relative Priority—High, moderate, or low priority as assigned by the jurisdiction.
- Lead Agency/Department—Department responsible for undertaking the action.

- Potential Funding Sources—Local, State, or Federal sources of funds are noted here, where applicable.
- Implementation Schedule—Date by which the action the action should be completed. More information is provided when possible.
- Implementation Status (2017)—Indication of completion, progress, deferment, or no change since the previous plan. If the action is new, that will be noted here.

MITIGATION ACTION PLANS

The mitigation actions proposed by each of the participating jurisdictions are listed in 22 individual MAPs on the following pages. Table 9.1 shows the location of each jurisdiction's MAP within this section as well as the number of mitigation actions proposed by each jurisdiction.

George County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Ensure strict enforcement of subdivision order.	All	High	George County Board of Supervisors	Local budget	2028	Ongoing
P-2	Ensure strict enforcement of regulations against structures in the floodplain.	Flooding	High	Floodplain Administrator; George County	Local budget	2028	Ongoing

P-3	Ensure continuity of services through an enhanced government services continuity plan.	All	Low to Moderate	George County Board of Supervisors	Local budget	2028	Ongoing dependent upon grant funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-5	Enhance stormwater management activities.	Hurricane and Tropical Storm, Flooding	High	George County Supervisors and Road Crews	Local budget	2028	Ongoing
P-6	Hardening of fire stations throughput the county. Retrofitting bay doors for wind proofing. Harden roofs with upgraded steel. Movella, Agricola, Howell, Central, Rocky Creek, Basin, Barton, Baxley, Salem, Benndale, Boone, Shipmon, Twin Creek and Ward VFD.	Severe Thunderstorm /Wind, Hurricane/Tropical Storm, Tornado, Hailstorm	High	OEM/Fire	FEMA , HMGP, BRIC	2028	New
Property Protection							
PP-1	Promote the building of "safe rooms" in new construction and when remodeling existing structures.	Severe Thunderstorm, Tornado, Hurricane and Tropical Storm	Moderate to High	George County OEM	Local, MEMA, FEMA, HMGP, BRIC	2028	Ongoing dependent upon grant funding

PP-2	Ensure continuity of services by retrofitting public buildings.	All	High	George County OEM	Local, MEMA, FEMA, HMGP, BRIC	2028	Ongoing contingent upon the availability of funding.
PP-3	Ensure that new public buildings are designed and built to hurricane resistant building codes.	Hurricane and Tropical Storm, Tornado, Severe Thunderstorm / High Winds	High	George County OEM	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
NRP-1	*Evaluated and found not appropriate for the jurisdiction.*	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	*Evaluated and found not appropriate for the jurisdiction.*	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Emergency Services							
ES-1	Ensure that communication systems are adequate during disasters.	All	High	George County Emergency Management; George County	Local budget	2028	Ongoing
ES-2	Monitor the current status of generators for maintenance of critical facilities	All	High	George County OEM	Local budget	2028	Ongoing
ES-3	Ensure the adequacy of emergency shelters.	All	High	George County Emergency Management Agency; George County	Local Budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-4	Enhance emergency response capabilities.	All	Moderate	George County OEM	Local budget	2028	Ongoing
Public Education and Awareness							
PEA-1	Expand public awareness through education and outreach materials to citizens and visitors.	All	High	George County Emergency Management Agency	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Develop and/or expand outreach strategies for vulnerable populations.	All	Moderate to High	George County; George County Emergency Management Agency; George County Sheriff's Department; George County VFDs	Local budget	2028	Ongoing
PEA-3	Provide and/or expand outreach information on hazard-resistant structures.	All	Moderate to High	George County Emergency Management Agency; George County	Local budget	2028	(Action 3.4 in previous plan) The county has done some outreach on constructing hazard resistant structures, but this is an area where more outreach is required so the county will continue to pursue this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Enhance disaster preparedness of local government.	Flooding, Severe Thunderstorm, Hurricane and Tropical Storm	Moderate to High	George County OEM	Local budget	2028	Ongoing

City of Lucedale Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Maintain elevation certificates for all post-FIRM structures.	Flooding, Hurricane and Tropical Storm	High	City Building Department	Local budget	2028	Ongoing
P-2	Ensure continuity of city services through an enhanced government services continuity plan.	All	Low to Moderate	City Planning Commission	Local budget	2028	Ongoing
P-3	Ensure strict enforcement of regulations against structures in the floodplain.	Flooding, Hurricane and Tropical Storm	High	City Planning Commission	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Enhance stormwater management activities.	Hurricane and Tropical Storm, Flooding	High	City Public Works Department	Local budget	2028	Ongoing
Property Protection							
PP-1	Promote the building of "safe rooms" in new construction and when remodeling existing structures.	Hurricane and Tropical Storm, Tornado, Severe Thunderstorm	Moderate to High	City Building Department	Local budget, MEMA, FEMA, HMGP	2028	Ongoing
PP-2	Ensure continuity of city services by retrofitting public buildings.	All	High	City Planning Commission	Local budget, MEMA, FEMA, HMGP	2028	Ongoing contingent upon the availability of funding.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-3	Ensure that new city buildings are designed and built to hurricane resistant building codes.	Hurricane and Tropical Storm, Tornado	High	City of Lucedale; City Building Department	Local budget	2028	Ongoing
Natural Resource Protection							
NRP-1	Ensure that environmental resources are protected and preserved through open spaces and green spaces.	All	Moderate	City Building Department and Planning Commission	Local	2028	Ongoing
NRP-2	Ensure that environmental resources are protect and preserved through conservation easements in natural wetlands and riparian areas.	Hurricane and Tropical Storm, Flooding	Moderate	Land Trust for the Mississippi Coastal Plain, City of Lucedale, George County	Local budget	2028	Ongoing
Structural Projects							
SP-1	*Evaluated and found not appropriate for the jurisdiction.*	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Ensure that communication systems are adequate during disasters.	All	High	City of Lucedale; George County Emergency Management	Local budget	2028	Ongoing
ES-2	Assess the current status of generators for maintenance of critical facilities.	All	High	City Planning Commission	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-3	Enhance emergency response capabilities.	All	Low to Moderate	City Police Department; City Fire Department	Local budget	2028	Ongoing
Public Education and Awareness							
PEA-1	Enhance the city's elevation awareness program.	Flooding, Hurricane and Tropical Storm	Moderate	City Building and Public Works Departments	Local budget	2028	Ongoing
PEA-2	Expand public awareness through education and outreach materials to citizens and visitors.	All	High	City Planning Commission	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-3	Encourage families to develop family disaster plans through utilizing local, state and FEMA resources.	All	Moderate to High	City First Responders (Police, Fire, etc.)	Local budget	2028	Ongoing
PEA-4	Develop and/or expand outreach strategies for vulnerable populations.	All	Moderate to High	City of Lucedale staff and officials; Lucedale Police Department; Lucedale Fire Department	Local budget	2028	Ongoing
PEA-5	Provide and/or expand outreach information on hazard-resistant structures.	Al	High	Lucedale Building Department	Local budget	2028	Ongoing
PEA-6	Enhance disaster preparedness of local government.	All	Moderate to High	City Planning Commission	Local budget	2028	Ongoing

Hancock County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Join the Community Rating System Program.	Hurricane, Flooding, Climate Change	High	Building and Zoning Department	Local budget	2025	Ongoing have not joined the CRS as of 2023 update.
P-2	Develop a Repetitive Loss Plan.	Hurricane, Flooding	High	Building and Zoning Department	FEMA-Flood Loss Planning	2028	Ongoing continuing to develop plans and reduces losses
P-3	Encourage household hazardous waste collection days to collect hazardous chemicals.	Hurricane, Flooding	Moderate	Hancock County Board of Supervisors	MS DEQ	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Encourage the Hancock County Solid Waste Authority to contract for a monthly household hazardous waste collection.	Hurricane, Flooding	Low	Hancock County Solid Waste Authority	MS DEQ	2028	Ongoing
P-5	Update typographic information to 1 foot contours to assist with planning for sea level rise.	Climate Change, Flooding	Low	Building and Zoning Office	Local budet	2025	Ongoing
P-6	Consider setbacks from canals and natural waterways to protect structures from sea level rise.	Climate Change, Flooding	Low	Building and Zoning Department	Local budget	2024	Ongoing
P-7	Assess and develop continuity plans for Volunteer Fire Departments.	All	High	Hancock County Emergency Management Agency	Local budget	2026	Ongoing
P-8	Adopt and implement updates to the International Building Code as the updates become available.	Hurricane, Earthquake, Severe Weather	High	Building Office	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Continue to implement recommendations of the Drainage Master Plan and continue to upgrade drainage facilities throughout the community to protect private and public property.	Hurricane, Flooding, Dam Failure	Low	Hancock County Road Dept.	Local budget, FEMA- HMGP	2028	Partially completed/Ongoing
P-10	Continue to implement the county's substantial damage and cumulative impact requirements.	Hurricane, Flooding	High	Hancock County Building and Zoning Office	Local budget	2028	Ongoing
P-11	Continue to maintain FEMA Elevation certificates on each building in the floodplain in Hancock County.	Hurricane, Flooding	High	Hancock County and Diamondhead Building Office	Local budget	2028	Ongoing
P-12	Continue to enforce the county's Erosion Control Ordinance to include erosion and sediment control BMPs as required by NPDES Phase II Program.	Hurricane, Flooding	Moderate	Hancock County Building Official; Diamondhead Building Official	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Continue to implement drainage standard operating procedure.	Hurricane, Flooding	Moderate	Hancock County Road Manager	Local budget	2028	Ongoing
P-14	Draft and adopt a Stream Dumping Ordinance to prohibit deposition of debris in the drainage systems.	Hurricane, Flooding	Low	Hancock County Road Manager	Local budget	2025	Ongoing
P-15	Purchase, install, and use the STAMP software program to make flood elevations available for review by building and zoning officials.	Hurricane, Flooding	Moderate	Hancock County Building Office	Local budget	2025	Ongoing
P-16	Continue to enforce tie down requirements for mobile homes.	All Severe Weather	Moderate	Hancock County Building and Zoning	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-17	Hancock County Board of Supervisors should require a maintenance plan and an emergency operations plan for dams built as infrastructure within a subdivision. These plans should be required and recorded as part of the subdivision plan.	Dam Failure	Low	Building and Zoning Dept.	Local budget	2024	Ongoing
P-18	Continue to implement a plan to conserve green spaces.	Erosion, Climate Change, Flooding	Low	Hancock County Board of Supervisors	CIAP, Tidelands	2028	Ongoing
P-20	Require subdivisions and community development projects to be submitted by a professional engineering and reviewed by a professional engineer employed by the county.	Flooding	Moderate	Hancock County Board of Supervisors; Building and Zoning Department	Local budget	2028	Ongoing
P-21	Keep drainage channels open.	Flooding	Moderate	Road Department	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-22	Update drainage study to include areas beyond the surge areas identified with Hurricane Katrina.	Flooding	Moderate	Hancock County Board of Supervisors	Corps of Engineers	2025	Ongoing
Property Protection							
PP-1	Elevate section of Highway 604 to ensure a safe evacuation route.	Hurricane, Flooding	Moderate	Hancock County Board of Supervisors; Gulf Regional Planning Commission	FHWA	2024	Ongoing
PP-2	Relocate Diamondhead Sewer System treatment facilities and other new treatment facilities in Hancock County to areas located outside of the floodplain and elevated above BFE.	Hurricane, Flooding	High	Diamondhead Water and Sewer District	CDBG, CWA-RLF, EPA, FEMA-HMGP	2026	Ongoing
PP-3	Continue to harden key lift stations to ensure safe operation during times of no power.	Hurricane, Flooding	High	Hancock County Sewer Organizations	CWA-RLF, FEMA-HMGP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-4	Retrofit existing sewer systems: equip grinder pumps with surge protectors and provide back-up generators.	All	High	Hancock County Utility Authority Sewer Districts	CWA-RLF, FEMA-HMGP	2028	Ongoing
PP-5	Build new public buildings above base flood elevation and provide protection from hurricane force winds.	Hurricane, Flooding	High	Hancock County Board of Supervisors; Diamondhead City Council	FEMA-HMGP	2026	Partially complete/Ongoing
PP-6	Establish back-up emergency operations locations throughout the county by strengthening new buildings as they are developed and by hardening existing suitable structures.	Hurricane, Flooding, Tornado, Earthquake	Moderate	Hancock County Emergency Management Agency	FEMA-HMGP	2026	Ongoing
PP-7	Mitigate the library system structures to ensure these buildings are functional after a natural hazard event.	All	High	Hancock County Library System; Hancock County Board of Supervisors	FEMA-HMGP	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-8	Retrofit existing public buildings for wind and water.	Hurricane, Flooding, Tornado, Hailstorm, Severe Thunderstorm / High Wind	High	Hancock County Board of Supervisors	FEMA-HMGP	2026	Ongoing
PP-9	Encourage people to protect property by insuring, floodproofing, and elevating their homes	Hurricane, Flooding, Dam Failure	High	Hancock County Emergency Management Agency, Hancock County Building and Zoning Office, Diamondhead Building Office	Local budget	2028	Ongoing
PP-10	Seek funding to assist property owners located in Special Flood Hazard Areas in mitigating their homes from flooding through elevation and acquisition, and identify programs to help property owners mitigate their structures from wind damage.	Hurricane, Flooding	High	Hancock County Board of Supervisors	Local budget, FEMA- HMGP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-11	Encourage the development of safe rooms in homes and businesses in Hancock County.	Tornado	Moderate	Hancock County Building and Zoning	Local budget	2028	Ongoing
PP-12	Promote the purchase of earthquake insurance by homeowners and business owners.	Earthquake	Low	Building and Zoning Dept.	Local budget	2028	Ongoing
Natural Resource Protection							
NRP-1	Adopt the "Beneficial Use of Dredge Material" Plan for placement of all new erosion control and reef development activities in near shore water.	Hurricane, Erosion, Climate Change	Moderate	Corps of Engineers	Private funds	2025	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
NRP-2	Continue to renourish the beach and adopt beach protection measures.	Hurricane, Climate Change, Coastal Erosion	High	Hancock County Board of Supervisors	Seawall Tax	2028	Completed/Ongoing
NRP-3	Support marsh re-nourishment and restoration by participating with coastal states to protect wetlands and marshes as protective barriers from storms. Actions may minimize storm surge.	Hurricane	High	Hancock County Board of Supervisors	Restore Act	2028	Ongoing
NRP-4	Restore barrier islands.	Hurricane, Climate Change, Erosion	Moderate	MS Secretary of State	National Park Service	2028	Ongoing
Structural Projects							
SP-1	Determine feasibility to construct levee system to protect southern Hancock County including the areas of Pearlington, Ansley, Clermont Harbor, Waveland, and Bay St. Louis as well as the Port Bienville Industrial Park.	Hurricane, Climate Change	Moderate	Hancock County Board of Supervisors	US Army Corps of Engineers	2025	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-2	Request that the US Army Corps of Engineers study the impact on southern Hancock County of existing structural flood protection impacts undertaken in southern Louisiana and project structural improvements in southern Louisiana.	Hurricane, Flooding	High	Hancock County Board of Supervisors	Corps of Engineers	2025	Ongoing
SP-3	Investigate the need for a second north-south roadway in Hancock County.	Hurricane, Flooding	Moderate	Hancock County Board of Supervisors; Gulf Regional Planning Commission	FWHA	2026	Ongoing
SP-4	Increase the capacity of Highway 603 between Highway 43 and Highway 53, and Highway 53 between Highway 603 and Interstate 59, to four lanes.	Hurricane, Flooding	Moderate	Hancock County Board of Supervisors; Gulf Regional Planning Commission	FHWA	2026	Ongoing
SP-5	Increase the capacity of Highway 43 to Interstate 59 from two lanes to four lanes.	Hurricane, Flooding	Moderate	Hancock County Board of Supervisors; Gulf Regional Planning Commission	FHWA	2026	Ongoing

SP-6	Continue to develop centralized water and sewer systems to serve flood- prone areas to assist with recovery by protecting drinking water.	Flooding, Hurricane	High	Hancock County Board of Supervisors; Hancock County Utility Authority	USDA, CIAP, CWA, RLF, CDBG	2026	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-7	Modify storm drainage system to implement structural projects that relive existing and projected flood conditions.	Flooding	Moderate	Hancock County Board of Supervisors	NRCS, FEMA-HMGP, CDBG	2028	Partially completed/Ongoing
SP-8	Continue county culvert replacement program.	Flooding	High	Road Department	Local budget	2028	Partially completed/Ongoing
Emergency Services							
ES-1	Where possible and legal, continue to pre-select and negotiate contracts for emergency response and recovery.	All	High	Hancock County Board of Supervisors; Diamondhead City Council	Local budget	2028	Ongoing
ES-2	Complete and maintain a new EOC that provides a safe area for sheltering, staging of equipment, response supplies, and emergency responders after a natural hazard event.	All	High	Hancock County Emergency Management Agency; Hancock County Board of Supervisors	Insurance, FEMA-HMGP	2026	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-3	Secure and utilize effective new technologies to communicate with residents before, during, and after a hazardous event.	All	High	E-911 Commission	Local budget, FEMA, HMGP	2028	Completed/Ongoing
ES-4	Continue to use the E-911 call out system to alert people living in evacuation zones of the need to evacuate.	Hurricane, Flooding	High	E-911 Commission	Local budget	2028	Completed/Ongoing
ES-5	Investigate incentives to help mobile home parks establish tornado shelters for their residents.	Tornado, All Severe Weather	Moderate	Hancock County Emergency Management Agency	Private Funding	2025	Ongoing
ES-6	Maintain a special needs only shelter and establish partnerships for operations.	Hurricane, Flooding, Tornado, Earthquake	High	Hancock County Emergency Management Agency; Hancock	Local budget	2026	Ongoing

				Medical Center			

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-7	Maintain shelter standards.	Hurricane. Flooding, Tornado, Earthquake	Moderate	Hancock County Emergency Management Agency; Hancock County Board of Supervisors	Local budget, FEMA- HMGP	2028	Ongoing
ES-8	Support regional pet friendly shelters.	Hurricane, Flooding, Earthquake	Moderate	Hancock County Animal Shelter; Friends of the Animal Shelter	Local budget	2028	Ongoing
ES-9	Establish a program to micro-chip pets. Pets that have a micro-chip are more likely to be returned to their owners after any hazardous event.	All	Low	Hancock County Animal Shelter; Friends of the Animal Shelter	Foundation/non-profit grants	2026	Partially completed/Ongoing
ES-10	Maintain shelters in Hancock County.	Hurricane, Flooding, Tornado, Earthquake	High	Hancock County Emergency Management Agency; Hancock County Board of Supervisors	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-11	Establish telecommunications links with Stennis Space Center, Pearl River County, Harrison County, MEMA, and FEMA, and increase reliability of the communications system and interoperability between emergency services responders. Improve public safety internal communications and ensure reliability in any type of disaster.	All	High	E-911 Commission	Local budget, FEMA- HMGP	2026	Partially completed/Ongoing
ES-12	Request cellular phone companies to provide HCEMA with an emergency operations plan for cellular communications during emergency situations.	All	Moderate	Hancock County Emergency Management Agency; Hancock County Building Office	Local budget to review and file plans	2028	Ongoing
ES-13	Enhance E-911 call system to recognize the location of cell phone calls received at the dispatch center.	All	High	E-911 Commission	Local budget, FEMA, HMGP	2025	Ongoing
ES-14	Join the NOAA Storm Ready Community Alert Program.	All	High	Hancock County Emergency Management Agency	Local budget	2025	Completed/Ongoing Certification Needed

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-15	Provide pre-hurricane season exercise.	Hurricane, Flooding	High	Hancock County Emergency Management Agency	Local budget	2024	Completed/Ongoing annually
ES-16	Augment warning systems throughout Hancock County.	All Severe Weather	High	Hancock County Emergency Management Agency	FEMA-HMGP	2028	Ongoing
ES-17	Purchase brush trucks or quick attack trucks and strategically place the trucks throughout the county for use by multiple stations.	Wildfire	Moderate	Fire Protection Districts	FEMA-AFG, CDBG, RDA	2025	Partially completed/Ongoing
ES-18	Encourage joint exercises among departments to train together for large wildfires.	Wildfire	High	Hancock County Emergency Management Agency; Fire Protection Districts	Local budget	2024	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-19	Purchase a marine fire fighting vehicle.	Wildfire	Low	Hancock County Board of Supervisors	FEMA-AFG, Coast Restore Act Funds	2026	Ongoing contingent upon funding
ES-20	Diamondhead Property Owners Association will continue to use a warning system to alert golfers of threatening lightning.	All Severe Weather	Moderate	Diamondhead Property Owner's Association	Property dues	2028	Completed/Ongoing
ES-21	Subscribe to the Lightning Detection Network, which alerts subscribers when dangerous lightning is within the region.	All Severe Weather	Low	Hancock County Emergency Management Agency	Local budget	2024	Completed/Ongoing
ES-22	Program emergency warning system to warn for lightning.	All Severe Weather	Low	Hancock County Emergency Management Agency; E-911	FEMA-HMGP	2028	Ongoing
ES-23	Spread sand on bridges that may ice during cold weather storms.	Extreme Cold, Winter Weather	Low	Road Department	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-24	Post signs on all bridges in the county which state “may ice in cold weather.”	Extreme Cold, Winter Weather	Low	Road Department	Local budget	2024	Ongoing
ES-25	Establish a sheltering plan for people without homes.	Extreme Cold, Winter Weather	Moderate	Hancock County Emergency Management Agency; Human Services	Gulf Coast Continuum of Care	2025	Ongoing still no formal plan in place
ES-26	Provide EMC training for Volunteer Fire Departments and continue to participate in exercises to sharpen emergency response skills.	All	High	Hancock County Emergency Management Agency	Local budget	2024	Ongoing Annually
ES-27	Establish a fuel reserve for emergency situations.	All	Moderate	Hancock County Emergency Management Agency	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-28	Continue badging program to ensure that essential county personnel can respond within disaster area to contain damages quickly.	All	High	Hancock County Emergency Management Agency	Local budget	2028	(Action 2006-13.8 in previous plan) A badging program has been established but there is a need for consistently updating badged personnel to ensure they are well-trained and prepared in an emergency.
Public Education and Awareness							
PEA-1	Support mitigation library in the Hancock County Library branches that provides materials on flood proofing and retrofitting and direct county residents to use these resources.	Hurricane, Flooding, Tornado	High	Building and Zoning Department	Local budget	2028	Ongoing
PEA-2	Establish training and outreach programs to prepare local businesses to be competitive in the disaster recovery and rebuilding economics.	All	Moderate	Chamber of Commerce; Pearl River Community College	MDA	2028	Ongoing
PEA-3	Publicize evacuation routes and locations of regional shelters.	Hurricane, Flooding, Tornado, Earthquake	Moderate	Hancock County Emergency Management Agency, American Red Cross	Local budget	2028	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-4	Promote the development of personal protection plans.	All	Moderate	Hancock County Emergency Management Agency; American Red Cross	Local funds, private donations, foundation funding	2028	Ongoing
PEA-5	Establish continuity training workshops for businesses.	All	Low	Hancock County Chamber of Commerce	Local budget, foundations	2028	Ongoing contingent upon available funding
PEA-6	Mail out a brochure to owners of property located in Special Flood Hazard Areas, suggesting methods for floodproofing.	Hurricane, Flooding, Dam Failure	High	Hancock County Building Official and Diamondhead Building Official	Local budget	2028	Partially completed/Ongoing
PEA-7	The Fire Coordinator and partners will provide homeowner education about protecting homes from wildfires.	Wildfire	High	Mississippi Forestry Commission	State-MFC	2025	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-8	Seek partners to educate residents and business owners about invasive species that may contribute to the loss of wetlands	Climate Change, Erosion	Low	MDMR, Land Trust for MS Coastal Plain	EPA Five Star Program, USFWS Focus Funds, CIAP, Tidelands	2028	Ongoing
PEA-9	Maintain a partnership with the American Red Cross to provide mitigation and prevention education in Hancock County.	All	High	Hancock County Emergency Management Agency; American Red Cross	Local budget	2028	Ongoing
PEA-10	Promote public information of prevention actions that can be taken by families and individuals.	All	High	Hancock County Emergency Management Agency	Local budget	2028	Ongoing

City of Bay St. Louis Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Apply to Insurance Services Office (ISO) to further lower the NFIP Flood Insurance Rating.	Flooding	High	CRS Administrator; Floodplain Insurance Administrator	Local budget	2025	Ongoing
P-2	Develop a Repetitive Loss Plan for the recently annexed area of the city.	Flooding	High	City of Bay St. Louis Flood Insurance Administrator; City Council, CRS Coordinator	MEMA Planning funds, local funds	2027	Ongoing
P-3	As development occurs in the annexed area, require that green space be set aside.	Flooding	High	City Council	FEMA, local budget	2028	Completed/Ongoing with additional annexation
P-4	Participate in the development of the District/County Hazard Mitigation Plan.	Hurricane, Flooding, Wind	High	Bay St. Louis Building Department; Public Safety Departments	Local budget	2028	Ongoing annual review and five year update cycle

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-5	Continue to maintain FEMA elevation certificates on each building in Bay St. Louis.	Flooding	High	Building Official; CRS Coordinator	Local budget	2028	Completed/Ongoing
P-6	Continue to enforce City Ordinance No. 285 to protect natural drainage from development.	Flooding	High	Building Official	Local funds	2028	Completed/Ongoing
P-7	Continue to enforce City Ordinance No. 285 to include erosion and sediment control Best Management Practices (BMP's) as required by NPDES Phase II Program.	Flooding	High	Building Official	Local budget	2028	Completed/Ongoing
P-8	Continue to enforce the city's Subdivision Regulations to require that streets in subdivisions are located above flood elevation to prevent isolation.	Flooding	High	Building Official	Local budget	2028	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Continue to implement the city's Substantial Damage Rule.	Flooding, Hurricane and Tropical Storm	High	Building Official	Local budget	2028	Completed/Ongoing
P-10	Continue to implement Drainage Standard Operating Procedure (SOP).	Flooding	High	Public Works Director	Local budget	2028	Ongoing
P-11	Continue to enforce the Stream Dumping Ordinance to prohibit depositing of debris in the drainage system.	Flooding	High	Public Works Director	Local budget	2025	Ongoing
P-12	Continue to enforce standards for hurricane resistant construction.	Hurricane, Tornado, Severe Thunderstorm / High Wind	High	Building Official	Local budget	2028	Ongoing
P-13	Continue to enforce the city's TreeOrdinance.	Flooding, Storm Surge, Hurricane	High	City Tree Officer	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-14	Digitize property maps to include base flood elevations and flood hazard information.	Flooding	High	Hancock County Tax Assessor	Local budget	2026	Partillay Completed/Ongoing
P-15	Partner with NASA's Commercial Remote Sensing Department for additional map based information.	All	Moderate	Planning Department	Local budget	2026	Completed/Ongoing
P-16	Develop a five year capital improvement program and continue to upgrade drainage facilities throughout the city to protect private and public property.	Flooding	High	City Council	Local budget, grant funds for implementation, HMGP, BRIC	2028	Completed/Ongoing review and updates
P-17	Coordinate with adjacent communities to assure that actions taken within one community will not contribute to a great impact by hazards within the floodplain and neighboring communities.	Flooding	High	City Council	Staff time	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Seek funding to assist homeowners located in the Special Flood Hazard Areas to mitigate their homes from flooding through elevation and acquisition.	Flooding	High	City Council	FEMA HMGP, FMA, SRL funding, CDBG, and other programs as available	2028	Ongoing contingent upon available funding
Natural Resource Protection							
NRP-1	*Evaluated and found not appropriate for the jurisdiction.*	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	*Evaluated and found not appropriate for the jurisdiction.*	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Emergency Services							
ES-1	*Evaluated and found not appropriate for the jurisdiction.*	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Public Education and Awareness							
PEA-1	Establish a program to offer CEUs to real estate and insurance professionals on hazard mitigation.	Flooding, Severe Thunderstorm / High Wind	High	Building Official	MEMA, local budget	2028	(Action 2005-40 in previous plan) The city has worked with real estate and insurance professionals to improve their understanding of mitigation but there is still room to improve this understanding further so this action will remain in

							place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	The Building Office should continue to offer site specific information to property owners and update the data available as it is made available by the Tax Assessor, FEMA, and MEMA.	Flooding, Hurricane	High	Building Official	Local budget	2028	Completed/Ongoing
PEA-3	Market the Hazard Mitigation Loan Program to home and business owners.	All	Low	Hancock County Board of Supervisors	FEMA Disaster Resistant Community Funds	2028	Completed/Ongoing
PEA-4	Continue to mail out a brochure to owners of property located in Special Flood Hazard Areas which suggests methods for flood proofing properties.	Flooding, Hurricane and Tropical Storm, Tornado, Sever Thunderstorm / High Wind	High	Building Official; CRS Coordinator	Local budget	2028	Ongoing

PEA-5	Post awareness posters in city offices.	Hurricane, Flooding, Tornado, High Wind, Severe Thunderstorm, Lightning, Heat	High	Building Official	Local budget	2028	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-6	Continue an internet website to make hazard mitigation information and programs and requirements in Bay St. Louis available to the public.	All	High	Building Official	Local budget	2028	Ongoing updates
PEA-7	Participate in Hurricane Awareness Week by adopting a proclamation.	Hurricane	Moderate	Community Development Director	Local budget	2025, Annually	Ongoing Annually
PEA-8	Participate in the Annual Mississippi Homebuilders Association Fair and Exposition, providing hazard mitigation information and related city programs and regulations.	All	Moderate	Building Official; CRS Coordinator; Fire Department	Local budget	2028	Ongoing Annually
PEA-9	Continue hurricane and storm safety curriculum in the Bay St. Louis High School.	Hurricane	Moderate	Bay St. Louis Fire and Police Department	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-10	Implement flood awareness/storm surge markers in Special Flood Hazard Areas.	Flooding	Moderate	Building Official	Staff time	2026	Completed/Ongoing as needed
PEA-11	Continue to update floodproofing, retrofitting, and construction technology resources in the Hancock County Library located in Bay St. Louis.	Flooding	High	CRS Coordinator	FEMA, HMGP, BRIC, FMA, staff time	2028	Ongoing with updated materials

City of Diamondhead Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Continue to implement a Floodplain Management Ordinance which includes substantial damage and cumulative impact requirements.	Hurricane, Flooding	High	City Building Official	Local budget	2028	Ongoing
P-2	Develop a Master Stormwater Plan for the City of Diamondhead and implement the recommendations included in the plan.	Hurricane and Flooding	High	City Council and Diamondhead Property Owners Association	USDA-NRCS, USACOE, MDEQ, FEMA-HMGP	2021	Comprehensive plan completed 2021, “Envision Diamondhead 2040”
P-3	Establish natural gas supply in Diamondhead.	All	Low	City Council	CDBG, FEMA-HMGP	2025	Deferred due to lack of funding
P-4	Establish and maintain fire breaks through Diamondhead.	Wildfire	Low	City Council, Fire Dept.	FEMA-HMGP, MFC	2026	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-5	Establish a dam maintenance program and emergency operations plan for dam failure.	Dam Failure	Low	Public Works Office, Diamondhead Property Owners Association	Local budget	2026	Ongoing
Property Protection							
PP-1	Reconstruct and elevate Kapalama Drive and the bridge north of Diamondhead to provide an adequate evacuation route.	Hurricane and Flooding	Moderate	City Council	FHWA, FEMA-HMGP	2025	Ongoing contingent upon funding
PP-2	Place power lines underground along city roadways.	All	Moderate	Coast Electric Power Association	CEPA	2026	Partially completed/Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-3	Mitigate City Hall and Public Safety Building for hurricanes.	Hurricane	High	City Council	FEMA-HMGP	2026	Ongoing contingent upon funding
Natural Resource Protection							
NRP-1	*Evaluated and found not appropriate for the jurisdiction.*	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	Construct berm or levee and floodgate with pump to protect a Diamondhead neighborhood from flooding due to an existing drainage outlet that drains to St. Louis Bay.	Hurricane, Flooding	Moderate	City Council	USACOE, FEMA-HMGP, MDOT	2025	Ongoing contingent upon funding
Emergency Services							
ES-1	Secure and utilize effective outreach methods to communicate with residents before a hazardous event.	All	Moderate	City Council; Fire Protection District	FEMA-HMGP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-2	Establish an audible and an electronic warning system for areas susceptible due to flash flooding.	Dam Failure, Flooding	High	City Council; Diamondhead Property Owners Association	Local budget	2026	Ongoing
ES-3	Establish warning signage and/or barriers for roads in Diamondhead that are susceptible to flash flooding.	Dam Failure, Flooding	Moderate	City Council; Diamondhead Property Owners Association	FWHA, FEMA-HMGP, Local funds	2028	Ongoing
Public Education and Awareness							
PEA-1	Establish a public information program to alert residents of mitigation actions to reduce damage from natural disasters.	All	Moderate	City Building Office	Local budget	2028	Ongoing

City of Waveland Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Designate an offsite storage facility for public records north of Interstate 10 or implement a system to protect all public records from flood or hurricanes.	Hurricane and Flooding	High	CRS Coordinator	FEMA -HMGP	2026	Ongoing
P-2	Update the City of Waveland Master Drainage Plan and implement new drainage improvement projects.	Flood	Moderate	Public Works Director	HMGP, CDBG, PA, MDOT, etc. grant funds	2028	Partially completed/Ongoing
P-3	Use the eight acres the city has located on Waveland Avenue to develop football fields and create green space which will help reduce flooding within the surrounding area.	Flood	Moderate	Mayor's Office; CRS Coordinator; Public Works Director	BP settlement funds, FEMA grant funds	2026	Completed/Ongoing
P-4	Develop and implement an automated database/GIS system for elevation certificates.	Flood	Moderate	CRS Coordinator	FEMA, HMGP, FMA	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-5	Establish programs to cleanout drainage canals throughout the city on an annual basis.	Erosion	High	Public Works Director	FEMA -HMGP, FMA	2024, Annually	Ongoing/Annually
P-6	Continue to control construction site runoff through requirement of clearing and grading permits erosion and sediment control regulations.	Flooding, Erosion	High	Planning/Code Office	FMA, HMGP	2026	Ongoing
P-7	Continue to control post-construction site runoff so it does not exceed pre- development site runoff through enforcement of best management practices.	Flooding, Erosion	High	Planning/Code Office	HMGP	2026	Completed/Ongoing
P-8	Continue to strengthen floodplain regulations as appropriate.	Flooding	High	Floodplain Manager	Existing budget	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Work with flood insurance agents and lending institutions to ensure that mandatory flood insurance requirements are being met in area annexed in 2006 and throughout Waveland when new maps are adopted.	Flooding	High	Floodplain Manager	State, HMGP, FEMA, FMA	2026	Ongoing
P-10	Promote business continuity planning for small business and government.	All	Moderate	Civil Defense Director/Fire Chief	Local budget	2028	Ongoing
P-11	Continue to update information about hazardous materials facilities in Waveland upon receiving Tier II Forms from the facilities.	Hazardous Materials	Moderate	Fire; Civil Defense	Local budget	2028	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Protect external A/C equipment in the Central Fire Station and install underground storage tanks.	All	High	Fire Department (Chief)	HMGP	2026	Ongoing contingent upon funding
PP-2	Elevate residential structures on existing property located in the flood zones to comply with the current flood ordinance.	Flood	High	Fire Chief; Civil Defense; CRS Coordinator	HMGP, FMA	2028	Partially completed/Ongoing
PP-3	Acquisition and demolition of repetitive loss and severe repetitive loss properties.	Flood	Moderate	CRS Coordinator	HMGP and FMA grant funds	2028	Partially completed/Ongoing
PP-4	Reconstruction and floodproofing of structure following hurricanes and/or other disasters.	Hurricane, Flooding	Moderate	CRS Coordinator	HMGP or FMA grant programs	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Retrofit city-owned facilities and privately-owned residential structures to help protect these structures from damage during hurricanes and other natural disasters.	Hurricane, Flooding	Moderate	CRS Coordinator	HMGP, CDBG, PA, or FMA grant programs	2028	Partially completed/Ongoing contingent upon funding
PP-6	Update list of city's repetitive flood loss properties to include properties in area annexed in 2006, and encourage owners of repetitive and severe repetitive loss properties citywide to participate in mitigation activities such as floodproofing, elevation, or buyout programs.	Flooding	High	Floodplain Manager; Planning; CRS Coordinator; Building Official	HMGP, FMA, RFC, SRL	2028	Partially completed/ Ongoing contingent upon funding
PP-7	Acquire or otherwise remove repetitive and severe repetitive loss properties from the floodplain.	Flooding	High	CRS Coordinator	HMGP, FMA	2028	Partially completed/ Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-8	Encourage business owners to protect vulnerable structures through floodproofing, elevation, shutters, and other mitigation activities.	Hurricane, Flooding	Moderate	Building Official, Planning, Mayor's Office, Floodplain Manager	HMGP	2023	Ongoing
Natural Resource Protection							
NRP-1	Evaluate and implement the best option for beach front erosion protection. Alternatives include fences, concrete barriers, create dune/vegetative areas.	Erosion	High	Harrison County Sand Beach Authority	Harrison County Beach Authority	2026	Ongoing
NRP-2	Develop and implement a plan in an effort to protect and maintain the natural marshes and other barriers.	Erosion	High	Public Works Director	Local, Regional budgets	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
NRP-3	Dredge Jackson Marsh to restore wetlands and help reduce flooding.	Erosion	High	Public Works Director	FEMA grant programs	2022	Completed/Ongoing
Structural Projects							
SP-1	Build access road from Sarah Lane north to Adams Lane to allow citizens on Sarah Lane to evacuate during storms.	Hurricane	High	Civil Defense	HMGP, CDBG	2026	Ongoing contingent upon funding
SP-2	Install barrier (check valve) in culvert under Highway 603 to prevent storm surge from entering the city and flooding homes.	Flood	High	CRS Coordinator; Civil Defense	HMGP, FMA, CDBG	2026	Ongoing contingent upon funding
SP-3	Install barrier (check valve) in culvert under railroad track on South Street to prevent storm surge from entering the city and flooding homes.	Flood	High	CRS Coordinator; Civil Defense	HMGP, FMA, CDBG	2026	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-4	Coordinate with and support the US Army Corps of Engineering on projects in the MsCIP relating to the City of Waveland.	Hurricane, Flooding, Storm Surge, Sea Level Rise	High	All City Departments; Board of Alderman	USACE	Corps of Engineers to determine schedule	Ongoing contingent upon funding
SP-5	Extend stormwater drainage pipes into gulf to help eliminate sand from filling drainage pipes during storm events.	Erosion	Moderate	Public Works Director	HMGP, FMA	2028	Ongoing contingent upon funding
SP-6	Install bypass valves at all City of Waveland sewer lift station pumps to reduce or eliminate the loss of sewer service and cost of vacuum trucks.	Hurricane, Flooding	High	Public Works Director	HMGP	2028	Ongoing contingent upon funding
Emergency Services							
ES-1	Install two warning sirens in the north and northeast areas of the city at a public park and a community center.	All	High	Fire Chief; Civil Defense	HMGP	2026	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-2	Review current evacuation plan and access to evacuation routes throughout the city.	All	High	CRS Coordinator	FEMA -HMGP	2028	Completed/Ongoing
ES-3	Develop a communication system utilizing LED boards along high traffic areas to warn citizens about the threat of potential hazards affecting the City of Waveland.	All	High	Fire Chief	FEMA-HMGP	2028	Complete/Ongoing
ES-4	Consider establishing a program to train and verify neighborhoods in first response actions after hazards.	All	Moderate	Civil Defense Director	Local budget	2028	Ongoing.
ES-5	Establish a facility north of Interstate 10 that can be used as a command center in the event of a major hurricane that can also serve as a shelter for essential city personnel and equipment and house a critical records vault.	All	Moderate	Board of Alderman; Mayor's Office	HMGP, CDBG	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-6	Develop a generator plan for all critical facilities.	All	Moderate	Fire Chief; Civil Defense Coordinator	HMGP, CDBG	2028	Ongoing
ES-7	Use the Reverse 911 system to issue evacuation warning and advisories, especially for special needs residents.	All	Moderate	Fire Chief	Local budget	2028	Completed/Ongoing
ES-8	Use existing data from the monitoring and warning gauges on waterways to predict hazardous situations. Use Hurrevac and other existing computer programs and data to predict hazardous situations.	Flooding	Moderate	Fire Department	USGS, Local budget	2028	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-9	Maintain NOAA StormReady Designation.	All	Low	Fire Chief; Civil Defense Director	NOAA, Local budget	2028	Ongoing
ES-10	Enhance the communications system in a coordinated fashion between appropriate departments in the county, city, and the state.	All	Moderate	Civil Defense Coordinator; Fire Chief; Police Chief	Local, State budgets	2023	Partially completed/Ongoing
ES-11	The City of Waveland will continue to train its personnel in weapons of mass destruction and hazardous materials response through education programs such as HazMat Level I and II and incident response to terrorist bombing.	Hazardous Materials	Low	Police; Fire; Civil Defense	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-12	Continue to update CAMEO, MARPLT, and ALOHA software where available and install in all response vehicles.	All	Moderate	Fire; Civil Defense	Local budget	2028	Ongoing
ES-13	Continue to update the Pre-plan Emergency Response Books for hazardous materials locations within Waveland.	Hazardous Materials	Moderate	Fire; Civil Defense	Local budget	2028	Ongoing
ES-14	Continue to seek grant funding through FEMA Fire Act Grants and Homeland Security Grants for terrorist and HAZMAT equipment to enable its emergency response personnel to prepare and respond to acts of terrorism and hazardous materials incidents.	Hazardous Materials	Moderate	Police; Fire; Civil Defense	Local budget	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Public Education and Awareness							
PEA-1	Educate citizens of Waveland about preparedness for all hazards affecting the city.	All	High	CRS Coordinator	City budget	2028	Ongoing
PEA-2	Educate homeowners regarding structural upgrades that can be made to residential homes for added protection against damage during hurricanes and flooding and can also help save citizens money on their annual homeowners insurance premiums.	Hurricane and Flooding	Moderate	CRS Coordinator; Planning Department	FEMA HMGP, local budget	2028	Ongoing/Annually
PEA-3	Enhance the usability and functionality of the city's website with an updated section to notify citizens about emergency services and hazards threatening the City of Waveland as well as emergency procedures for different types of hazards and evacuation routes.	All	Moderate	CRS Coordinator	City budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-4	Develop a plan to educate and promote flood insurance to the citizens of Waveland.	Flood	High	CRS Coordinator	Local budget	2028	Ongoing
PEA-5	Continue to publicize evacuation routes and approximate travel times to evacuate the area.	Flooding, Hurricane	High	Floodplain Manager; CRS Coordinator	Local budget	2028	Ongoing
PEA-6	Continue to mail flood safety information, including evacuation zones and routes, to every address in Waveland every year.	Flooding	High	Floodplain Manager; Civil Defense Coordinator	Local budget	2028	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-7	Continue to publicize how families can prepare and plan for disaster.	All	High	Civil Defense Coordinator; American Red Cross	Local budget	2023	Ongoing
PEA-8	Publicize information about the special needs registry maintained by the Hancock County Emergency Management Agency and how residents with special needs can register themselves.	All	Moderate	Civil Defense Director	Local budget	2023	Ongoing
PEA-9	Provide information on model construction techniques, such as storm shutters, in public places so people can learn about these mitigation techniques and adopt them for their own homes.	Severe Thunderstorm / High Wind, Hurricane, Flooding	Moderate	Building Official; CRS Coordinator	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-10	Encourage residents to acquire and monitor NOAA weather radios.	All	Moderate	OEM	Local budget	2028	Ongoing
PEA-11	Provide an annual pre-hurricane season workshop and exercise for elected officials and emergency operations staff.	Hurricane	High	OEM	Local budget	2028	Ongoing contingent upon funding

Harrison County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Identify resources that are available to be shared between municipalities and the county.	Hurricane, Flood, Thunderstorm, Tornado, All Severe Weather	High	Harrison County Emergency Management	Local budget	2027	Ongoing
P-2	Build partnerships to share resources.	All	High	Harrison County Emergency Management	Local budget	2027	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-3	Identify cross ownership and multi- jurisdictional issues related to flood hazards.	Flood	High	Harrison County Planning and Zoning Department	Local budget	2027	Ongoing
P-4	Continue support of the U.S. Army Corps of Engineers study of the Turkey Creek Drainage area and implement recommendations made in the study.	Flood	Moderate	Harrison County Board of Supervisors	U.S. Army Corps of Engineers	2025	Ongoing contingent upon funding
P-5	Develop a data network that provides "real-time" information from data generated through the county building permit program.	Hurricane, Flood	Moderate	Harrison County Data center	Department of Transportation, general revenues	2025	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-6	Adopt Smart Growth policies.	All	Low	Harrison County Board of Supervisors	Local budget	2025	Ongoing
P-7	Develop regulatory standards for floodplain management that go beyond the minimum standards of the NFIP.	Flood, Hurricane	Moderate	Harrison County Building Code Administration and Building Official	Local budget	2027	Completed/Ongoing
P-8	Develop local, city, and county wetlands regulations that provide the "intent" of the regulations for flood storage (available for CRS credit).	Flood	High	Harrison County Planning and Zoning Department; Planning Departments and Planning Commissions of Biloxi, Gulfport, Long Beach, D'Iberville, and Pass Christian	Local budget	2027	Completed/Ongoing

P-10	Continue enforcement of the Zoning Ordinance and amend the ordinance as necessary.	Flood	High	Harrison County Zoning Department and Planning Commission	Local budget	2027	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-11	Develop subdivision regulations that require a lower number of lots in order to be reviewed.	Flood	Low	Harrison County Planning Commission; Zoning Department; Engineering Department	Local budget	2027	Ongoing
P-12	Adopt the current International Building Code.	Hurricane, Tornado, Thunderstorm, High Wind, Lightning	Moderate	Harrison County Code Administration	Local budget	2027	Ongoing
P-13	Encourage plantings of live oak trees on public and private properties.	Hurricane, Flood	Moderate	Harrison County Beautification Department; Municipal Beautification Departments	MS Department of Transportation, general revenues, private funding	2027	Ongoing
P-14	Develop a county-wide Stormwater Plan.	Flood	Moderate	Harrison County Wastewater District	Coastal Impact Assistance Program, general revenues	2025	Completed/Ongoing updates

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-15	Require final inspection by a qualified engineer on behalf of the local government for stormwater conveyances.	Flood	Moderate	Harrison County Board of Supervisors; Cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian	Local budget	2027	Ongoing
P-16	Request authority for the Health Department to issue final approval of installed individual onsite wastewater disposal systems.	Flood	Moderate	Mississippi State Department of Health	Local budget	2027	Ongoing
P-17	Encourage and keep record of the elevations of homes, bridges, roads, and reference marks.	Flood	High	Harrison County Engineer; CRS Coordinator	General revenues	2027	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-18	Continue to assist FEMA in mapping floodplains by requesting map updates as needed.	Flood	Moderate	Harrison County Emergency Management; Harrison County Board of Supervisors	General revenues, HMGP	2027	Maps updated 2016, Ongoing Updates
P-19	Develop cross platform mobile device accessible web mapping applications to be used for post-disaster reconnaissance, asset inventory, and damage assessments.	All	Moderate	Harrison County GIS Department	Capital budget, Harrison County GIS Coalition	2025	Partially completed/Ongoing
P-20	Develop and maintain GIS database to track county and city vulnerability (exposure to known hazard areas) through coordination with subject- matter experts and the Harrison County GIS Coalition (HCGISC).	All	Moderate	Harrison County GIS Department; Harrison County Emergency Management Agency	Capital budget, Harrison County GIS Coalition	2025	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-21	Implement a county-wide database of utility infrastructure showing geographic location of underground and surface level water and sewer assets. This database will include municipalities. This will enhance the ability during a declared emergency to determine affected assets during surge/flood events.	All	Moderate	Harrison County GIS Department; Harrison County Emergency Management Agency	Capital budget, Harrison County GIS Coalition	2025	Completed/Ongoing updates
P-22	Implement a county-wide database of physical address locations and structures types for rapid spatial analysis of disaster affected properties to determine damage assessments for number of structures by type and estimated values.	All	Moderate	Harrison County GIS Department; Harrison County Emergency Management Agency	Capital budget, Harrison County GIS Coalition	2025	Partially completed/Ongoing
Property Protection							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-1	Continue to participate in the Hazard Mitigation Grant Program to purchase and elevation structures that are repeatedly flooded.	Flood, Hurricane	Moderate	Harrison County Board of Supervisors, Cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian	Hazard Mitigation Grant funds, Flood Mitigation Assistant Program funds, Pre-disaster Mitigation Grant Program	2028	Partially completed/Ongoing
PP-3	Encourage safe room construction in all new structures or substantially improved structures. To include a new EOC/EMA Office (Safe Room) outside the Historic Flood Zone of Downtown Gulfport.	Hurricane, Tornado, Flood, Thunderstorm, High Wind, Lightning, Hail	Moderate	Harrison County Emergency Management	Local budget, State, Federal, HMGP, BRIC	2027	Partially completed/Ongoing
PP-4	Install storm shutters to protect exterior of ambulance service headquarters, dispatch, and personnel area.	Hurricane, Tornado	Moderate	Harrison County American Medical Response	HMGP, BRIC	2025	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Build out a functional Sheriff's Work Center by installing a 125 kw generator to power inmate housing, kitchen, vehicle maintenance center	All	High	Harrison County Inmate Work Center	Local budget	2025	Partially completed/Ongoing
PP-6	Construct a new county Emergency Operations Center that is located in a non-flood impact area and which incorporates protection from wind and other hazards to the greatest extent possible	All	High	Harrison County Emergency Management	Hazard Mitigation Grant Funds, Pre-disaster Mitigation Grant Program, Capital Budget	2027	Ongoing contingent on funding
PP-7	Increase stormwater flow capacity along roadways and other critical infrastructure in areas of high flood risk.	Flood, Severe Weather, Tropical Storm Hurricane	High	Harrison County Engineering	BRIC	2027	New
Natural Resource Protection							
NRP-1	Continue to maintain the sand beach.	Hurricane, Flood, High Wind	High	Harrison County Sand Beach Authority	General revenues, USACE	2028	Ongoing

NRP-2	Petition the Secretary of State for tax delinquent properties that lie in the floodplain that may contribute to flood storage, stormwater control, and linked green space. Establish a cooperative maintenance agreement among the communities for the maintenance of these properties.	Flood	Moderate	Community Development; Planning and Recreation Departments of Harrison County and the Cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian	Local budget	2025	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
NRP-3	Encourage acquisition or donation of conservation easements and properties in environmentally sensitive areas.	Flood	Moderate	Harrison County Board of Supervisors	HMGP, FMA	2028	Ongoing
NRP-4	Encourage dune propagation in areas where the seawall is below 10 feet (NGVD).	Hurricane, Flood, High Wind	High	Harrison County Sand Beach Authority	HMGP	2028	Ongoing
Structural Projects							
SP-1	Improve East-West Corridor transportation infrastructure to ensure adequate evacuation clearance times.	Hurricane	Moderate	Harrison County Transportation Authority	Department of Transportation, general revenues	2024	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-2	Improve North-South Connector in Biloxi transportation infrastructure to ensure adequate evacuation clearance times.	Hurricane	Moderate	Mississippi Department of Transportation	Federal Highway Funds, MS Department of Transportation Funds	2024	Ongoing
SP-3	Improve North-South Connector in western Harrison County transportation infrastructure to ensure adequate evacuation clearance times.	Hurricane	Moderate	Harrison County Board of Supervisors	Federal Highway Funds, MS Department of Transportation Funds	2024	Ongoing
Emergency Services							
ES-1	Increase above ground fuel storage capacity by at least 12,000 gallons for generators at Memorial Hospital. This would allow fuel capacity operation for 96 hours without replenishment.	All	High	Memorial Hospital	Mitigation Grant, Capital Budget monies	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-2	Increase generator capacity at Memorial Hospital to provide sustained uninterrupted patient care before, during, and after an emergency event.	All	High	Memorial Hospital	Mitigation Grant, Capital Budget monies	2028	Ongoing contingent upon funding
ES-3	Continue to participate in Hazard Mitigation Grant Program to build 361 community shelters (shelters that meet the requirements of FEMA Publication 361: Design and Construction Guidance for Community Shelters) and stand alone within Harrison County for shelter up to 45% of population.	All	Moderate	Harrison County Emergency Management Agency; Harrison County Board of Supervisors; Harrison County School District	General revenues, federal match, grants, HMGP, FMA, BRIC	2026	Partially completed/ Ongoing contingent upon funding
ES-4	Seek Hazard Mitigation funds to provide generator power back up systems, and retrofit county and city- owned critical facilities to meet extreme wind standards.	All	High	Harrison County Emergency Management Agency; Harrison County Board of Supervisors; Harrison County School	General revenues, Hazard Mitigation funding	2028	Partially completed/ Ongoing contingent upon funding

				District			

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-5	Implement a county-wide database of emergency response inventory showing geographic location and emergency point of contact that includes equipment, supplies, and personnel.	All	High	Harrison County GIS Department, Emergency Management Agency, Board of Supervisors	Capital budget, Harrison County GIS Coalition	2025	Partially completed/Ongoing
ES-6	Enhance Reverse 911 and cell phone registration with web applications and emergency alerts as part of the multiple pre-working systems and expand to cover high risk areas not covered.	All	High	Harrison County Board of Supervisors, Emergency Management Agency, IT	MEMA, private donations from cellular companies	2028	Partially completed/Ongoing
ES-7	Establish evacuation routes to include a north-south transportation evacuation corridor in west Harrison County.	Hurricane, Tropical Storm, Flood	Moderate	Harrison County Transportation Authority, Planning Commission	MS Dept. of Transportation	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-8	Develop a plan that defines and clarifies Special Needs as it relates to evacuation and sheltering throughout Emergency Management Services.	All	High	Emergency Management Agency, Dept. of Health, local hospitals, Red Cross	MEMA, Local budget	2024	Partially completed/Ongoing
ES-9	Expand the use of weather radios as part of the multiple pre-working systems and expand to cover high risk areas not covered.	All	High	Emergency Management Agency, Board of Supervisors	MEMA, private donations	2028	Ongoing
ES-10	Continue development of water supply in rural areas in order to service wildfires to protect homes, large timberland, and schools located in rural areas.	Wildfire	Moderate	Harrison County Board of Supervisors, Waterwise, Utility Authority District; MS Development Authority	WaterSMART Water and Energy Efficient Grant funding, Alliance Grants	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-11	Expand the current Flood Warning System to include: GIS mapping of developments and inundation areas to inform warning system and ability to access data through online viewer; further define special needs and include in warning system as a separate criterion for warning; provide public education and outreach for how the system works and who will be informed and criteria for implementing system; and broaden warning mechanisms to include TV messages and social media outlets, include school districts as agency for dismissal or holding during a flood hazard.	All	Moderate	Harrison County Emergency Management Agency, Code Enforcement	Capital budget, in- house	2028	Partially completed/Ongoing
ES-12	Construct a 10,000 square foot Emergency Operations Center that will be strategically located within the county to assist in preparing for and responding to future natural hazards.	All	High	Board of Supervisors, Emergency Management Agency	TBS	2028	Ongoing contingent upon funding
ES-13	Add bi-fuel capability for existing hospital generators to utilize natural gas as an alternate fuel source.	All	High	Memorial Hospital	Mitigation Grant, Capital Budget monies	2026	Ongoing contingent upon funding
Public Education and Awareness							

PEA-1	Establish an education program to promote the CRS program.	Flood	Moderate	Harrison County Building Department	General revenues	2024	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Create an education outreach program to encourage better design.	Flood	Low	Mississippi Department of Marine Resources	DEQ, EPA, Conference Fees	2024, Annually	Ongoing
PEA-3	Set up booths/displays for mitigation activities at Homeowners Show and building suppliers. Initiate an annual county-wide hurricane fair.	Hurricane, Flood, High Wind	Moderate	Harrison County Emergency Management	General revenues	2025	Ongoing Annually
PEA-4	Prepare and implement construction workshops with builders.	Hurricane, Tornado, Flood, High Wind	Low	Building Officials from Harrison County and Cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian	Local budget	2028	Ongoing
PEA-5	Find funds to develop a model project that contractors and individuals can view.	Hurricane, Tornado, High Wind, Flood	Low	Harrison County Board of Supervisors	FEMA/MEMA, general revenues	2024	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-6	Continue support of Hurricane Museum.	Hurricane, High Wind, Tornado, Flood	Low	Harrison County Board of Supervisors; Mississippi Maritime and Seafood Industry Museum	General revenues	2028	Ongoing
PEA-7	Continue tourist outreach and education about potential hazards and evacuation.	Hurricane, High Wind, Flood	Low	Harrison County Emergency Management; Casino Operators	General revenues	2028	Ongoing
PEA-8	Continue distribution of military orientation package on hazard preparedness.	Hurricane, Tornado, Flood, High Wind	Moderate	Harrison County Emergency Management	General revenues	2028	Ongoing
PEA-9	Prepare an insert on hurricane, tropical storm, and flood preparedness for the Chamber’s newcomer packages.	Hurricane, Tornado, Flood, High Wind	Moderate	Harrison County Emergency Management	General revenues	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-10	Encourage individual residents to purchase and monitor NOAA weather radio broadcasts.	Hurricane, Tornado, Flood, Thunderstorm, High Wind, Lightning, Hail	Moderate	Harrison County Emergency Management Director; local media outlets	Local budget	2028	Ongoing
PEA-11	Distribute current stock of disaster preparedness brochures. Print additional brochures. Schedule sessions with local civic groups to discuss preparedness. Provide printed training materials to least EMS agency for employees regarding special needs patients.	All	Moderate	Harrison County Emergency Management Agency	HMGP	2028	Ongoing
PEA-12	Develop a public education outreach program to the public for wildfires procedures and protection. The first step in wildfire prevention education is to raise awareness of the responsibilities of living in a fire-prone environment, individual and community action can ensure that homes and neighborhoods are prepared for wildfire.	Wildfire	Moderate	Harrison County Fire Services; MS Forestry Commission	Firewise.org	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-13	Educate the public on warning system, 911 reverse system, and the importance of having a weather radio. Coordinate with non-profit organizations and VOAD.	All	High	Harrison County Board of Supervisors, Emergency Management Agency	MEMA, private donations from cellular companies	2024	Ongoing
PEA-14	Develop a Public Education Outreach program for education to the public for special needs evacuation and sheltering procedures.	All	High	Emergency Management Agency, Dept. of Health, local hospitals, Red Cross	MEMA, Local budget	2025	Ongoing
PEA-15	Community education and outreach to develop and provide CEO multi- media services and material to inform residents and absentee property owners in Harrison County about community redevelopment and long- term recovery; natural hazard impacts and risks; hazard mitigation for homeowners and businesses; improved building codes, materials, and techniques; public safety; and property insurance and insurance	All	Moderate	Emergency Management Agency, Board of Supervisors	FEMA/MEMA, Home Builders Association	2028	Ongoing

	incentives.						

City of Biloxi Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Strictly enforce building and related codes to insure design and construction of new structures (building/infrastructure) will provide maximum protection against all hazards.	All	High	City of Biloxi Community Development, Public Works	Existing budget	2028	Ongoing
P-2	Continue to integrate mitigation strategies into the city's planning initiatives including their Comprehensive Plan, Ordinances, Capital Improvement Plans, etc. for all hazards.	All	High	City of Biloxi Community Development, Public Works	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-3	Maintain or improve the status of the City of Biloxi in the Community Rating System and the National Flood Insurance Program.	Flood	High	Community Development, Floodplain Manager	HMGP, existing budget	2028	Ongoing
P-4	Prevent unprotected and improper development in flood hazard areas through the improvement of existing regulations governing building and land development in Biloxi.	Flood	High	Community Development, Floodplain Manager	Existing budget	2028	Ongoing
P-5	Research the potential effects of sea level rise, coastal erosion, and salt water intrusion.	Tropical Storm, Erosion, Hurricane	Low	Public Works	HMGP, FMA	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-6	Develop regulation and educational materials for water preservation addressing potential issues that could be caused by drought conditions.	Drought	Moderate	Public Works	Existing budget	2028	Ongoing
P-7	Encourage private and public entities to develop and share Emergency Response Plans/Procedures with the city to improve preparedness and recovery procedures.	All	High	Community Development	Existing budget	2028	Ongoing
P-8	Develop Continuity of Operation Plan for city departments to address health and manmade-related incidents.	Manmade Hazards	High	All departments	EMGP, Homeland Security, existing budget	2024	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Conduct a Commodity Flow Study to identify hazards transported into and around the city or stored at fixed site locations.	Hazardous Materials	Moderate	Biloxi Fire Department	EMGP	2025	Ongoing
P-10	Update and/or develop SOPs for preparedness and response procedures for applicable health and man-made incidents.	Manmade Hazards	High	Biloxi Fire, Police, Public Works, Emergency Management	General budget	2028	Ongoing
P-11	Continue to enforce building codes, fire prevention codes, and other codes and ordinances that help reduce risks to the health, safety, and welfare of citizens and visitors.	Manmade Hazards	High	Biloxi Fire Department; Biloxi Community Development	General budget	2028	Ongoing
Property Protection							
PP-1	Storm proof and/or retrofit existing and new critical facilities and infrastructure.	All	High	City of Biloxi	HMGP, existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	Replace existing traffic signals at major intersections with more durable weather resistant mast arm poles. Install mast arm poles for future traffic improvement projects.	All	High	City of Biloxi Public Works	HMGP	2028	Ongoing
PP-3	Encourage home/business owners affected by flooding to protect existing and new properties with mitigation strategies such as flood insurance, elevation, floodproofing, structural protection, etc.	Flood	Moderate	City of Biloxi Community Development, Floodplain Manager	Existing budget	2028	Ongoing
PP-4	Reduce the number of repetitive losses and severity of flooding for residents of Biloxi with corresponding reduction in costs to federal, state, and local governments.	Flood	High	City of Biloxi Community Development	HMGP	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Retrofit public piers with improved building materials.	Tropical Storm, Hurricane	High		HMGP, existing budget	2028	Partially completed/Ongoing
PP-6	Retrofit/improve bridges.	Hurricane	Moderate	Biloxi Public Works	HMGP	2028	Partially completed/Ongoing
PP-7	Fortification/hardening of the new building for Station 7 on Popps Ferry Road. This will be to establish an improved municipal EOC in this building.	All	High	Biloxi Fire Department and Biloxi Emergency Management	HMGP, existing budget	TBD	Ongoing contingent upon funding
PP-8	Harden waterfront assets with stronger materials and barrier systems. Coliseum pier flow-through and Light House pier North stone jetty with flow through boards and concrete pilings.	Tropical Storm, Hurricane, Storm Surge	High	City of Biloxi Emergency Management Harrison County OEM	HMGP, BRIC, 404 &406	Summer 2024	New
PP-9	Construct new fire stations #8 at Woolmarket Rd and construct fire station #5 at 2499 Pass Rd.	All	High	Biloxi Fire	BRIC, CDBG, HUD	2028	New

PP-10	Construct new bridge at Cedar Lake.	Flood, Storm Surge, Sea Level Rise, Tropical Storm Hurricane	High	City of Biloxi	BRIC	2033	New
Natural Resource Protection							
NRP-1	*Evaluated and found not appropriate for the jurisdiction.*	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	Continue to improve and upgrade drainage to reduce flooding.	Flood	High	Biloxi Department of Public Works	HMGP, existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-2	Explore road materials/signage for areas prone to limited visibility.	All Severe Weather	Moderate	Public Works	Existing budget	2028	Ongoing
Emergency Services							
ES-1	Evaluate the effectiveness of the outdoor siren system and track maintenance/performance issues.	All	High	Biloxi Emergency Management	Existing budget	2028	Completed/Ongoing
ES-2	Enhance evacuation routes throughout the city including appropriate signage designating evacuation corridors.	Hurricane, Costal Storm	Moderate	Biloxi Public Works	HMGP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-3	Continue to implement the Reverse 911 notification system and research new technology to improve notification procedures.	All	High	Biloxi Emergency Management	HMGP	2028	Ongoing
ES-4	Research and pursue alternative communication devices improving communication before, during, and after a disaster.	All	High	Biloxi Emergency Management	HMGP	2028	Ongoing
ES-5	Continue annual National Incident Management System training for first responders, city officials, and critical employees.	All	High	Biloxi Emergency Management	Existing budget	2028	Completed/Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-6	Continue to maintain and update the city's Comprehensive Emergency Management Plan (CEMP) and Standard Operating Procedures (SOP) for applicable departments. Provide overview for new employees and inform existing employees of changes.	All	High	Biloxi Fire and Police Departments	Existing budget	2028	Ongoing regular updates
ES-7	Purchase a 5-ton truck.	All	High	Biloxi Emergency Management	To be determined	2028	Ongoing contingent upon funding
ES-8	Secure generators ensuring continuous operation for existing and new critical facilities and infrastructure.	All	High	Biloxi Public Works	HMGP	2028	Ongoing contingent upon funding
ES-9	Conduct annual training exercise for potential manmade hazards.	Manmade Hazards	High	Biloxi Fire, Police, Emergency Management	Existing budget	2028	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-10	Continue to explore ways to enhance and improve training and equipment needs for the Biloxi Fire, Police, and Emergency Management Departments.	Manmade Hazards	High	Biloxi Fire and Police	Homeland Security, existing budget	2028	Ongoing
ES-11	Upgrade and improvements to the tornado/hurricane siren warning system located throughout the City of Biloxi.	Tornado, Severe Thunderstorm, Hurricane	High	Biloxi Fire Department and Biloxi Emergency Management	HMGP, existing budget	2025	Ongoing
Public Education and Awareness							
PEA-1	Continue outreach efforts to educate the public about the dangers of all hazards.	All	High	City of Biloxi Public Affairs	Current budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Promote the Firewise awareness program.	Wildfire	High	City of Biloxi Public Affairs	Current budget	2028	Ongoing
PEA-3	Provide all-hazard education and outreach to vulnerable populations.	All	High	City of Biloxi Public Affairs	Existing budget	2028	Ongoing
PEA-4	Work with the Chamber of Commerce and local civic groups to establish continuity in training workshops and distribute education information to new existing businesses.	All	High	Coastal Chamber of Commerce, Biloxi Bay Chamber	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Work with appropriate agencies to identify high risk areas and distribute educational information to residents and business owners.	Manmade Hazards	High	Biloxi Public Affairs	Existing budget	2028	Ongoing
PEA-6	Promote a mosquito control and West Nile Virus Prevention program.	Infectious Disease	High	City of Biloxi Public Affairs	Current budget	2028	Ongoing
PEA-7	Increase the number of hurricane preparedness outreach meetings for the community. This will be established to increase the points to our CRS program and to provide the community with flood insurance program and emergency preparedness information	Hurricane, Flood	High	Biloxi Fire Department and Community Development	Existing budget, outside sources	2024	Ongoing

City of D'Iberville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Continue to maintain and update the city's internal Hurricane Action Plan. Provide overview for new employees and inform existing employees of changes.	All	Moderate	City of D'Iberville	Existing budget	2028	Ongoing
P-2	Strictly enforce building and related codes to insure that design and construction of structures will provide maximum protection against hurricanes, floods, and other natural hazards.	All	High	FEMA	Existing budget	2028	Ongoing
P-3	Prevent unprotected and improper development in flood hazard areas and prohibit development in floodways through the improvement of existing regulations, ordinances, and plans governing building and land development in D'Iberville.	Flood	High	D'Iberville Floodplain Manager	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Continue to maintain elevation certificates for all post-FIRM structures.	Flood, Hurricane	High	D'Iberville Floodplain Manager, CRS Coordinator	Existing budget	2028	Ongoing
P-5	Insure that all properties affected by flooding have some form of protection i.e., flood insurance, elevation, floodproofing, structural protection. etc.	Flood, Hurricane, Storm Surge	High	D'Iberville Floodplain Manager	Existing budget	2028	Ongoing
P-6	Maintain or improve the status of the City of D'Iberville in the Community Rating System and the National Flood Insurance Program.	Flood, Hurricane	High	D'Iberville Floodplain Manager, CRS Coordinator	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Enhance the city's government services continuity plan to ensure that emergency operations within the city can function and that day-to-day operations can resume as soon as possible after an emergency.	All	High	D'Iberville City Manager, Mayor, Council	Existing budget	2028	Ongoing
P-8	Enhance the city's regulatory framework to reduce the risk of manmade hazards.	Man-made Hazards	High	City of D'Iberville	Existing budget	2024, Annual	Ongoing
Property Protection							
PP-1	Storm proof and retrofit critical facilities.	Hurricane, Flood	High	City of D'Iberville	HMGP, existing budget, other	2025	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	Replace existing traffic signals at major intersections with more durable and weather resistant mast arm poles.	Hurricane, Thunderstorm, Tornado	Moderate	City of D'Iberville	HMGP, existing budget, other	2025	Partially Completed/Ongoing
PP-3	Continue to encourage the retrofitting of repetitive loss structures within the city.	Hurricane, Tropical Storm, Tornado, Flood	High	City of D'Iberville Building Department	Existing budget	2028	Ongoing
PP-4	Promote the building of "safe rooms" in new construction and when remodeling existing structures.	Tornado	Low	FEMA	FEMA, Local budget	2028	Ongoing
PP-5	Relocate all critical Assets from flood zones	Flood, Tropical Storm Hurricane Seal Level Rise	Medium	City of D'Iberville	HMGP, BRIC FMA	TBD	New

Natural Resource Protection							
NRP-1	*Evaluated and found not appropriate for the jurisdiction.*	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Continue to improve and upgrade drainage to reduce flooding.	Flood, Hurricane	High	D'Iberville Public Works	Existing budget, HMGP	2024, Annual review	Ongoing
Emergency Services							
ES-1	Continue annual National Incident Management System training for first responders, city officials, and critical employees.	All	Moderate	City of D'Iberville	Existing budget	2028	Ongoing Annually
ES-2	Acquire an outdoor siren system.	Tornado, Hurricane, Thunderstorm, Man-made Hazards	High	MEMA, City of D'Iberville	Existing budget	2025	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-3	Continue to enhance evacuation routes throughout the city through placement and maintenance of appropriate signage.	Hurricane	Moderate	City of D'Iberville	Existing budget	2028	Ongoing
ES-4	Coordinate with the City of Biloxi to ensure consistency of evacuation plans for Interstate 10 through D'Iberville.	Hurricane	Moderate	City of D'Iberville	Existing budget	2028	Completed/Ongoing
ES-5	Continue to support and encourage Harrison County's effort to build multiple 361 shelters.	Hurricane	Moderate	Harrison County Emergency Management, Board of Supervisors	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-6	Secure generators to insure continuous operation for critical city facilities and utilities.	Hurricane, Thunderstorm, Winter Storm, Tornado	High	D'Iberville, MEMA	Existing budget	2028	Partially completed/Ongoing
ES-7	Conduct and participate in annual training exercise at major technological sites to increase preparedness in the event of an incident.	Man-made Hazards	Moderate	City of D'Iberville; American Medical Response; Keesler; others	Existing budget	2024, Annual	Ongoing
Public Education and Awareness							
PEA-1	Explore continuing education programs/opportunities for city staff and elected officials.	All	Moderate	City of D'Iberville Planning	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Display hazard outreach materials in lobby of City Hall. Provide outreach materials at city functions and through city mailings.	Hurricane, Thunderstorm, Flood, River Erosion	Moderate	City of D'Iberville, CRS Coordinator	Existing budget	2024, Annual review	Ongoing
PEA-3	Provide hazard education and outreach to vulnerable and underserved populations.	All	Moderate	City of D'Iberville Planning	Existing budget	2024	Ongoing
PEA-4	Develop and promote a wildfire awareness program.	Wildfire	Moderate	City of D'Iberville Planning	Existing budget	2025	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Work with American Medical Response and Harrison County Emergency Management to educate senior citizens, disabled citizens, and special needs patients about the importance of having a personal evacuation plan.	Hurricane	Moderate	American Medical Response; Harrison County Emergency Management Agency	Existing budget	2028	Ongoing.
PEA-6	Enhance the city's elevation awareness program, posting flood elevation markers in flood-prone areas.	Tropical Storm, Flood, Storm Surge, Wave Action	High	City of D'Iberville Floodplain Manager, Building Department	Existing budget	2028	Ongoing
PEA-7	Expand outreach information to property owners regarding retrofitting and floodproofing techniques through community workshops, brochures, and newspaper articles.	Flood	High	City of D'Iberville Floodplain Manager, Building Department	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-8	Encourage local civic groups to establish continuity training workshops and education information to be distributed to new and existing businesses.	Hurricane	Moderate	Coast Chamber, Civic Organizations	Existing budget	2028	Ongoing
PEA-9	Work with appropriate agencies to identify high risk areas and distribute education information to residents and business owners.	Man-made Hazards	Moderate	City of D'Iberville Planning	Existing budget	2028	Ongoing

City of Gulfport Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Continue participation in C-HOST Program.	Flood, Hurricane	High	Building Department	General budget	2028	Ongoing
P-2	Conduct a feasibility study to mitigate sewer and water lines that cross streams.	Hurricane, Flood	Low	Public Works, Engineering	General funds	2024	Partially completed/Ongoing
P-3	Require concurrence from all departments on projects through site plan.	All	High	Gulfport Building Department	General funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Partner with the Land Trust for the Coastal Mississippi Plain to preserve open space.	Flood and Erosion	High	Land Trust for the Coastal Mississippi Plain	Land Trust secures grants and private funding	2028	Ongoing
P-5	Continue to implement drainage standard operating procedure.	Flood	High	Public Works Director	General funds	2028	Ongoing
P-6	Implement maintenance program for storm water conveyance and detention structures dedicated to the city.	Flood	High	City Public Works Department	CDBG, CIAP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Work with county to determine long- term solutions to flooding along the Flat Branch, Turkey Creek, and Brickyard Bayou.	Flood	High	Building Office	US Army Corps of Engineers, US Environmental Protection Agency, HMGP	2028	Partially completed/Ongoing
P-8	Improve/maintain CRS rating and the NFIP Program.	Flood	High	Building Official	General budget	2028	Ongoing
P-9	Become a Firewise Community.	Wildfire	High	Fire Department	MFC, general budget	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-10	Continue to enforce the city burn ban.	Wildfire	High	City Fire Chief	Currently funds staff to implement	2028	Ongoing when applicable
P-11	Participate in local and statewide studies, workshops, and committees that address the all hazards prone to the Mississippi Coast.	All	High	Planning Department, Building Official, Emergency Manager	General budget	2028	Ongoing
P-12	Monitor water supply and establish conservation regulations.	Drought	Moderate	Public Works	General budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Update the city's Comprehensive Emergency Management Plan (CEMP).	All	High	Police/Fire Departments	Homeland Security, EMPG	2028	Completed/Ongoing regular updates
P-14	Update and implement the Master Drainage Plan.	Flood	High	City Engineer	General budget	2027	Completed/Ongoing regular updates
P-15	Continue to enforce/improve, as needed, the city's ordinances and regulations for all hazards.	All	High	Gulfport Building Office	General funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-16	Enforce the city's substantial damageand substantial improvement rule.	Flood and Hurricane	High	Building Official	General funds	2028	Ongoing
P-17	Require non-conversion agreements for enclosures below the base flood elevation.	Hurricane and Flood	High	Building Official	General funds	2028	Ongoing
P-18	Integrate mitigation in to local planning.	All	High	Planning and Zoning	General budget	2025	Ongoing during annual review and five-year updates

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-19	Conduct post-disaster Hazard Mitigation Committee meetings for declared events to assess the city's impacts to people and property.	All	High	Deputy Building Official and City Emergency Manager	General funds	2028	Ongoing following disasters
P-20	Conduct annual reviews of the hazard mitigation and flood protection plan.	All	High	Deputy Building Office and City Emergency Manager	General funds	2024, Annually	Ongoing
P-21	Pursue funding for mitigation actions.	All	High	Comptroller	General budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-22	Continue to mitigate educate mosquito control procedures.	Infectious Disease	High	Public Affairs, Public Works	General budget	2028	Ongoing
P-23	Develop a Commodity Flow Study.	Technological/ Man-made Hazards	High	Fire Department	HMGP	2024	Ongoing contingent upon funding
Property Protection							
PP-1	Storm proof new critical facilities and infrastructure.	All	High	Mayor and City Council	HMGP, CDBG	2028	Partially Completed/ Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	Retrofit existing critical facilities and infrastructure to be more resistant to all hazards.	All	High	City of Gulfport Comptroller	HMGP, CDBG	2028	Partially completed/ Ongoing contingent upon funding
PP-3	Replace cable hung traffic signals with mast arm signals along major highways.	Hurricane, Severe Storm, Tornado	High	MDOT, FHWA	FHWA, CDBG	2028	Partially completed/ Ongoing contingent upon funding
PP-4	Relocate/retrofit Gulfport's south wastewater treatment plant.	Hurricane, Flood	High	City of Gulfport	HMGP, MDEQ, CDBG, restore/recovery programs	2025	Ongoing contingent upon funding
PP-5	Complete the installation of Supervisory Control and Data Acquisition (SCADA) units.	All	High	Public Works Department	General funds	2024	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-6	Elevate/relocate bridges that provide access to neighborhoods to protect residents.	Flood, Hurricane	Moderate	Engineering	406, HMA, other federal/state transportation programs	2026	Partially completed/ Ongoing contingent upon funding
PP-7	Armor bridge approaches and abutments to prevent washouts.	Hurricane and Flood	Moderate	Mayor and City Council	406, HMA, other federal/state transportation programs	2028	Partially completed/ Ongoing contingent upon funding
PP-8	Upgrade the North Wastewater Treatment Plan to eliminate need for the South Plant.	All	High	Public Works, Engineering; Harrison County Wastewater	HMGP, MDEQ, restore program	2028	Ongoing contingent upon funding
PP-9	Retrofit city-owned piers/pavilions.	Hurricane, Flood, Severe Weather	Low	Public Works	HMGP, general funds	2028	Partially completed/ Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-10	Promote elevation/acquisition activities to residents/commercial owners located in the Special Flood Hazard Area.	Hurricane and Flood	High	City of Gulfport Planning Department	FMA	2028	Ongoing
PP-11	Create defensible space around structures and infrastructure.	Wildfire	High	Public Works	General funds	2028	Partially completed/ Ongoing contingent upon funding
PP-12	Install lightning grounding systems and lighting protection devices on critical sewer and water systems and city buildings.	Hurricane and All Severe Weather	Moderate	Public Works Department	General funds	2028	Partially complete/ Ongoing contingent upon funding

PP-12	Harden all fire station and city hall generators from lightning strikes with electronic protection systems	Lightning	High	City of Gulfport	Grant and General Funds	TBD	New

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
NRP-1	Support Harrison County's efforts to re-nourish the beach and implement beach protection measures.	Hurricane, Erosion, Flood	High	Harrison County Sand Beach Department and Board of Supervisors	Seawall Tax, local funds, funding through NOAA	2028	Ongoing
NRP-2	Support marsh restoration efforts.	Hurricane and Erosion	High	Harrison County Sand Beach	Tidelands funds, foundation funds, funding from NOAA, EPA, CIAP	2028	Ongoing
NRP-3	Support the restoration of the barrier islands.	Hurricane, Erosion	High	Department of Marine Resources	Coastal Impact Assistance Program, Tidelands Funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
NRP-4	Continue to enforce no wake zones and water speed limits.	Flood and Erosion	High	MDMR, Harrison County Sherriff, MDWFP	Not applicable	2028	Ongoing
Structural Projects							
SP-1	Promote/build detention ponds when appropriate.	Flood	High	Engineering Department	CDBG, included in new development funding	2028	Ongoing
SP-2	Upgrade drainage systems and culverts.	Flood	High	Engineering Department	HMGP, CDBG, CIAP funding, or as part of developer agreement	2028	Partially completed/ Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Install severe weather warning systems across the city.	All Severe Weather, Tornado	Moderate	Mayor, City Council, Engineering	HMGP	2024	Ongoing
ES-2	Install electronic information alert signs over major evacuation routes to alert residents and travelers of threat conditions.	All	High	Mississippi Department of Transportation	FHWA	2024	Ongoing
ES-3	Continue to work with CTA and other transportation providers to evacuate people that do not have transportation.	Hurricane and Flood	High	Harrison County, MEMA	FEMA	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-4	Secure generators for existing and new critical facilities and infrastructure.	All	High	City of Gulfport Comptroller, Public Works Director	HMGP	2028	Partially completed/ Ongoing contingent upon funding
ES-5	Conduct annual first responder training for all hazards.	All	High	Emergency Manager	General funds	2024, Annual	Ongoing
ES-6	Conduct annual NIMS training for first responders, city officials, and critical employees.	All	High	Fire and Police Departments	General budget	2024, Annual	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-7	Continue to participate with state and federal agencies in training and educational programs for technological, man-made, and health- related hazards.	Hazardous Materials, Infectious Disease	High	City Emergency Manager, key staff	General budget	2028	Ongoing
Public Education and Awareness							
PEA-1	Establish and maintain a hazard preparedness link on the city's webpage.	All	High	Public Affairs	General funds	2028	Ongoing
PEA-2	Promote workshops for emergency preparedness plans.	All	High	Emergency Manager	Undetermined	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-3	Work with applicable agencies to identify high risk areas and distribute educational information.	Infectious Disease, Hazardous Materials	High	Emergency Manager, Public Affairs	MSDH, EMPG, Homeland Security, city general funds	2028	Ongoing
PEA-4	Encourage the development of training and emergency planning for private companies that handle hazardous materials.	Hazardous Materials	High	Emergency Manager, Police and Fire Officials	General budget	2028	Ongoing

City of Long Beach Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Implement a residential water metering program to monitor water usage and promote conservation and limit water usage during periods of severe drought.	Drought	Moderate	Public Works and Board of Alderman	CDBG	2028	Ongoing
P-2	Develop and enhance building codes.	All	Moderate	Building Official	General fund	2025	Ongoing
P-3	Participate as a member of CHOST to meet and discuss issues and solutions to flooding problems with neighboring jurisdictions.	Flood, Hurricane	Moderate	Building Official	General fund	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Acquisition of several repetitive loss properties located within the city limits of Long Beach.	Flood, Hurricane, Thunderstorm	Low	Civil Defense Coordinator and Building Official	HMGP or FMA	2028	Partially completed/ Ongoing contingent upon funding
PP-2	Elevation projects including several residential structures located within the city limits of Long Beach that are below the current BFE requirements.	Flood, Hurricane, Thunderstorm	Moderate	Civil Defense Coordinator and Building Official	HMGP or FMA	2028	Partially completed/ Ongoing contingent upon funding
PP-3	Reconstruction/rebuild of homes through grant funding and public assistance following flooding, tropical storms, and hurricanes.	Flood, Hurricane, Thunderstorm	Moderate	Civil Defense Coordinator and Building Official	HMGP and general fund	2028	Partially completed/ Ongoing contingent upon funding

PP-4	Widening of drainage canal from County through Lib to Pass Christian. Enhance under street drainage to increase flow capacity near new development.	Flood, Hurricane, Erosion	High	Long Beach Wastewater Management District	HMGP, BRIC, FMA	2028	New
Natural Resource Protection							
NRP-1	*Evaluated and found not appropriate for the jurisdiction.*	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Gandy Circle drainage improvements.	Flood	Moderate	Board of Alderman	HMGP, PA, CDBG	2028	Ongoing contingent upon funding
SP-2	Royal Drive drainage improvements	Flood	Moderate	Board of Alderman	HMGP, PA, CDBG	2028	Ongoing contingent upon funding
SP-3	Bear Creek drainage canal improvements from Douglas to USM to reshape and stabilize drainage channel.	Flood	Moderate	Board of Alderman	CDBG, PDM, HMGP	2028	Ongoing contingent upon funding
SP-4	Canal #1 drainage improvements to reshape and stabilize drainage canal.	Flood	Low	Board of Alderman and County Board of Supervisors	CDBG, PDM, HMGP	2028	Ongoing contingent upon funding
SP-5	Canal #1 bridge replacement. Commission Road Bridge is in poor condition. Timber piling and caps are deteriorating. Bridge should be replaced and channel widened to improve stormwater flow.	Erosion	Moderate	Board of Alderman	CDBG, HMGP	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-6	Gates Avenue drainage outfall needs small, inadequate culverts to be improved.	Flood	Moderate	Board of Alderman	CDBG, PDM, HMGP	2028	Ongoing contingent upon funding.
SP-7	Long Beach Harbor "issues" improvements including bank stabilization and bulkhead replacement.	Erosion	Moderate	Board of Alderman and Port Commission	CDBG, Tidelands, PA, HMGP	2028	Ongoing contingent upon funding
SP-8	Turkey Creek drainage reservoir to retain flood waters and eliminate flooding.	Flood	Low	Board of Alderman and neighboring jurisdictions	FEMA	2028	Ongoing contingent upon funding
SP-9	Commission Road drainage improvements.	Flood	Low	Board of Alderman	CDBG, PDM, PA, HMGP	2028	Ongoing contingent upon funding
SP-10	Citywide drainage canal improvements including reshaping and stabilizing drainage canals throughout the city. (St. Augustine, Green Acres Ditch). Install rip rap/reslope and stabilize.	Flood	Moderate	Board of Alderman	CDBG, PDM, PA, HMGP	2028	Ongoing contingent upon funding

SP-11	Construct new water tower and tank to eliminate low water pressure issues and poor water quality during periods of Drought.	Drought	Low	Board of Alderman	FEMA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-12	Construct new water well to eliminate low water pressure issues and poor water quality during periods of drought.	Drought	Low	Board of Alderman	FEMA	2028	Ongoing contingent upon funding
Emergency Services							
ES-1	Install warning sirens to notify citizens of threatening weather or man-made hazards.	All	High	Fire and Police Departments	HMGP	2028	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Maintain and enhance website to inform residents of hazards and preparation.	All	Moderate	Building Code Office	General fund	2026	Ongoing

City of Pass Christian Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Enhance the city's Continuity Plan to ensure that emergency operations can function and that day-to-day management of the city can be back on track as soon as possible after an emergency.	All	High	Fire and Police Departments	Emergency operations budget	2028	Ongoing regular updates
P-2	Incorporate the Pass Christian hazard Mitigation Plan into the city's Comprehensive Plan and other strategic planning processes.	All	High	Board of Alderman, Planning Commission	City budget	2028	Ongoing during annual review and five-year update
P-3	Develop and implement a Capital Improvement Plan (CIP) for the City of Pass Christian.	All	Moderate	Public Works Department	PDM Grant, FEMA	2028	Ongoing regular updates
Property Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
NRP-1	Work with the Harrison County Sand Beach Authority to continue maintaining the beach and seawall to allow them to continue to serve their function of mitigating wave and flooding action to protect U.S. Highway 90.	Flood, Hurricane	Moderate	Harrison County Sand Beach Authority	Mississippi Coastal Improvement Program, U.S. Army Corps of Engineers	2028	Ongoing
NRP-2	Preserve and protect trees and vegetation on uninhabited properties to improve natural stormwater management and flood control processes.	Flood	Moderate	Public Works Department	City budget	2028	Ongoing
NRP-3	Work with the Harrison County Sand Beach Authority to continue dune propagation in areas along the beach where the seawall is below 10 foot in elevation.	Hurricane, Flood	Low	Harrison County Sand Beach Authority	Harrison County Sand Beach Authority	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Build a new drinking water well in area less prone to flooding.	Flood	High	Water Department	Water Department, water usage fees	2028	Ongoing contingent upon funding
SP-2	Continue the city's efforts to upgrade drainage facilities.	Flood	High	Fire and Police Departments	PDM Grant, FEMA	2028	Ongoing contingent upon funding
SP-3	Develop a new east/west roadway connecting Menge and Easpy Avenues.	All	Moderate	Public Works Department, Harrison County	Public Works Department, Harrison County	2028	Ongoing contingent upon funding
SP-4	Improve the north/south roadway access in western Pass Christian.	All	Moderate	Public Works Department, Harrison County	Public Works Department, Harrison County	2028	Ongoing contingent upon funding
SP-5	Improve drainage through incorporating additional storm sewer improvements on roads that were not upgraded after the storm.	Flood	Moderate	Public Works Department, Harrison County	Public Works Department, Harrison County	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Implement an early warning network to alert citizens to oncoming hazards.	All	High	Fire and Police Departments	PDM Grant, FEMA	2028	Ongoing
ES-2	Upgrade fire protection through acquisition of a new fire truck capable of reaching new elevated buildings and construct a fire station large enough to accommodate it.	Wildfire	High	Fire and Police Department	PDM Grant, FEMA	2028	Ongoing
Public Education and Awareness							
PEA-1	Create a partnership to assist with development of Family Disaster Plans.	All	High	Fire and Police Departments	Emergency operations budget	2028	Ongoing
PEA-2	Establish and implement a public education and outreach program focused on hurricane evacuation procedures.	All	High	Fire and Police Departments	Emergency operations budget	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-3	Reach out to at-risk and vulnerable families through programs aimed at local schools and youth programs.	All	Moderate	Pass Christian Schools	Pass Christian Schools	2028	Ongoing
PEA-4	Educate residents on their part in managing stormwater and reducing flooding through better disposal practices.	Flood	Moderate	Buildings Department	City budget	2028	Ongoing
PEA-5	Continue to teach floodplain management curriculum in Pass Christian High School science classes.	Flood	Low	Pass Christian Schools	Pass Christian Schools	2028	Ongoing
PEA-6	Provide education and outreach materials at local public functions and through direct mail-outs.	All	Low	Buildings Department	Buildings Department	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-7	Work with the Gulf Coast Community Action Agency to provide one-to-one outreach on preparedness and risk to low-income residents.	All	Low	Buildings Department	Buildings Department	2028	Ongoing
PEA-8	Continue participation in the Gulf Coast Homeowner's Show and other "trade" shows to provide mitigation and preparedness information to the public.	All	Low	Buildings Department	Building Departments	2028	Ongoing

Jackson County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Enforce building codes.	All	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing
P-2	Maintain debris program to clean drainage ways from existing properties and critical facilities.	Flood	High	Gautier Street Division; Jackson County Road Department	Internal budget	2028	Ongoing
P-3	Maintain debris program to clear roadside ditches and culverts.	Flood	High	Gautier Street Division; Jackson County Road Department	Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Develop/enforce landscaping requirements to provide absorption of average volumes of rainfall on property.	Flood	Moderate	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing
P-5	Enforce storm water ordinances and encourage use of pervious surfaces and natural absorption of rainwater.	Flood	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing
P-6	Enforce the revised Digital Flood Insurance Rate Map (DFIRM).	Flood	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Control vegetation growth around critical facilities.	Wildfire	High	Gautier Street Division; Jackson County Road Department	Internal budget	2028	Ongoing
P-8	Coordinate prescribed burns in heavily forested areas with state and federal agencies.	Wildfire	High	Gautier and Jackson County Fire Departments	Internal budget	2028	Ongoing
P-9	Conduct a study of the effects of sea level rise and develop mitigation strategies to minimize those effects.	Sea Level Rise	Low	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-10	Encourage private land owners on waterfronts to implement erosion control measures.	Erosion	Low	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing
P-11	Develop/enforce water use ordinance to address drought condition procedures.	Drought	High	Gautier and Jackson County Planning Departments	Internal budget	2026	Ongoing
P-12	Conduct study on aquifers to determine impacts on public and private wells.	Drought	Moderate	Jackson County Utility Authority	Jackson County Utility Authority	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Implement dredging program for the Bayou areas to improve effects of sediment buildup caused by storm surge.	Storm Surge	Moderate	Gautier Public Works; Jackson County Public Works	MDMR, USACE, NRCS, CIAP, Tideland	2028	Partially completed/ Ongoing contingent upon funding
P-14	Develop continuity of operations plans.	All	High	Jackson County and City of Gautier	Internal budget	2026	Ongoing contingent upon funding
P-15	Develop Emergency response plans.	All	High	Jackson County and City of Gautier	Internal budget	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-16	Develop capital improvement plans.	All	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing contingent upon funding
P-17	Develop/enhance asset inventories (e.g., critical facilities, infrastructure, equipment) into GIS.	All	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Completed/ Ongoing
P-18	Upgrade devices used for damage assessments and communication as technology improves/changes.	All	High	Jackson County Emergency Management Agency	Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-19	Seek opportunities to continue to lower the CRS rating (and insurance rate).	Flood	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing
P-20	Incorporate the goals and objectives of the hazard mitigation plan into all planning documents and ordinances.	All	High	Gautier and Jackson County Planning Departments	Internal budget	2023	Ongoing during regular updates
P-21	Conduct annual review of the hazard mitigation plan.	All	High	Hazard Mitigation Council; Gautier and Jackson County Planning Departments	Internal budget	2024, Annually	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-22	Conduct evaluation of mitigation strategies and projects following a hazard impact.	All	High	Hazard Mitigation Council; Jackson County Emergency Management Agency	Internal budget	2028	Ongoing following disaster events
P-23	Document damages/losses sustained from natural hazards.	All	High	Jackson County Emergency Management Agency	Internal budget	2028	Ongoing following disaster events
P-24	Conduct After Action Reviews (AAR) following events to capture lessons learned, reassess damages incurred, and complete damage assessment forms with accurate information.	All	High	Hazard Mitigation Council	Internal budget	2028	Ongoing following disaster events

P-25	Revamping the LEPC within Jackson County, to bolster communications between emergency responders and private industry.	All	High	Jackson County OES	Local Industry	2025	New

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Upgrade/harden water and wastewater facilities. (Gautier water towers/wells, Shell landing Wastewater Collection Systems, Jackson County motor control centers, Jackson County sanitary generators)	All	High	City of Gautier; Jackson County Utility Authority	HMA	2028	Ongoing contingent upon funding
PP-2	Harden existing critical facilities. (Gautier Police Dept., Gautier Public Works, Gautier Maintenance Shop, Singing River Hospital and Ocean Springs Hospital, Gautier Fire Dept., Pascagoula/Moss Point Wastewater Treatment Facility, and Escatawpa Wastewater Reclamation Facility).	All	High	City of Gautier; Jackson Count; Singing River Health	HMA	2028	Partially completed/Ongoing contingent upon funding
PP-3	Elevate/improve roads and bridges that are below base flood elevation.	Flood	High	Jackson County Road Dept.; Gautier Public Works	Local budget, State, Federal	2028	Partially completed/ Ongoing contingent upon funding
PP-4	Relocate Jackson County Emergency Operation Center to county-owned property on Jim Ramsey Road.	All	High	Jackson County	HMA	2024	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Relocate Jackson County Sheriff Dispatch/E-911 with EOC on Jim Ramsey Road or to existing EOC on Convent Avenue.	All	High	Jackson County	HMA	2025	Ongoing contingent upon funding
PP-6	Encourage use of underground utilities in higher elevation areas.	All	Moderate	Gautier and Jackson County Planning Departments	Internal budget	2028	Partially completed/ Ongoing contingent upon funding
PP-7	Construct all new critical facilities and infrastructure with materials designed to minimize impacts from all hazards.	All	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-8	Identify location for community safe rooms in Gautier and Jackson County to accommodate the remaining population not covered in the existing safe rooms.	All	High	Gautier City Council; Jackson County Board of Supervisors	HMA	2028	Ongoing contingent upon funding
PP-9	Acquisition/demolition of Severe Repetitive Loss Properties (SRL) and Repetitive Flood Claim (RFC) properties by continuing to apply for FMA to mitigate when practical.	Flood	High	Gautier and Jackson County Planning Departments	FMA	2028	Partially completed/Ongoing
PP-10	Raise lift stations and other critical infrastructure above base floodplain where feasible.	Flood	High	Jackson County Utility Authority; City of Gautier	Local budget	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-11	Encourage existing and new developments to include surge and lightning protectors and use of enhanced construction materials.	Lightning	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing
PP-12	Implement mast arm traffic signal improvements.	All	High	Gautier Street Division; Jackson County Road Department	Local budget	2028	Partially completed/Ongoing
PP-13	Mount street signs to existing mast arm traffic signals.	All	High	Gautier Street Division; Jackson County Road Department	Local budget	2028	Partially completed/Ongoing
PP-14	Mitigate/redirect flood waters from Big Creek Reservoir in Mobile County.	Flood, Tropical Storm Hurricane, Erosion	High	Jackson County Board of Supervisors	FEMA, MEMA, BRIC, Alabama EMA	2026	New

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
NRP-1	Develop/maintain a beach erosion and renourishment program.	Erosion	Moderate	Gautier and Jackson County Public Works	Internal budget	2028	Partially completed/Ongoing
Structural Projects							
SP-1	Coordinate with applicable agencies on constructing new roadways and bridges above the base flood elevation.	Flood	High	Gautier Public Works, Jackson County Road Department	Local budget	2028	Ongoing
Emergency Services							
ES-1	Identify and prioritize portable generator hook ups or permanent mount units for wells, lift stations, and facilities.	All	High	Jackson County; City of Gautier; Jackson County Utility	HMA	2026	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-2	Explore options for back up water supply system/service for Ocean Springs and Singing River Hospitals.	All	High	Singing River Health Systems	Local budget	20124	Ongoing
ES-3	Develop agreements/reprocess for providing tie-ins and back up water service for Jackson County Utility Authority and Gautier.	All	High	Jackson County Utility Authority; Gautier Public Works	Local budget	2024	Ongoing regular updates
ES-4	Improve notification procedures of impending hazards and evacuation procedures.	All	High	Jackson County Emergency Management Agency	Local budget	2025	Ongoing regular updates
ES-5	Develop/update and conduct exercises on response procedures.	All	High	Jackson County and City of Gautier	Internal budget	2026	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-6	Increase evacuation route options and coordination of activation by working with state/federal agencies.	All	High	Jackson County Emergency Management Agency	Local budget	2027	Ongoing
ES-7	Improve signage/traffic control devices for evacuations.	All	High	Jackson County Emergency Management Agency	Local budget	2027	Ongoing
Public Education and Awareness							
PEA-1	Educate the public on all hazard preparedness.	All	High	Jackson County Emergency Management Agency	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Educate the public on all hazard mitigation programs (safe rooms, wind retrofit, etc.).	All	High	Jackson County Emergency Management Agency	Local budget	2028	Ongoing
PEA-3	Educate the public about the benefits of flood mitigation of homes and businesses.	Flood	High	Jackson County Emergency Management Agency	Local budget	2028	Ongoing
PEA-4	Continue to deliver programs to residents, business owners, and developers regarding best management practices for storm water control and household hazardous waste.	Flood, Hazardous Materials Incident	High	Gautier and Jackson County Planning Departments	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Develop education materials for water conservation.	Drought	High	Gautier and Jackson County Planning Departments	Local budget	2028	Ongoing
PEA-6	Promote Firewise program to homeowners, builders/contractors, and developers.	Wildfire	High	Gautier and Jackson County Fire Departments	Local budget	2028	Ongoing
PEA-7	Develop outreach strategies for non- English/underserved communities.	All	High	Applicable state and federal agencies and local agencies/ associations	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-8	Develop outreach strategies for tourists (i.e., part-time residents, RV campers, vacationers, etc.)	All	High	Applicable state and federal agencies and local agencies/ associations	Local budget	2028	Ongoing
PEA-9	Develop outreach strategies for elderly and low-income underserved residents.	All	High	Applicable state and federal agencies and local agencies/ associations	Local budget	2028	Ongoing
PEA-10	Develop outreach strategies for the physically challenged.	All	High	Applicable state and federal agencies and local agencies/ associations	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-11	Develop outreach strategies for those with mental health disabilities.	All	High	Applicable state and federal agencies and local agencies/ associations	Local budget	2028	Ongoing
PEA-12	Develop outreach strategies and implement school programs for children.	All	High	All school districts and daycare providers within the county	Local budget	2028	Ongoing

City of Gautier Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Enforce building codes.	All	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing
P-2	Maintain debris program to clean drainage ways from existing properties and critical facilities.	Flood	High	Gautier Street Division; Jackson County Road Department	Internal budget	2028	Ongoing
P-3	Maintain debris program to clear roadside ditches and culverts.	Flood	High	Gautier Street Division; Jackson County Road Department	Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Develop/enforce landscaping requirements to provide absorption of average volumes of rainfall on property.	Flood	Moderate	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing
P-5	Enforce storm water ordinances and encourage use of pervious surfaces and natural absorption of rainwater.	Flood	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing
P-6	Enforce the revised Digital Flood Insurance Rate Map (DFIRM).	Flood	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Control vegetation growth around critical facilities.	Wildfire	High	Gautier Street Division; Jackson County Road Department	Internal budget	2028	Ongoing
P-8	Coordinate prescribed burns in heavily forested areas with state and federal agencies.	Wildfire	High	Gautier and Jackson County Fire Departments	Internal budget	2028	Ongoing
P-9	Conduct a study of the effects of sea level rise and develop mitigation strategies to minimize those effects.	Sea Level Rise	Low		Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-10	Encourage private land owners on waterfronts to implement erosion control measures.	Erosion	Low	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing
P-11	Develop/enforce water use ordinance to address drought condition procedures.	Drought	High	Gautier and Jackson County Planning Departments	Internal budget	2026	Ongoing
P-12	Implement dredging program for the Bayou areas to improve effects of sediment buildup caused by storm surge.	Storm Surge	Moderate	Gautier Public Works; Jackson County Public Works	Jackson County Utility Authority	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Develop continuity of operations plans.	All	High	Jackson County OEM and City of Gautier	MDMR, USACE, NRCS, CIAP, Tideland	2028	Ongoing contingent upon funding
P-14	Emergency response plans.	All	High	Jackson County OEM and City of Gautier	Internal budget	2026	Ongoing contingent upon funding
P-15	Develop capital improvement plans.	All	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-16	Develop/enhance asset inventories (e.g., critical facilities, infrastructure, equipment) into GIS.	All	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Completed/Ongoing regular updates
P-17	Upgrade decides used for damage assessments and communication as technology improves/changes.	All	High	Jackson County Emergency Management Agency	Internal budget	2028	Ongoing
P-18	Seek opportunities to continue to lower the CRS rating (and insurance rate).	Flood	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-19	Incorporate the goals and objectives of the hazard mitigation plan into all planning documents and ordinances.	All	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing annual review and five-year updates
P-20	Conduct annual review of the hazard mitigation plan.	All	High	Hazard Mitigation Council; Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing Annually
P-21	Conduct evaluation of mitigation strategies and projects following a hazard impact.	All	High	Hazard Mitigation Council; Jackson County Emergency Management Agency	Internal budget	2024, Annually	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-22	Document damages/losses sustained from natural hazards.	All	High	Jackson County Emergency Management Agency	Internal budget	2028	Ongoing following disaster events
P-23	Conduct After Action Reviews (AAR) following events to capture lessons learned, reassess damages incurred, and complete damage assessment forms with accurate information.	All	High	Hazard Mitigation Council	Internal budget	2028	Ongoing following disaster events
Property Protection							
PP-1	Retrofit critical facilities with safe rooms, including the Fire, Police, Public Works, and City Hall facilities.	All	Moderate	City of Gautier	HMA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	Upgrade/harden water and wastewater facilities. (Gautier water towers/wells, Shell landing Wastewater Collection Systems, Jackson County motor control centers, Jackson County sanitary generators)	All	High	City of Gautier; Jackson County Utility Authority	HMA	2028	Ongoing contingent upon funding
PP-3	Harden existing critical facilities. (Gautier Police Dept., Gautier Public Works, Gautier Maintenance Shop, Singing River Hospital and Ocean Springs Hospital, Gautier Fire Dept., Pascagoula/Moss Point Wastewater Treatment Facility, and Escatawpa Wastewater Reclamation Facility).	All	High	City of Gautier; Jackson Count; Singing River Health	HMA	2028	Ongoing contingent upon funding
PP-4	Elevate/improve roads and bridges that are below base flood elevation.	Flood	High	Jackson County Road Dept.; Gautier Public Works	Local budget, State, Federal, HMGP	2028	Ongoing contingent upon funding
PP-5	Relocate Emergency Operation Center for Gautier.	All	High	City of Gautier	HMA	2024	Ongoing contingent upon funding.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-6	Encourage use of underground utilities in higher elevation areas.	All	Moderate	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing contingent upon funding
PP-7	Construct all new critical facilities and infrastructure with materials designed to minimize impacts from all hazards.	All	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing
PP-8	Identify location for community safe rooms in Gautier and Jackson County to accommodate the remaining population not covered in the existing safe rooms.	All	High	Gautier City Council; Jackson County Board of Supervisors	HMA	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-9	Acquisition/demolition of Severe Repetitive Loss Properties (SRL) and Repetitive Flood Claim (RFC) properties by continuing to apply for FMA to mitigate when practical.	Flood	High	Gautier and Jackson County Planning Departments	FMA	2028	Partially completed/ Ongoing contingent upon funding
PP-10	Raise lift stations and other critical infrastructure above base floodplain where feasible.	Flood	High	Jackson County Utility Authority; City of Gautier	Local budget	2028	Ongoing contingent upon funding
PP-11	Encourage existing and new developments to include surge and lightning protectors and use of enhanced construction materials.	Lightning	High	Gautier and Jackson County Planning Departments	Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-12	Implement mast arm traffic signal improvements.	All	High	Gautier Street Division; Jackson County Road Department	Local budget	2028	Ongoing
PP-13	Mount street signs to existing mast arm traffic signals.	All	High	Gautier Street Division; Jackson County Road Department	Local budget	2028	Ongoing
Natural Resource Protection							
NRP-1	Develop/maintain a beach erosion and renourishment program.	Erosion	Moderate	Gautier and Jackson County Public Works	Internal budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Coordinate with applicable agencies on constructing new roadways and bridges above the base flood elevation.	Flood	High	Gautier Public Works, Jackson County Road Department	Local budget	2028	Completed/Ongoing
Emergency Services							
ES-1	Identify and prioritize portable generator hook ups or permanent mount units for wells, lift stations, and facilities.	All	High	Jackson County; City of Gautier; Jackson County Utility	HMA	2026	Completed/Ongoing
ES-2	Develop agreements/reprocess for providing tie-ins and back up water service for Jackson County Utility Authority and Gautier.	All	High	Jackson County Utility Authority; Gautier Public Works	Local budget	2024	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-3	Improve notification procedures of impending hazards and evacuation procedures.	All	High	Jackson County Emergency Management Agency	Local budget	2025	Ongoing
ES-4	Develop/update and conduct exercises on response procedures.	All	High	Jackson County OEM and City of Gautier	Internal budget	2026	Ongoing
ES-5	Increase evacuation route options and coordination of activation by working with state/federal agencies.	All	High	Jackson County Emergency Management Agency	Local budget	2027	Ongoing
ES-6	Improve signage/traffic control devices for evacuations.	All	High	Jackson County Emergency Management Agency	Local budget	2027	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Public Education and Awareness							
PEA-1	Educate the public on all hazard preparedness.	All	High	Jackson County Emergency Management Agency	Local budget	2028	Ongoing
PEA-2	Educate the public on all hazard mitigation programs (safe rooms, wind retrofit, etc.).	All	High	Jackson County Emergency Management Agency	Local budget	2028	Ongoing
PEA-3	Educate the public about the benefits of flood mitigation of homes and businesses.	Flood	High	Jackson County Emergency Management Agency	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-4	Continue to deliver programs to residents, business owners, and developers regarding best management practices for storm water control and household hazardous waste.	Flood, Hazardous Materials Incident	High	Gautier and Jackson County Planning Departments	Local budget	2028	Ongoing
PEA-5	Develop education materials for water conservation.	Drought	High	Gautier and Jackson County Planning Departments	Local budget	2028	Ongoing
PEA-6	Promote Firewise program to homeowners, builders/contractors, and developers.	Wildfire	High	Gautier and Jackson County Fire Departments	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-7	Develop outreach strategies for non- English communities.	All	High	Applicable state and federal agencies and local agencies/ associations	Local budget	2028	Ongoing
PEA-8	Develop outreach strategies for tourists (i.e., part-time residents, RV campers, vacationers, etc.)	All	High	Applicable state and federal agencies and local agencies/ associations	Local budget	2028	Ongoing
PEA-9	Develop outreach strategies for elderly and low-income residents.	All	High	Applicable state and federal agencies and local agencies/ associations	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-10	Develop outreach strategies for the physically challenged.	All	High	Applicable state and federal agencies and local agencies/ associations	Local budget	2028	Ongoing
PEA-11	Develop outreach strategies for those with mental health disabilities.	All	High	Applicable state and federal agencies and local agencies/ associations	Local budget	2028	Ongoing
PEA-12	Develop outreach strategies and implement school programs for children.	All	High	All school districts and daycare providers within the county	Local budget	2028	Ongoing

City of Moss Point Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Update Emergency Operation Plan.	All	High	Fire and Human Resources Departments	Local Budget	2025	Completed/Regular updates
P-2	New water supply tank.	Drought	Moderate	Public Works Department	Budget as capital outlay project for Public Works	2027	Ongoing contingent upon funding
P-3	Develop no burn ordinance.	Drought, Wildfire	Moderate	Fire Department	Local budget	2025	Ongoing as needed
P-4	Promote and implement conservation program (in coordination with developing emergency drought ordinance).	Drought	High	Fire Department and Building Inspection	Local budget	2025	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Retrofit/361.	Hurricane	Low	Community Development	CDBG grant funding, city funding	2026	Ongoing
PP-2	Elevation of streets.	Flood, Hurricane, Severe Thunderstorm	Moderate	Public Works and Governing Body	Local budget	2028	Ongoing contingent upon funding
PP-3	Bridge replacement.	Flood, Hurricane, Severe Thunderstorm	Moderate	Public Works and Governing Body	Local budget	2028	Ongoing contingent upon funding
PP-4	Acquisition projects.	Flood, Hurricane, Severe Thunderstorm	Low	Community Development	HMGP, CDBG	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Home elevation projects.	Flood, Hurricane, Severe Thunderstorm	Moderate	Community Development	CDBG Hazard Mitigation funding, city and county funding	2028	Ongoing contingent upon funding
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	Drainage improvement projects.	Flood, Hurricane, Severe Thunderstorm	High	Community Development and Public Works	CDBG Hazard Mitigation funding, city and county funding	2025	Ongoing contingent upon funding
SP-2	Scaling system.	Flood, Hurricane, Severe Thunderstorm	High	Public Works	CIAP Grant funding, city and county funding	2026	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Evacuation routing and planning.	All	Moderate	Police Department	Seek/secure grant opportunities with MDOT, MS Public Safety Commission, etc.	2025	Ongoing
ES-2	Establish an effective early warning audio system (sirens).	All	Low	Police and Fire Department	Seek grant opportunities with MDOT, MS Public Safety Commission, etc.	2026	Ongoing
ES-3	Generator	Hurricane	High	Community Development Department	Budget and/or secure CDBG grant funding	2026	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Public outreach: education and preparedness for all hazards.	All	High	Fire and Human Resources Department	Existing budget	2028	Ongoing

City of Ocean Springs Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Coordinate with the Ocean Springs participants on Jackson County's Haz- Mat team to ensure the adequacy of the regional response strategy.	Hazardous Materials Incident	High	Fire Department	MS Dept. of Public Safety Planning	2028	Ongoing regular updates
P-2	Buildings above a certain elevation must have sprinklers for fire protection.	Wildfire	High	Buildings Department	Individual home and building owners	2028	Ongoing
P-3	Include structural design, elevation, and location standards in the Unified Development Code to mitigate effects of natural hazards.	All	High	Planning and Community Development	Administrative – not revenue dependent	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Continue to require that development exceeds FEMA's require base elevations by a measure of one foot.	Flood	High	Buildings Department	Administrative – not revenue dependent	2028	Ongoing enforcement
P-5	Continue to require lot elevation determination for structures in new subdivision through site plan review.	Flood	High	Buildings Department	Administrative – not revenue dependent	2028	Ongoing enforcement
P-6	Continue to enforce city's subdivision regulations for developments in flood hazard areas by enforcing flood ordinance and restricting development in floodplain.	Flood	High	Planning and Community Development; Buildings Department	Administrative – not revenue dependent	2028	Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Undertake an annual review of the Hazard Mitigation Plan with the assistance of the floodplain manager, building official, city planner, and EOC coordinator.	All	High	Planning and Community Development	Administrative – not revenue dependent	2024, Annually	Ongoing
P-8	Incorporated the Ocean Springs Hazard Mitigation Plan into the city's Comprehensive Plan.	All	High	Planning and Community Development; Planning Commission; Board of Alderman	Administrative – not revenue dependent	2028	Ongoing annual review and five year update
P-9	Develop a Capital Improvements Plan (CIP) for the City of Ocean Springs.	All	High	Planning and Community Development; Public Works	MDA – Economic Development	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-10	Maintain elevation certificates on all structures built after the adoption of new FIRM maps.	Flood	High	Buildings Department	Administrative – not revenue dependent	2028	Ongoing regular updates
P-11	Continue to promote storm smart coasts through the Coastal Hazard Outreach Strategy Team (C-HOST) which brings together local officials, community stakeholders, private businesses, and major employers to coordinate messages and develop new projects with the guidance of building officials and floodplain managers from Ocean Springs, Pascagoula, Gautier, Bay St. Louise, Biloxi, D'Iberville, Gulfport, Harrison County, Long Beach, Pass Christian, and Waveland.	Hurricane, Storm Surge, Flood	Moderate	Buildings Department	FEMA, Sea Grant	2023	Ongoing

P-12	Enhance the city’s Continuity Plan to ensure that emergency operations can function and that day-to-day management of the city can be back on track as soon as possible after an emergency.	All	Moderate	Fire Department	MS Dept. of Public Safety	2028	Ongoing plan updates

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Maintain flood elevation certificates in the Buildings Department.	Flood	Moderate	Buildings Department	Administrative – not revenue dependent	2028	Ongoing
P-14	Conduct regional beach clean-up programs to reduce the potential of damage from flooding and free- floating debris.	Flood	Moderate	MS Power	DMR, Sea Grant	2024, Annually	Ongoing
P-15	Provide buffers between natural forest and urban development to protect against wildfire.	Wildfire	Moderate	Planning and Community Development	MS Dept. of Forestry, Gulf Islands National Seashore	2026	Partially completed/Ongoing
P-16	Study potential effects of sea level rise on near shore structures and infrastructure and prepare to adopt mitigation measures to minimize its effects.	Sea Level Rise	Low	Mayor's Office; Planning and Community Development	MS AL Sea Grant, COE	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-17	Mandate larger setbacks from bayous and streams.	Flood	Low	Planning and Community Development	Administrative – not revenue dependent	2028	Ongoing
P-18	Conduct regular controlled burns to limit fuel for forest fires in wet pine savanna habitats.	Wildfire	Low	Fire Department; MS Department of Forestry	MS Dept. of Forestry	2025	Ongoing as needed
Property Protection							
PP-1	Encourage the underground placement of electric, telephone, and cable TV lines by developers working outside of the coastal zone to improve aesthetics, prevent disfigurement of trees, and provide protection form high winds and other hazards.	Hurricane, Tornado, Severe Thunderstorm	High	Public Works Department; MS Power; Singing River Electric	MEMA - HMGP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	New construction of city buildings should meet the 2012 IBC.	All	High	Buildings Department; Board of Alderman	MDA – Energy Efficiency Programs	2028	Ongoing enforcement
PP-3	Inspect water wells and towers to ensure they are sufficiently strong to withstand high winds and storm surge.	Hurricane, Storm Surge, Tornado, Severe Thunderstorm	High	Water Department	DEQ, EPA	2023	Ongoing inspections
PP-4	Prepare lift stations for inundation and power outages by raising electrical equipment above the BFE in the event of storm surge and long- term power outages.	Hurricane, Storm Surge, Flood	High	MS Power; Public Works	Utility fees	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Mitigate properties in V and AE zones through acquisition.	Flood	Moderate	Mayor's Office; Parks Department	COE, MEMA-HMGP, MCIAP/ Army Corps of Engineers	2028	Ongoing contingent upon funding
PP-6	Protect transformers after a tropical storm or hurricane by washing down salt spray before power supply is re- engaged.	Hurricane	Low	MS Power; Singing River Electric; Fire Department	MS Power, Singing River Electric, Fire Department	2028	Ongoing as needed
Natural Resource Protection							
NRP-1	Preserve trees and vegetation on uninhabited properties to improve stormwater management/flood control.	Flood	Low	Parks and Public Works Departments	MDOT (MS Dept. of Forestry)	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
NRP-2	Preserve natural/wetlands and riparian areas through acquisition or conservation easements.	Flood	Low	Mayor's Office; Grants Department	FEMA, Army Corps of Engineers/ MCIAP, MEMA-HMGP	2028	Ongoing contingent upon funding
NRP-3	Extend sand beach additional 100 feet to the east and stabilize with plantings.	Storm Surge, Erosion	Low	Planning and Community Development; Jackson County	FEMA Grant, DMR, COE	2026	Ongoing contingent upon funding.
NRP-4	Request that Jackson County continue dune propagation in areas along East Beach and Front Beach.	Storm Surge, Erosion	Low	Jackson County	Jackson County Seawall Tax	2023	Completed/Ongoing
Structural Projects							
SP-1	Maintain the Jackson County seawall tax.	Storm Surge, Erosion	Moderate	Jackson County Board of Supervisors	Jackson County budget	2028	Ongoing tax renewal process

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-2	Continue the city's efforts to upgrade drainage facilities along coastal roadways.	Flood	Moderate	Public Works and Streets	COE, MEMA-HMGP, MCIAP	2028	Partially completed/ Ongoing contingent upon funding
Emergency Services							
ES-1	Maintain a hazardous materials, oil spill, and natural gas response force to address immediate aftermath of a material release.	Hazardous Materials Incident	High	Fire Department	AFG, SAFER	2028	Ongoing
ES-2	Update the city's Hazard Mitigation and Emergency Response Plan and its Hurricane Response Plan to ensure emergency service and evacuation routes are adequate for demand, well-marked, and accessible to individuals with special needs during inclement weather.	All	High	Planning and Community Development Department; Fire Department	MEMA - HMGP	2025	Ongoing

ES-3	Maintain a reverse 911 call-back system for railroad derailments and other hazardous material spills.	Hazardous Materials Incident	High	Fire Department	MS Dept. of Public Safety Planning	2028	Ongoing.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-4	Increase the number of fire department and police personnel trained to respond to hazardous waste releases on the railroad, highways, hospital, and other critical facilities.	Hazardous Materials Incident	Moderate	Buildings Department	FEMA, AFG	2028	Ongoing regular basis
ES-5	Implement an early warning network to alert citizens to oncoming hazards.	All	Moderate	Fire and Police Departments	MS Dept. of Public Safety Planning, AFG	2028	Ongoing
ES-8	Establish high ground staging area for emergency vehicles that provides added protection from wind-blown debris.	All	Moderate	Fire and Police Departments	FEMA, HMGP	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-9	As population grows to the east, southeast, and northeast, plan for the expansion of the city's firefighting capacity through an additional facility, possible on the Highway 57 corridor, including new fire trucks, personnel, and equipment.	All	Low	Fire Department	AFG	2028	Ongoing contingent upon funding
ES-10	Plan for the construction of an underpass to the railroad tracks at Halstead for emergency evacuation with a water pump to prevent groundwater flooding.	All	Low	Public Works Department	MS Dept. of Public Safety Planning, MDOT, DEQ, EPA	2028	Ongoing contingent upon funding
ES-11	Upgrade fire protection through acquisition of a new fire truck capable of reaching new elevated buildings and construct a fire station large enough to accommodate it.	Wildfire	Low	Fire Department	AFG	2028	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Create partnership to assist with development of Family Disaster Plans.	All	High	Fire Department	Administrative – not revenue dependent	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Educate residents on how better waste disposal can reduce flooding.	Flood	Moderate	Public Works; Planning and Community Development	FEMA, Sea Grant	2028	Ongoing
PEA-3	Provide outreach materials about mitigating the impact of a hazard through city mailings and raise the awareness of home and business owners.	All	Moderate	Mayor’s Office; Buildings and Water Departments	FEMA, Sea Grant	2024, Annually	Ongoing
PEA-4	Encourage small businesses to develop business continuity plans.	All	Moderate	Mayor’s Office	MDA – Economic Development, FEMA	2025	Ongoing
PEA-5	Launch a coordinated education effort on hurricane evacuation procedures to teach people who should evacuate, when evacuation should begin, and routes available through Ocean Springs and the surrounding areas.	Hurricane	Low	Fire and Police Departments	FEMA, Sea Grant	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-6	Participate in Gulf Coast Homeowner’s Show and building supply store shows to provide mitigation information to the public.	All	Low	Buildings Department	FEMA, Sea Grant	2028	Ongoing

City of Pascagoula Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Update Emergency Response Plan.	All	Moderate	Fire	General Fund	2024, Annually	Ongoing
P-2	Adopt Local Hazard Mitigation Plan as part of Comprehensive Plan.	All	Moderate	Community and Economic Development Department	General Fund	2025	Ongoing
P-3	Enhance enforcement of existing codes, ordinances, etc.	All	Moderate	Planning and Building	General Fund	2028	Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Continued compliance with the NFIP/implementation of CRS Activities.	Flood, Hurricane, Severe Thunderstorm	Moderate	Planning and Building	General Fund	2028	Ongoing participation.
P-5	Continue to participate in the Jackson County Stormwater Taskforce.	Flood, Hurricane, Tropical Storm, Severe Thunderstorm	Moderate	Planning and Building; Public Works	General Fund	2024, Annually	Ongoing
P-6	Maintenance of existing drainage facilities.	Flood, Hurricane, Tropical Storm, Severe Thunderstorm	High	Public Works; Engineering	General Fund	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Continue implementation of open space preservation.	Flood, Hurricane, Tropical Storm, Severe Thunderstorm	Moderate	Planning and Building	General Fund	2028	Ongoing
P-8	Continue citizens' hotline for drainage issues.	Flood, Hurricane, Thunderstorm, Erosion	High	Planning and Building; Public Relations	General Fund, HMGP grants	2028	Ongoing
Property Protection							
PP-1	Protect water wells, sewer systems, and ensure backup power.	All	High	Public Works	City Budget Utility Fund, Hazard Mitigation Grant funding	2026	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	Residential elevation.	Flood	High	Planning and Building; CRS Coordinator	HMGP, FMA	2028	Ongoing contingent upon funding
PP-3	Property acquisition project.	Flood	Moderate	CRS Coordinator	HMGP and FMA Grant funds	2028	Ongoing contingent upon funding
PP-4	Mitigation reconstruction/ floodproofing.	Hurricane, Flood	Moderate	CRS Coordinator	HMGP or FMA Grant programs	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Structure hardening: upgrade roof systems/windows to meet current code requirements to ensure continuity of emergency services – Pascagoula Police Dept., Lake Avenue Fire Station, City Hall, and others.	Hurricane, Severe Thunderstorm / High Wind, Hailstorm, Tornado	High	Planning and Building Department; Economic Development	General Fund; Hazard Mitigation Grants	2028	Ongoing contingent upon funding
PP-6	Relocation and placement of utilities.	Flood, Hurricane, Tropical Storm, Severe Thunderstorm	High	Planning and Building; Economic Development; Public Works	HMGP funding, City of Pascagoula Utility Fund, state and federal grants, JCUA budget funding	2028	Ongoing contingent upon funding
PP-7	Critical facilities inventory and mitigation opportunities.	All	Moderate	Public Works; Police; Fire; Parks and Recreation; Economic Development; Building and Planning; City Hall	HMGP and PDM Grants	2024	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
NRP-1	Natural resource protection – wetlands, others.	Flood, Hurricane, Severe Thunderstorm, Erosion	High	Planning and Building; Public Relations	General Fund, Hazard Mitigation grants, and other funded activities	2028	Ongoing
Structural Projects							
SP-1	Implement projects from Master Drainage Plan.	Flood, Hurricane, Tropical Storm, Severe Thunderstorm	High	Public Works; Engineering	General Fund	2028	Partially completed/ Ongoing contingent upon funding
Emergency Services							
ES-1	Coordination of evacuation planning and sheltering	All	Moderate	Pascagoula Police/Fire	General Fund, CDBG, HMGP funding	2024, Annually	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-2	NIMS certification.	All	High	Fire/Police	HMGP, EMPG	2028	Ongoing regular training
Public Education and Awareness							
PEA-1	Public/stakeholder outreach: education and preparedness for all hazards.	All	High	Planning and Building; Public Relations	General Fund; Hazard Mitigation Grants	Mailing biannually, web and media constant	Ongoing
PEA-2	Provide post-disaster guidance materials.	All	Moderate	Planning and Building	Existing budget	2028	Ongoing following disaster events

Pearl River County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Develop a Stormwater Management Plan for Pearl River County.	Flood	High	County Planning and Development; Board of Supervisors; Picayune City Council	U.S. Army Corps of Engineers; Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding
P-2	Develop a capital improvement program that includes drainage.	Flood	Moderate	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local funding	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-3	Establish a policy of extra-territorial review of subdivisions adjacent to jurisdictional boundaries to insure a comprehensive review of cumulative impacts within the watershed.	All	High	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local budget	2028	Ongoing
P-4	Establish a comprehensive drainage model.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Engineering Department; City of Poplarville Public Works; Pearl River County Tax Office	Dues to regional planning agency (SMPDD)	2028	Ongoing
P-5	Provide updated information to the U.S. Army Corps of Engineers through a grant program entitle planning assistance to states.	Flood	Moderate	Pearl River County Department of Planning and Development; Pearl River County Mapping Office; U.S.	USA Planning Assistance to States	2028	Ongoing

				Army Corps of Engineers			

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-6	Establish pre-disaster maintenance procedures for right of way along county roadways.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Road Department; Pearl River County Engineer	Local budgets	2028	Ongoing
P-7	The county will establish and adopt a policy on maintaining drainage ways. This policy will include regularly scheduled maintenance and the establishment of written tracking policy.	Flood	High	Pearl River County Road Manager	Local budgets	2028	Ongoing
P-8	Continue an ordinance and policy to determine and require the correct size culverts.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	Local budget	2028	Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Minimize damage to structure through code enforcement.	All	Moderate	Pearl River County Board of Supervisors; City of Picayune Mayor and City Council; City of Poplarville Mayor and Board of Alderman	Local budget and revenues	2028	Ongoing enforcement
P-10	Adopt and implement a regulation requiring building owners to retrofit their structures for flood damage if the structure's insured loss exceeds 50% or more of the structure's value.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Planning Department	Local budget	2028	Ongoing enforcement
P-11	Establish a formal policy to invite countywide staff to attend site plan review for projects that are immediately adjacent to the jurisdiction or will impact the jurisdiction.	All	Moderate	Pearl River County Board of Supervisors; City Council of Picayune; Poplarville Board of Alderman	Local revenues	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Reduce the number of repetitive loss properties within the county by elevating and where elevation is not an option, purchase properties at owner's request.	Flood	High	Pearl River County Board of Supervisors; Picayune Board of Alderman; Pearl River County Department of Planning and Development; Picayune Planning and Development Department	Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance Grants (FMA), Severe Repetitive Loss Grants (SRL), MEMA Planning Funds	2028	Ongoing contingent upon funding
Natural Resource Protection							
NRP-1	Continue and expand stream protection and preservation programs to secure easements to protect riparian areas.	Flood	High	Mississippi Department of Wildfire and Parks; Pearl River County Department of Planning and Development	Department of Interior; Soil and Water Conservation	2028	Ongoing contingent upon funding

NRP-2	Continue to preserve green spaces.	Flood	High	Pearl River County Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Private	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Follow through with Alligator Branch improvements.	Flood	Moderate	Pearl River County Board of Supervisors	Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding
Emergency Services							
ES-1	Through a Mississippi/Louisiana Partnership, establish a first responders shelter to house personnel and parking space for necessary equipment until the emergency has passed and personnel and equipment can be returned to Louisiana. Also, establish and man an information center to pass on critical information to returning evacuees where evacuees can temporarily remain until it is safe to return to their homes.	Hurricane	Moderate	Pearl River County Civil Defense Agency; Pearl River County Board of Supervisors; Louisiana Emergency Management Agency; Mississippi Emergency Management Agency	FEMA Grants, local emergency management funding	2028	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Provide easily accessible tax map information to the municipalities in the county, insurance agents, realtors, banking interest, and individuals.	Flood	High	Pearl River Mapping Office; Pearl River County Tax Office	Local budget	2028	Ongoing updates

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Establish monthly educational programs for local government and staff.	All	High	Pearl River County Department of Planning and Development; Picayune Planning and Development Office	Salaries	2028	Ongoing
PEA-3	Continue outreach to the community, including local officials, about the Hazard Mitigation Grant Program and requirements of elevation and purchase programs.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	HMGP	2028	Ongoing
PEA-4	Establish a hazard mitigation library at the public library.	All	High	Picayune CRS Coordinator; Pearl River County Library System; Pearl River County Department of Planning and Development	Local budget	2026	Ongoing with updated materials

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Develop a brochure “Hazards in Pearl River County” that will detail hazards within the county.	Flood, Hurricane, Tornado, Wind	High	Pearl River County Emergency Management	Local budget	2026	Ongoing updated materials
PEA-6	Develop three programs for “Focus on Pearl River County” on WRJW.	Hurricane, Flood, Tornado, Wind	High	Pearl River County Emergency Management; Pearl River County Planning and Development; WRJW	Local budget	2028	Ongoing
PEA-7	Establish a speaker’s forum.	Hurricane, Tornado, Flood, Wind Storm	High	Pearl River Emergency Management	Local budget	2028	Ongoing
PEA-8	Establish a hazard mitigation and disaster preparedness booth at the Blueberry Festival and the Picayune Street Fair.	Flood, Hurricane, Tornado, Wind Storm	High	Pearl River County Emergency Management; Picayune CRS Coordinator	Local budget	2028	Ongoing annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-9	Encourage the Chambers of Commerce, PRCDA, and Civil Defense to develop a program on business continuity planning for businesses.	Hurricane, Flood, Tornado	Low	Picayune and Poplarville Chamber of Commerce	Local budget	2028	Ongoing
PEA-10	Advise school officials and teachers of availability of education materials for children.	Hurricane, Flood, Tornado, High Wind, Thunderstorm	Moderate	Pearl River Emergency Management; Picayune CRS Coordinator	Local revenues	2028	Ongoing

City of Picayune Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Develop a Stormwater Management Plan for Pearl River County.	Flood	High	County Planning and Development; Board of Supervisors; Picayune City Council	U.S. Army Corps of Engineers; Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding
P-2	Develop a capital improvement program that includes drainage.	Flood	Moderate	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local budget	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-3	Establish a policy of extra-territorial review of subdivisions adjacent to jurisdictional boundaries to insure a comprehensive review of cumulative impacts within the watershed.	All	High	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local budget	2028	Ongoing
P-4	Establish a comprehensive drainage model.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Engineering Department; City of Poplarville Public Works; Pearl River County Tax Office	Dues to regional planning agency (SMPDD)	2028	Ongoing contingent upon funding
P-5	Provide updated information to the U.S. Army Corps of Engineers through a grant program entitle planning assistance to states.	Flood	Moderate	Pearl River County Department of Planning and Development; Pearl River County Mapping Office; U.S.	USA Planning Assistance to States	2028	Ongoing contingent upon funding

				Army Corps of Engineers			

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-6	Establish pre-disaster maintenance procedures for right of way along county roadways.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Road Department; Pearl River County Engineer	Local budgets	2028	Ongoing
P-7	The county will establish and adopt a policy on maintaining drainage ways. This policy will include regularly scheduled maintenance and the establishment of written tracking policy.	Flood	High	Pearl River County Road Manager	Local budgets	2028	Ongoing
P-8	Continue an ordinance and policy to determine and require the correct size culverts.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	Local budget	2028	Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Minimize damage to structure through code enforcement.	All	Moderate	Pearl River County Board of Supervisors; City of Picayune Mayor and City Council; City of Poplarville Mayor and Board of Alderman	Local funds and revenues	2028	Ongoing enforcement
P-10	Adopt and implement a regulation requiring building owners to retrofit their structures for flood damage if the structure's insured loss exceeds 50% or more of the structure's value.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Planning Department	Local budget	2028	Ongoing enforcement
P-11	Establish a formal policy to invite countywide staff to attend site plan review for projects that are immediately adjacent to the jurisdiction or will impact the jurisdiction.	All	Moderate	Pearl River County Board of Supervisors; City Council of Picayune; Poplarville Board of Alderman	Local revenues	2026	Ongoing
P-12	File an amendment to the Community Rating System application requesting additional CRS credit to further lower the city's NFIP CRS application.	Flood	High	Picayune Planning and Building Code	FEMA/MEMA HMGP Planning Grant	2026	Ongoing efforts to lower rating

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Request funding to prepare a repetitive loss plan for the city, identifying and cataloging all repetitive loss properties, ownership, and whether or not owner is interested in mitigation activities.	Flood	High	Picayune Planning and Building Code	FEMA/MEMA HMGP Planning Grant	2028	Ongoing contingent upon funding
P-14	Adopt the International Building Codes.	Wind, Flood, Earthquake, Tornado	High	Picayune Planning and Building	Local General Funds	2028	Completed/Ongoing enforcement
Property Protection							
PP-1	Reduce the number of repetitive loss properties within the county by elevating and where elevation is not an option, purchase properties at owner's request.	Flood	High	Pearl River County Board of Supervisors; Picayune Board of Alderman; Pearl River County Department of Planning and Development; Picayune Planning and Development Department	Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance Grants (FMA), Severe Repetitive Loss Grants (SRL), MEMA Planning Funds	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
NRP-1	Continue and expand stream protection and preservation programs to secure easements to protect riparian areas.	Flood	High	Mississippi Department of Wildfire and Parks; Pearl River County Department of Planning and Development	Department of Interior; Soil and Water Conservation	2028	Ongoing contingent upon funding
NRP-2	Continue to preserve green spaces.	Flood	High	Pearl River County Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Private	2028	Ongoing contingent upon funding
Structural Projects							
SP-1	Follow through with Alligator Branch improvements.	Flood	Moderate	Pearl River County Board of Supervisors	Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Through a Mississippi/Louisiana Partnership, establish a first responders shelter to house personnel and parking space for necessary equipment until the emergency has passed and personnel and equipment can be returned to Louisiana. Also, establish and man an information center to pass on critical information to returning evacuees where evacuees can temporarily remain until it is safe to return to their homes.	Hurricane	Moderate	Pearl River County Civil Defense Agency; Pearl River County Board of Supervisors; Louisiana Emergency Management Agency; Mississippi Emergency Management Agency	FEMA Grants, local emergency management funding	2028	Ongoing
Public Education and Awareness							
PEA-1	Provide easily accessible tax map information to the municipalities in the county, insurance agents, realtors, banking interest, and individuals.	Flood	High	Pearl River Mapping Office; Pearl River County Tax Office	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Establish monthly educational programs for local government and staff.	All	High	Pearl River County Department of Planning and Development; Picayune Planning and Development Office	Salaries	2028	Ongoing
PEA-3	Continue outreach to the community, including local officials, about the Hazard Mitigation Grant Program and requirements of elevation and purchase programs.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	HMGP	2028	Ongoing
PEA-4	Establish a hazard mitigation library at the public library.	All	High	Picayune CRS Coordinator; Pearl River County Library System; Pearl River County Department of Planning and Development	Local budget	2026	Ongoing updated materials regularly

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Develop a brochure “Hazards in Pearl River County” that will detail hazards within the county.	Flood, Hurricane, Tornado, Wind	High	Pearl River County Emergency Management	Local budget	2026	Ongoing regular updates
PEA-6	Develop three programs for “Focus on Pearl River County” on WRJW.	Hurricane, Flood, Tornado, Wind	High	Pearl River County Emergency Management; Pearl River County Planning and Development; WRJW	Local budget	2028	Ongoing
PEA-7	Establish a speaker’s forum.	Hurricane, Tornado, Flood, Wind Storm	High	Pearl River Emergency Management	Local budget	2028	Ongoing
PEA-8	Establish a hazard mitigation and disaster preparedness booth at the Blueberry Festival and the Picayune Street Fair.	Flood, Hurricane, Tornado, Wind Storm	High	Pearl River County Emergency Management; Picayune CRS Coordinator	Local budget	2028	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-9	Encourage the Chambers of Commerce, PRCDA, and Civil Defense to develop a program on business continuity planning for businesses.	Hurricane, Flood, Tornado	Low	Picayune and Poplarville Chamber of Commerce	Local budget	2028	Ongoing
PEA-10	Advise school officials and teachers of availability of education materials for children.	Hurricane, Flood, Tornado, High Wind, Thunderstorm	Moderate	Pearl River Emergency Management; Picayune CRS Coordinator	Local revenues	2028	Ongoing

City of Poplarville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Develop a Stormwater Management Plan for Pearl River County.	Flood	High	County Planning and Development; Board of Supervisors; Picayune City Council	U.S. Army Corps of Engineers; Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding
P-2	Develop a capital improvement program that includes drainage.	Flood	Moderate	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local budget	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-3	Establish a policy of extra-territorial review of subdivisions adjacent to jurisdictional boundaries to insure a comprehensive review of cumulative impacts within the watershed.	All	High	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local budget	2028	Ongoing
P-4	Establish a comprehensive drainage model.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Engineering Department; City of Poplarville Public Works; Pearl River County Tax Office	Dues to regional planning agency (SMPDD)	2028	Ongoing contingent upon funding
P-5	Provide updated information to the U.S. Army Corps of Engineers through a grant program entitle planning assistance to states.	Flood	Moderate	Pearl River County Department of Planning and Development; Pearl River County Mapping Office; U.S.	USA Planning Assistance to States	2028	Ongoing

				Army Corps of Engineers			

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-6	Establish pre-disaster maintenance procedures for right of way along county roadways.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Road Department; Pearl River County Engineer	Local budgets	2028	Ongoing
P-7	The county will establish and adopt a policy on maintaining drainage ways. This policy will include regularly scheduled maintenance and the establishment of written tracking policy.	Flood	High	Pearl River County Road Manager	Local budgets	2028	Ongoing
P-8	Continue an ordinance and policy to determine and require the correct size culverts.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	Local budget	2028	Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Minimize damage to structure through code enforcement.	All	Moderate	Pearl River County Board of Supervisors; City of Picayune Mayor and City Council; City of Poplarville Mayor and Board of Alderman	Local funds and revenues	2028	Ongoing enforcement
P-10	Adopt and implement a regulation requiring building owners to retrofit their structures for flood damage if the structure's insured loss exceeds 50% or more of the structure's value.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Planning Department	Local budget	2028	Ongoing enforcement
P-11	Establish a formal policy to invite countywide staff to attend site plan review for projects that are immediately adjacent to the jurisdiction or will impact the jurisdiction.	All	Moderate	Pearl River County Board of Supervisors; City Council of Picayune; Poplarville Board of Alderman	Local revenues	2026	Ongoing

P-12	Develop and adopt a flood ordinance for the City of Poplarville.	Flood	High	Poplarville Board of Alderman	Local budgets	2028	Completed/Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Reduce the number of repetitive loss properties within the county by elevating and where elevation is not an option, purchase properties at owner's request.	Flood	High	Pearl River County Board of Supervisors; Picayune Board of Alderman; Pearl River County Department of Planning and Development; Picayune Planning and Development Department	Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance Grants (FMA), Severe Repetitive Loss Grants (SRL), MEMA Planning Funds	2028	Ongoing contingent upon funding
Natural Resource Protection							
NRP-1	Continue and expand stream protection and preservation programs to secure easements to protect riparian areas.	Flood	High	Mississippi Department of Wildfire and Parks; Pearl River County Department of Planning and Development	Department of Interior; Soil and Water Conservation	2028	Ongoing contingent upon funding

NRP-2	Continue to preserve green spaces.	Flood	High	Pearl River County Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Private	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Follow through with Alligator Branch improvements.	Flood	Moderate	Pearl River County Board of Supervisors	Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding
Emergency Services							
ES-1	Through a Mississippi/Louisiana Partnership, establish a first responders shelter to house personnel and parking space for necessary equipment until the emergency has passed and personnel and equipment can be returned to Louisiana. Also, establish and man an information center to pass on critical information to returning evacuees where evacuees can temporarily remain until it is safe to return to their homes.	Hurricane	Moderate	Pearl River County Civil Defense Agency; Pearl River County Board of Supervisors; Louisiana Emergency Management Agency; Mississippi Emergency Management Agency	FEMA Grants, local emergency management funding	2028	Ongoing
Public Education and Awareness							
PEA-1	Provide easily accessible tax map information to the municipalities in the county, insurance agents, realtors, banking interest, and individuals.	Flood	High	Pearl River Mapping Office; Pearl River County Tax Office	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Establish monthly educational programs for local government and staff.	All	High	Pearl River County Department of Planning and Development; Picayune Planning and Development Office	Salaries	2028	Ongoing
PEA-3	Continue outreach to the community, including local officials, about the Hazard Mitigation Grant Program and requirements of elevation and purchase programs.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	HMGP	2028	Ongoing
PEA-4	Establish a hazard mitigation library at the public library.	All	High	Picayune CRS Coordinator; Pearl River County Library System; Pearl River County Department of Planning and Development	Local budget	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Develop a brochure “Hazards in Pearl River County” that will detail hazards within the county.	Flood, Hurricane, Tornado, Wind	High	Pearl River County Emergency Management	Local budget	2026	Ongoing updated materials
PEA-6	Develop three programs for “Focus on Pearl River County” on WRJW.	Hurricane, Flood, Tornado, Wind	High	Pearl River County Emergency Management; Pearl River County Planning and Development; WRJW	Local budget	2028	Ongoing
PEA-7	Establish a speaker’s forum.	Hurricane, Tornado, Flood, Wind Storm	High	Pearl River Emergency Management	Local budget	2028	Ongoing
PEA-8	Establish a hazard mitigation and disaster preparedness booth at the Blueberry Festival and the Picayune Street Fair.	Flood, Hurricane, Tornado, Wind Storm	High	Pearl River County Emergency Management; Picayune CRS Coordinator	Local budget	2028	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-9	Encourage the Chambers of Commerce, PRCDA, and Civil Defense to develop a program on business continuity planning for businesses.	Hurricane, Flood, Tornado	Low	Picayune and Poplarville Chamber of Commerce	Local budget	2028	Ongoing
PEA-10	Advise school officials and teachers of availability of education materials for children.	Hurricane, Flood, Tornado, High Wind, Thunderstorm	Moderate	Pearl River Emergency Management; Picayune CRS Coordinator	Local revenues	2028	Ongoing

Stone County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Provide flood monitors along Red Creek to monitor flood levels to inform/warn people of dangerous water levels.	Flood	High	Emergency Operations Director; Stone County Board of Supervisors; U.S. Geological Survey	MEMA, Environmental Protection Agency, South Mississippi Land Trust	2028	Ongoing
P-2	Study ways to provide property value protection for residents from encroachment but limiting restraints on property owners. (Study, plan, and implement selected land use ordinances.)	All	High	Stone County Board of Supervisors; City of Wiggins	MDA, Coastal Impact Assistance Program (CIAP)	2027	Ongoing
P-3	Update and enhance Geographic Information System (GIS) and connect EOC building in order to improve the county/city capacity to respond to disasters; to create and manage spatial data; and to enhance the tax assessment, environmental preservation, mapping, and other county functions that rely on detailed geographic information.	All	Moderate	Stone County Tax Assessor's Office; Emergency Operations	MEMA/FEMA, local, budget GORR	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Conduct a comprehensive study to determine the best possible location for new schools and district lines to accommodate future growth in Stone County School System.	Coastal Storms	Moderate	Stone County School Board; Stone County; City of Wiggins	Local, private foundations	2026	Ongoing
P-5	Secure and preserve county records to digitized format and develop and maintain electronic data storage.	Hurricane, Tornado	High	Stone County Chancery Clerk	MEMA, USDA Rural Development, state funding, local	2024	Completed/Ongoing
P-6	Promote economic development in Wiggins by continuing to revitalize the downtown area, thereby increasing its attractiveness to new businesses, the growing population, and visitors.	All	Moderate	City of Wiggins; Stone County Economic Development Partnership; Stone County	CDBG, USDA, local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Develop a retail targeting strategy for City of Wiggins and Stone County.	All	Moderate	City of Wiggins; Stone County Economic Development Partnership	CDBG, USDA, local budget	2028	Partially completed/Ongoing
P-8	Provide an entrepreneurial initiative for developing small businesses in Stone County and City of Wiggins.	All	Moderate	Stone County Economic Development Partnership; Mississippi Gulf Coast Community College; Stone County Board of Supervisors; private partners	MDA, private foundations, MGCCC, Stone County EDP	2028	Ongoing initiatives
P-9	Expand technology infrastructure (Broadband telecommunication) to support small business development in Stone County.	All	Moderate	Stone County Economic Development Partnership; Stone County	USDA Rural Development, AT&T	2028	Ongoing
Property Protection							

	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	Expand sewer service and enhance potable water service in county and City of Wiggins; provide additional fire plugs in city and unincorporated areas of county.	All	Moderate	Stone County Utility Authority; rural water systems; City of Wiggins	USDA, local, CDBG	2028	Ongoing contingent upon funding
SP-2	Widen Highway 26 to encourage safer, more efficient traffic flow through Wiggins and across Stone County.	All	Moderate	MDOT; City of Wiggins	MDOT	2028	Ongoing contingent upon funding
SP-3	Build safer access roads from U.S. Highway 49 into Perkinston Elementary School and Mississippi Gulf Coast Community College.	All	Moderate	MDOT; Stone County Board of Supervisors; MGCCC	MDOT, CDBG, MDA	2028	Ongoing contingent upon funding

SP-4	Upgrade major artery roads and bridges throughout high growth areas of county (roads: East McHenry, West McHenry, East Wire Road, West Wire Road, King Bee, New Hope Road, Perkinston-Silver Run, City Road, and City Bridge Road; bridges: Inda Road Bridge).	All		Moderate	Stone County board of Supervisors	State Aid Roads, local MDA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-5	Implement erosion protection procedures/projects on Red Creek at City Bridge, Highway 49/Perkinston, and Ramsey Springs infrastructure.	Erosion	Low	Stone County Board of Supervisors; Land Trust of South Mississippi; MDEQ	Mississippi Game and Fish, local, Land Trust of South Mississippi	2026	Ongoing contingent upon funding
SP-6	Upgrade railroad crossings with safety cross arms and warning lights.	Hazardous Materials/ Railroad Incidents	High	MDOT and KCS Railroad	MDOT and KCS Railroad	2026	Ongoing
SP-7	Improve drainage throughout the county at identified flood prone areas as delineated by county flood maps.	Flood	High	Stone County Board of Supervisors, U.S. Geological Survey	Pat Harrison Waterway District, local, MEMA/FEMA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Improve county-wide emergency communications to include radios, base stations, satellite phones, warning systems, and enhanced CAD system and staffing for 911.	All	High	Emergency Operations Director	Homeland Security, MEMA/FEMA, HMGP	2028	Ongoing contingent upon funding
ES-2	Provide sufficient evacuation routes and notify public of evacuation routes and procedures and shelter locations in a timely manner.	Hurricane, Coastal Storm	Moderate	MEMA; MDOT; Stone County Emergency Operations	MEMA/FEMA, HMGP	2028	Ongoing contingent upon funding
ES-3	Prepare fire stations on east, west, and south areas of county with safe rooms and in-place generators to allow fire personnel to stay on site during hazard event such as hurricane force winds.	Hurricane, Tornado	Moderate	Stone County Fire Coordinator; Stone County	MEMA/FEMA, HMGP	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-4	Provide personnel to improve the firefighting delivery system, insurance ratings, and assist in coordinating efforts of volunteer fire departments.	All	Moderate	City of Wiggins; Stone County Fire Coordinator	Local budget	2028	Ongoing
ES-5	Provide firefighting capability for multi-story buildings and commercial/industrial facilities.	All	Moderate	City of Wiggins; Stone County Board of Supervisors	U.S. Fire Administration, FEMA, CDBG	2028	Partially completed/ Ongoing contingent upon funding
ES-6	Provide mobile alternate emergency service site for serving remote areas and as a backup for the Emergency Operations Center if out of commission.	All	High	City of Wiggins; Stone County Board of Supervisors; Emergency Operations Director	FEMA/MEMA, Homeland Security, HMGP	2026	Ongoing contingent upon funding will be retained.
ES-7	Upgrade emergency operations 911 system equipment/software and add personnel to support emergency services.	All	High	Stone County Board of Supervisors; Emergency Operations	Homeland Security, FEMA/MEMA, HMGP local budget	2028	Ongoing upgrades

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-8	Provide community centers in areas of concentrated population that can be used for emergency service centers in recovery phase of disasters.	All	High	Stone County Board of Supervisors	CDBG, local budget	2028	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Provide disaster preparedness and recovery education/training to residents, pre-school, and school children/youth/college students to include hurricane/tornadoes, chemical spills, flooding, fire, and railroad crossings.	All	High	Emergency Operations Director	MEMA, Red Cross	2028	Ongoing
PEA-2	Provide fire and emergency preparedness and response education to children/youth/college students and other residents of the county/city.	Wildfire	Low	Stone County Fire Coordinator; City of Wiggins Fire Chief; American Red Cross	MEMA, U.S. Fire Administration, county/city, private sources	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-3	Conduct safety awareness programming alerting residents of Stone County and Wiggins of the increased train activity, speed, and capacity to include dangers at railroad crossing brought forth from the KCS rail upgrade from Gulfport to Hattiesburg, MS.	Hazardous Materials/ Railroad Incident	Moderate	Emergency Operations Director; Stone County Board of Supervisors; City of Wiggins; KCS Railroad	Local and KCS railroad	2028	Ongoing

City of Wiggins Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Provide flood monitors along Red Creek to monitor flood levels to inform/warn people of dangerous water levels.	Flood	High	Emergency Operations Director; Stone County Board of Supervisors; U.S. Geological Survey	MEMA, Environmental Protection Agency, South Mississippi Land Trust	2028	Ongoing
P-2	Study ways to provide property value protection for residents from encroachment but limiting restraints on property owners. (Study, plan, and implement selected land use ordinances.)	All	High	Stone County Board of Supervisors; City of Wiggins	MDA, Coastal Impact Assistance Program (CIAP)	2027	Ongoing
P-3	Update and enhance Geographic Information System (GIS) and connect EOC building in order to improve the county/city capacity to respond to disasters; to create and manage spatial data; and to enhance the tax assessment, environmental preservation, mapping, and other county functions that rely on detailed geographic information.	All	Moderate	Stone County Tax Assessor's Office; Emergency Operations	MEMA/FEMA, local, GORR	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Conduct a comprehensive study to determine the best possible location for new schools and district lines to accommodate future growth in Stone County School System.	Coastal Storms	Moderate	Stone County School Board; Stone County; City of Wiggins	Local, private foundations	2027	Ongoing contingent upon funding
P-5	Secure and preserve county records to digitized format and develop and maintain electronic data storage.	Hurricane, Tornado	High	Stone County Chancery Clerk	MEMA, USDA Rural Development, state funding, local	2025	Partially completed/Ongoing
P-6	Promote economic development in Wiggins by continuing to revitalize the downtown area, thereby increasing its attractiveness to new businesses, the growing population, and visitors.	All	Moderate	City of Wiggins; Stone County Economic Development Partnership; Stone County	CDBG, USDA, local	2028	Ongoing intiatives

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Develop a retail targeting strategy for City of Wiggins and Stone County.	All	Moderate	City of Wiggins; Stone County Economic Development Partnership	CDBG, USDA, local	2028	Ongoing
P-8	Provide an entrepreneurial initiative for developing small businesses in Stone County and City of Wiggins.	All	Moderate	Stone County Economic Development Partnership; Mississippi Gulf Coast Community College; Stone County Board of Supervisors; private partners	MDA, private foundations, MGCCC, Stone County EDP	2028	Ongoing
P-9	Expand technology infrastructure (Broadband telecommunication) to support small business development in Stone County.	All	Moderate	Stone County Economic Development Partnership; Stone County	USDA Rural Development, AT&T	2028	Ongoing contingent upon funding
Property Protection							

	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	Expand sewer service and enhance potable water service in county and City of Wiggins; provide additional fire plugs in city and unincorporated areas of county.	All	Moderate	Stone County Utility Authority; rural water systems; City of Wiggins	USDA, local, CDBG	2028	Ongoing contingent upon funding
SP-2	Widen Highway 26 to encourage safer, more efficient traffic flow through Wiggins and across Stone County.	All	Moderate	MDOT; City of Wiggins	MDOT	2028	Ongoing contingent upon funding
SP-3	Build safer access roads from U.S. Highway 49 into Perkinston Elementary School and Mississippi Gulf Coast Community College.	All	Moderate	MDOT; Stone County Board of Supervisors; MGCCC	MDOT, CDBG, MDA	2028	Ongoing contingent upon funding

SP-4	Upgrade major artery roads and bridges throughout high growth areas of county (roads: East McHenry, West McHenry, East Wire Road, West Wire Road, King Bee, New Hope Road, Perkinston-Silver Run, City Road, and City Bridge Road; bridges: Inda Road Bridge).	All	Moderate	Stone County board of Supervisors	State Aid Roads, local MDA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-5	Implement erosion protection procedures/projects on Red Creek at City Bridge, Highway 49/Perkinston, and Ramsey Springs infrastructure.	Erosion	Low	Stone County Board of Supervisors; Land Trust of South Mississippi; MDEQ	Mississippi Game and Fish, local, Land Trust of South Mississippi	2027	Ongoing contingent upon funding
SP-6	Upgrade railroad crossings with safety cross arms and warning lights.	Hazardous Materials/ Railroad Incidents	High	MDOT and KCS Railroad	MDOT and KCS Railroad	2027	Ongoing
SP-7	Improve drainage throughout the county at identified flood prone areas as delineated by county flood maps.	Flood	High	Stone County Board of Supervisors, U.S. Geological Survey	Pat Harrison Waterway District, local, MEMA/FEMA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Improve county-wide emergency communications to include radios, base stations, satellite phones, warning systems, and enhanced CAD system and staffing for 911.	All	High	Emergency Operations Director	Homeland Security, MEMA/FEMA	2028	Completed/Ongoing
ES-2	Provide sufficient evacuation routes and notify public of evacuation routes and procedures and shelter locations in a timely manner.	Hurricane, Coastal Storm	Moderate	MEMA; MDOT; Stone County Emergency Operations	MEMA/FEMA	2028	Ongoing contingent upon funding
ES-3	Prepare fire stations on east, west, and south areas of county with safe rooms and in-place generators to allow fire personnel to stay on site during hazard event such as hurricane force winds.	Hurricane, Tornado	Moderate	Stone County Fire Coordinator; Stone County	MEMA/FEMA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-4	Provide personnel to improve the firefighting delivery system, insurance ratings, and assist in coordinating efforts of volunteer fire departments.	All	Moderate	City of Wiggins; Stone County Fire Coordinator	Local budget	2028	Ongoing
ES-5	Provide firefighting capability for multi-story buildings and commercial/industrial facilities.	All	Moderate	City of Wiggins; Stone County Board of Supervisors	U.S. Fire Administration, FEMA, CDBG	2028	Partially completed/Ongoing
ES-6	Provide mobile alternate emergency service site for serving remote areas and as a backup for the Emergency Operations Center if out of commission.	All	High	City of Wiggins; Stone County Board of Supervisors; Emergency Operations Director	FEMA/MEMA, Homeland Security	2027	Ongoing contingent upon funding
ES-7	Upgrade emergency operations 911 system equipment/software and add personnel to support emergency services.	All	High	Stone County Board of Supervisors; Emergency Operations	Homeland Security, FEMA/MEMA, local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-8	Provide community centers in areas of concentrated population that can be used for emergency service centers in recovery phase of disasters.	All	High	Stone County Board of Supervisors	CDBG, local budget	2028	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Provide disaster preparedness and recovery education/training to residents, pre-school, and school children/youth/college students to include hurricane/tornadoes, chemical spills, flooding, fire, and railroad crossings.	All	High	Emergency Operations Director	MEMA, Red Cross	2028	Ongoing
PEA-2	Provide fire and emergency preparedness and response education to children/youth/college students and other residents of the county/city.	Wildfire	Low	Stone County Fire Coordinator; City of Wiggins Fire Chief; American Red Cross	MEMA, U.S. Fire Administration, county/city, private sources	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-3	Conduct safety awareness programming alerting residents of Stone County and Wiggins of the increased train activity, speed, and capacity to include dangers at railroad crossing brought forth from the KCS rail upgrade from Gulfport to Hattiesburg, MS.	Railroad Incident	Moderate	Emergency Operations Director; Stone County Board of Supervisors; City of Wiggins; KCS Railroad	Local and KCS railroad	2028	Ongoing

SECTION 10 PLAN MAINTENANCE

This section discusses how the MEMA District 9 Mitigation Strategy and Mitigation Action Plan will be implemented and how the Regional Hazard Mitigation Plan will be evaluated and enhanced over time. This section also discusses how the public will continue to be involved in a sustained hazard mitigation planning process. It consists of the following four subsections:

10.1 Monitoring and Evaluating the Previous Plan
10.2 Implementation and Integration
10.3 Monitoring, Evaluation, and Enhancement
10.4 Continued Public Involvement

44 CFR Requirement
44 CFR Part201.6(c)(4)(i): The plan shall include a plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a five-year cycle. ***44 CFR Part 201.6(c)(4)(ii):*** The plan maintenance process shall include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate

MONITORING, EVALUATING AND UPDATING THE PLAN

To ensure the Hazard Mitigation Plan continues to provide an appropriate path for risk reduction throughout the district, it is necessary to regularly evaluate and update it. The planning committee will be responsible for monitoring the status of the plan and gathering appropriate parties to report the status of mitigation actions. The committee will convene on an annual basis to determine the progress of the identified mitigation actions. The committee will also be an active participant in the next plan update. As the Hazard Mitigation Plan matures, new stakeholders, specifically those stakeholders and organizations that represent underserved populations and groups in the district and all participating jrisdictions, will be identified and encouraged to join the existing committee.

Each community was ultimately successful in implementing the monitoring and evaluation processes that were outlined in previous plans as all communities held annual meetings to discuss the mitigation plan and the priorities that were outlined in it. Each county's specific process is outlined below with an explanation of how the monitoring and evaluating process was carried out as well as any changes that were identified by the county or its jurisdictions that would be useful to implement during the next update.

George County

George County, includes an annual review process and progress report on mitigation strategies, focusing on those expected to be initiated or completed in that year. This review process was carried out by the Advisory Council every year since the previous plan was approved. During this annual review process, the Advisory Council developed a report on the plan to detail mitigation activities undertaken over the course of the year for the Board of Supervisors.

Hancock County

Hancock County, includes an annual review process in June of each year. This review process is carried out by the Hazard Mitigation Planning Committee every year since the previous plan was approved. During this annual review process, the information from this meeting is used to update the Risk Assessment section of the plan and modify the

Action Plan.

Additionally, the county's Emergency Management Director requires semi-annual reviews of the progress towards implementing the plan. This review is coordinated to review both the plan and coordinate actions defined within the activities of the county's CRS Program Report and NPDES Phase II Stormwater Program Report. These meetings are held in June and December

Although there were some minor revisions made to the plan during the interim update period, there were few major revisions identified during these annual reviews and the Hazard Mitigation Planning Committee generally agreed that the plan was on course and that the monitoring and evaluating process itself was sufficient to ensure implementation of the plan.

Bay St. Louis

Bay St. Louis includes an annual review process and reviews following a hazard event. This review process is carried out by the Bay St. Louis CRS Coordinator every year since the previous plan was approved. During this annual review process, review of changes in vulnerability is the focus. Moreover, the city will document where mitigation actions were not effective and where additional data or capabilities could be incorporated.

A representative from the responsible office identified in each mitigation measure is responsible for tracking the action status and reporting on it during the annual review. If the action did not meet identified objectives, the jurisdictional lead determined what additional measures might be implemented to lead to success. Updating of the plan will be by written changes and submissions as approved by the City Council.

Waveland

Waveland includes an annual review process and progress report on the plan. This review process is carried out by the Fire Chief every year since the previous plan was approved. During this annual review process, review of changes in vulnerability is the focus. Moreover, the city will document where mitigation actions were not effective and where additional data or capabilities could be incorporated.

A representative from the responsible office identified in each mitigation measure is responsible for tracking the action status and reporting on it during the annual review. If the action did not meet identified objectives, the jurisdictional lead determined what additional measures might be implemented to lead to success. Updating of the plan will be by written changes and submissions as approved by the City Council.

Harrison County

Harrison County includes a bi-annual review process in January and June and progress report on the plan, as well as reviews after any disaster events. This review process is carried out by the Harrison County LHMPC every year since the previous plan was approved. During this annual review process, the County LHMPC develops an end-of-year report on the plan, when requested, to detail mitigation activities undertaken over the course of the year as well as any mitigation projects that have been completed. This was presented to the Harrison County Board of Supervisors. The agenda for each review meeting is determined by the Office of Emergency Management and LHMPC, but always includes a review of high and medium priority actions.

Biloxi

Biloxi includes an annual review process and progress report on the plan. This review process is carried out by the Biloxi Emergency Management Director every year since the previous plan was approved. During this annual review process, the EM Director is responsible for general upkeep and oversight of the plan and collecting relevant information from other city departments for use in the plan. The EM Director develops meeting agendas, invitations, and scheduled the annual meetings in coordination with the Public Affairs Manager when applicable.

During the meetings, the Committee discuss issues including the impacts of past events on the Gulf Coast and an evaluation of project implementation and timeline. Suggestions on improvements are made to the Director and incorporated as needed.

D'Iberville

D'Iberville includes an annual review process that takes place in June at the beginning of hurricane season. This review process was carried out by the Community Development Director in conjunction with the Hazard Mitigation Planning Committee every year since the previous plan was approved. During this annual review process, the Hazard Mitigation Planning Committee develops an end-of-year report on the plan to highlight accomplishments, shortfalls and areas of concern to the Mayor and City Council. Any suggestions for written changes are then incorporated and the Committee determines whether or not to incorporate these suggestions.

Gulfport

Gulfport) includes an annual review process that is carried out in February of each year. This review process is carried out by the Deputy Building Official and Hazard Mitigation Committee every year since the previous plan was approved. During this annual review process, the Hazard Mitigation Committee reviews any issues that occurred since the last plan update and made suggestions on improving the plan and any changes that might be required. There were also discussions with the city's Public Information Officer on what information may need to be shared with the public.

Long Beach

Long Beach includes an annual review process and progress report on the plan. This review process is carried out by the Fire Chief every year since the previous plan was approved. During this annual review process, review of changes in vulnerability were especially the focus. Moreover, the city will document where mitigation actions were not effective and where additional data or capabilities could be incorporated.

A representative from the responsible office identified in each mitigation measure was responsible for tracking the action status and reporting on it during the annual review. If the action did not meet identified objectives, the jurisdictional lead determines what additional measures might be implemented to lead to success. Updating of the plan will be by written changes and submissions as approved by the City Council.

Pass Christian

Pass Christian includes a bi-annual review process with meetings to take place in the spring and fall. This review process is carried out by the Hazard Mitigation Planning Committee every year since the previous plan was approved. During the spring review process, the Hazard Mitigation Planning Committee reviews the overall functionality of the plan and relevance to current conditions. This includes a review of new construction and/or planed construction, additional risks and vulnerabilities, and any new actions that might be added to the plan. During the fall review process, the discussions focused on major components of the plan including implementation of activities and nay hazards that occurred since the previous meeting.

Jackson County

Jackson County includes an annual review process that is focused on the mitigation actions in the plan. This review process is carried out by the Jackson County Hazard Mitigation Committee every year since the previous plan was approved. During this annual review process, the County Hazard Mitigation Committee also addresses issues not identified during the past plan update, assessed events that impacted the participating jurisdictions, and evaluating the effectiveness of the planning team. This is also complemented by an annual report that details the status of the planreview.

Moss Point
Moss Point includes an annual review process and progress report on the plan. This review process is carried out by the Building Department every year since the previous plan was approved. During this annual review process, review of changes in vulnerability is the focus. Moreover, the city will document where mitigation actions were not effective and where additional data or capabilities could be incorporated.

A representative from the responsible office identified in each mitigation measure is responsible for tracking the action status and reporting on it during the annual review. If the action did not meet identified objectives, the jurisdictional lead determines what additional measures might be implemented to lead to success. Updating of the plan will be by written changes and submissions as approved by the City Council.

Ocean Springs
Ocean Springs includes a bi-annual review process with meetings to take place in the spring and fall. This review process is carried out by the Hazard Mitigation Planning Committee every year since the previous plan was approved. During the spring review process, the Hazard Mitigation Planning Committee reviewes the overall functionality of the plan and relevance to current conditions. This included a review of new construction and/or planed construction, additional risks and vulnerabilities, and any new actions that might be added to the plan. During the fall review process, the discussions focus on major components of the plan including implementation of activities and nay hazards that occurred since the previous meeting.

Pascagoula
Pascagoula) includes a bi-annual review process with meetings to take place in the spring and fall. This review process is carried out by the Hazard Mitigation Planning Committee every year since the previous plan was approved. During the spring review process, the Hazard Mitigation Planning Committee reviews the overall functionality of the plan and relevance to current conditions. This included a review of new construction and/or planed construction, additional risks and vulnerabilities, and any new actions that might be added to the plan. During the fall review process, the discussions focus on major components of the plan including implementation of activities and nay hazards that occurred since the previous meeting.

Pearl River County
Pearl River County includes a bi-annual review process with meetings to take place in the spring and fall. This review process is carried out by the Hazard Mitigation Planning Committee every year since the previous plan was approved. During the spring review process, the Hazard Mitigation Planning Committee reviewed the overall functionality of the plan and relevance to current conditions. This included a review of new construction and/or planed construction, additional risks and vulnerabilities, and any new actions that might be added to the plan. During the fall review process, the discussions focus on major components of the plan including implementation of activities and nay hazards that occurred since the previous meeting.

Stone County
Stone County includes an annual review process with a yearly meeting. This review process is carried out by the Director of Emergency Operations every year since the previous plan was approved. During the review process, the county reviews potential hazards and meets with county/city department heads. This included a review of severity of area impacted, probability of occurring, impact to life/property, vulnerability of structures, and overall risk assessment. This review leads to an annual report that is presented to the Board of Supervisors and the Mayor/Board of Alderman.

IMPLEMENTATION AND INTEGRATION

Hazard mitigation practices must be incorporated within existing plans, projects, and programs. Therefore, the involvement of all departments, private non-profits, private industry, and appropriate jurisdictions is necessary in order to find mitigation opportunities within existing or planned projects and programs. To execute this, the committee will assist and coordinate resources for the mitigation actions and provide strategic outreach to implement mitigation actions that meet the goals identified in this plan.

Each agency, department, or other partner participating under the MEMA District 9 Regional Hazard Mitigation Plan is responsible for implementing specific mitigation actions as prescribed in the Mitigation Action Plan. Every proposed action listed in the Mitigation Action Plan is assigned to a specific "lead" agency or department in order to assign responsibility and accountability and increase the likelihood of subsequent implementation.

In addition to the assignment of a local lead department or agency, an implementation time period or a specific implementation date has been assigned in order to assess whether actions are being implemented in a timely fashion. The counties in the MEMA District 9 Region will seek outside funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, potential funding sources have been identified for proposed actions listed in the Mitigation Action Plan.

The participating jurisdictions will integrate this Hazard Mitigation Plan into relevant city and county government decision-making processes or mechanisms, where feasible. This includes integrating the requirements of the Hazard Mitigation Plan into other local planning documents, processes, or mechanisms, such as comprehensive or capital improvement plans, when appropriate. The members of the MEMA District 9 Regional Hazard Mitigation Council (RHMC) will remain charged with ensuring that the goals and mitigation actions of new and updated local planning documents for their agencies or departments are consistent, or do not conflict with, the goals and actions of the Hazard Mitigation Plan, and will not contribute to increased hazard vulnerability in the MEMA District 9 Region.

Since the previous plans were adopted, each county and participating jurisdiction has worked to integrate the hazard mitigation plan into other planning mechanisms where applicable/feasible. Examples of how this integration has occurred have been documented in the Implementation Status discussion provided for each of the mitigation actions found in Section 9. Specific examples of how integration has occurred include:

- Integrating the mitigation plan into reviews and updates of floodplain management ordinances
- Integrating the mitigation plan into reviews and updates of emergency operations plans
- Integrating the mitigation plan into review and updates of building codes
- Integrating the mitigation plan into the capital improvements plans/programs through identification of mitigation actions that require local funding

Opportunities to further integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the RHMC, individual county meetings, and the annual review process described herein. Although it is recognized that there are many possible benefits to integrating components of this Plan into other local planning mechanisms, the development and maintenance of this stand-alone Regional Hazard Mitigation Plan is deemed by the MEMA District 9

RHMC to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

MONITORING, EVALUATION, AND ENHANCEMENT

Periodic revisions and updates of the Hazard Mitigation Plan are required to ensure that the goals of the Plan are kept current, taking into account potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan is in full compliance with applicable federal and state regulations. Periodic evaluation of the Plan will also ensure that specific mitigation actions are being reviewed and carried out according to the Mitigation Action Plan.

The MEMA District 9 RHMC shall meet every year to evaluate the progress attained and to revise, where needed, the activities set forth in the Plan. The findings and recommendations of the RHMC shall be shared with interested municipal and county Board/Council members. The RHMC will also meet following any disaster events warranting a reexamination of the mitigation actions being implemented or proposed for future implementation. This will ensure that the Plan is continuously updated to reflect changing conditions and needs within the region. MEMA will be responsible for reconvening the RHMC for these reviews.

FIVE YEAR PLAN REVIEW

The Plan will be thoroughly reviewed by the RHMC every five years to determine whether there have been any significant changes in the region that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased exposure to hazards, an increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the necessary content of the Plan. During the 2023 HMP update, based on available data, no significant changes in development were noted within hazard prone areas.

The plan review provides MEMA District 9 county officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned. MEMA will be responsible for reconvening the RHMC and helping conduct the five-year review.

During the five-year plan review process, the following questions will be considered as criteria for assessing the effectiveness and appropriateness of the Plan:

- Do the goals address current and expected conditions?
- Has the nature or magnitude of risks changed?
- Are the current resources appropriate for implementing the Plan?
- Are there implementation problems, such as technical, political, legal or coordination issues with other agencies?
- Have the outcomes occurred as expected?
- Did County departments participate in the plan implementation process as assigned? With the five-year review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined herein. Upon completion of the review and update/amendment process, the MEMA District 9 Regional Hazard Mitigation Plan will be submitted to the State Hazard Mitigation Officer at MEMA for final review and approval in coordination with the Federal Emergency Management Agency (FEMA).

Because the plan update process can take several months to complete, and because Federal funding may be needed to update the plan, it is recommended that the five-year review process begin at the beginning of the third year after the plan was last approved. This will allow the participants in the MEMA District 9 Regional Hazard Mitigation Plan to organize to seek Federal funding if necessary and complete required plan update documentation before the plan expires at the end of the fifth year.

DISASTER DECLARATION

Following a disaster declaration, the MEMA District 9 Regional Hazard Mitigation Plan will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of MEMA to reconvene the RHMC and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

REPORTING PROCEDURES

The results of the five-year review will be summarized by the RHMC in the plan update and will include an evaluation of the effectiveness of the Plan and any required or recommended changes or amendments. The results will also include an evaluation of implementation progress for each of the proposed mitigation actions, identifying reasons for delays or obstacles to their completion along with recommendations as to whether and how to continue to pursue the action.

PLAN AMENDMENT PROCESS

In general, the RHMC agreed that any minor amendments suggested by a county or participating municipality would be automatically accepted into the plan as long as the amendment only impacted that jurisdiction. However, if the amendment proposed a large-scale change to the structure of the plan or impacted other jurisdictions, the following amendment process would need to be followed.

Upon the initiation of the amendment process, the MEMA District 9 counties will forward information on the proposed change(s) to all interested parties including, but not limited to, all directly affected County departments, residents, and businesses. Information will also be forwarded to MEMA. This information will be disseminated in order to seek input on the proposed amendment(s) for no less than a 45-day review and comment period.

At the end of the 45-day review and comment period, the proposed amendment(s) and all comments will be forwarded to the RHMC for final consideration. The RHMC will review the proposed amendment along with the comments received from other parties, and if acceptable, the committee will submit a recommendation for the approval and adoption of changes to the Plan.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered by the RHMC:

There are errors, inaccuracies, or omissions made in the identification of issues or needs in the Plan.
New issues or needs have been identified which are not adequately addressed in the Plan.
There has been a change in information, data, or assumptions from those on which the Plan is based.

Upon receiving the recommendation from the RHMC, and prior to adoption of the Plan Amendment, the participating jurisdictions may hold a public hearing, if deemed necessary. The governing bodies of each participating jurisdiction will review the recommendation from the RHMC (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, the governing bodies will take one of the following actions:

Adopt the proposed amendments as presented
Adopt the proposed amendments with modifications
Refer the amendments request back to the RHMC for further revision
Defer the amendment request back to the RHMC for further consideration and/or additional hearings

CONTINUED PUBLIC INVOLVEMENT

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

Public participation is an integral component to the mitigation planning process and will continue to be essential as this Plan evolves over time. As described above, significant changes or amendments to the Plan shall require a public hearing prior to any adoption procedures.

Other efforts to involve the public in the maintenance, evaluation, and revision process will be made as necessary. These efforts may include:

- Advertising meetings of the RHMC in local newspapers, public bulletin boards and/or County office buildings
- Designating willing and voluntary citizens and private sector representatives as official members of the RHMC
- Utilizing local media to update the public on any maintenance and/or periodic review activities taking place
- Utilizing the MEMA District 9 county websites to advertise any maintenance and/or periodic review activities taking place
- Keeping copies of the Plan in public libraries

Overall, the RHMC and participating counties will continue to provide outreach concerning mitigation through TV and other media as well as through outreach events such as local fairs or public events. In this way, the public will have continual interaction with the mitigation process and the efforts taken by local officials to implement mitigation.

ANNEX A: GEORGE COUNTY

This annex includes jurisdiction-specific information for George County and its participating municipalities. It consists of the following five subsections:

A.1 George County Community Profile
A.2 George County Risk Assessment
A.3 George County Vulnerability Assessment
A.4 George County Capability Assessment
A.5 George County Mitigation Strategy

GEORGE COUNTY COMMUNITY PROFILE

GEOGRAPHY AND THE ENVIRONMENT

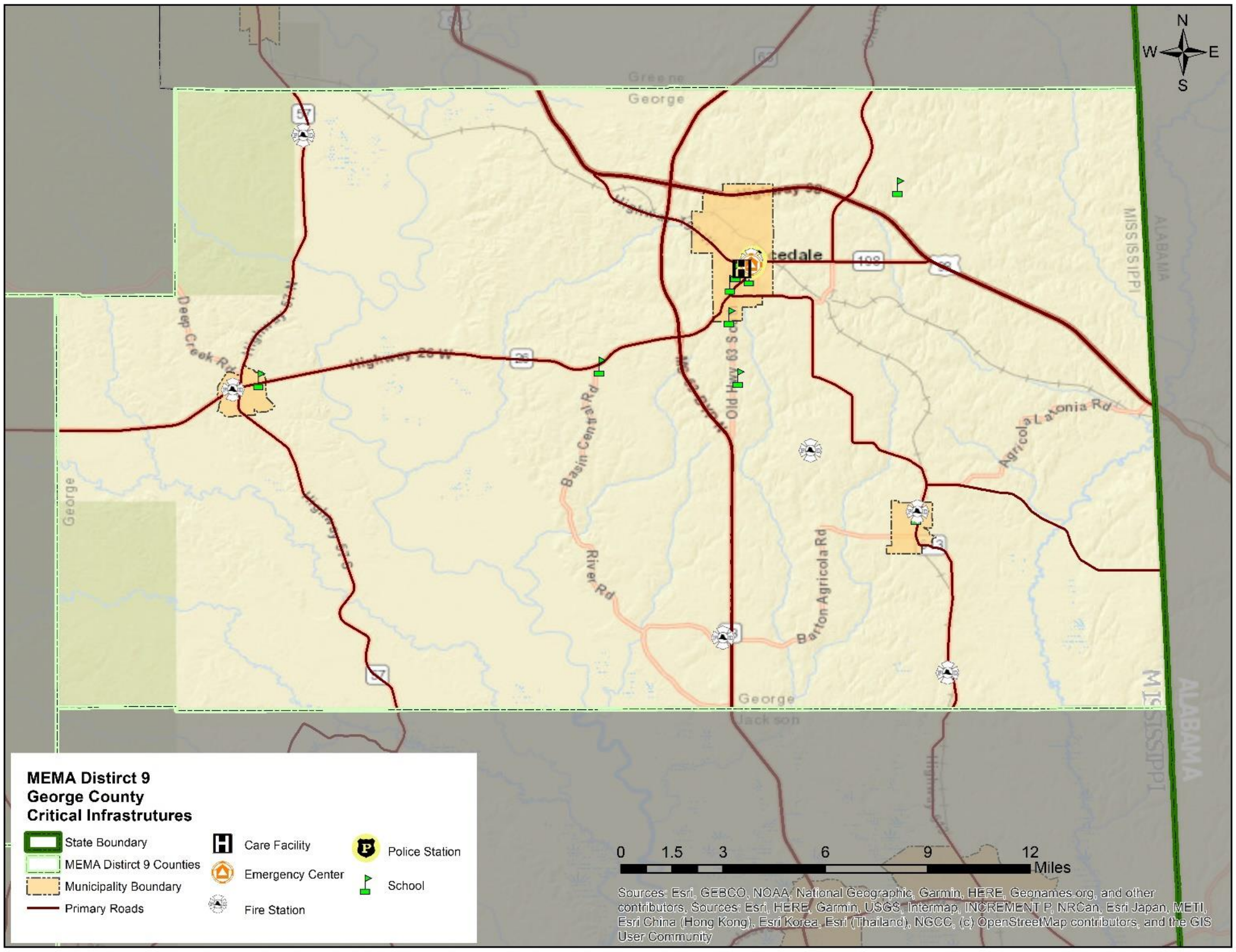
George County is located in southern Mississippi. It comprises one city, Lucedale, as well as many small unincorporated communities. An orientation map is provided as Figure A.1.

ANNEX A

George County is situated in the East Gulf Coastal Plain. It is made up of the gently rolling Pine Belt, also known as the "Piney Woods," and the coastal area called the Coastal Meadows or Terrace. The region has generally low topographic elevations and extensive tracts of marshy land. There are many rivers, creeks, bayous, and other natural drainage networks in the region which empty into the Gulf of Mexico. The total area of the county is 484 square miles, 5 square miles of which is water area.

George County enjoys four distinct seasons but the climate in the region is generally hot and humid compared to the rest of the United States given its latitude and location along the Gulf Coast. Precipitation is generally highest in winter months when the temperatures are moderately lower, but the likelihood of precipitation remains relatively constant throughout the year. Snowfall is rare but does occur. Summers in the region can become fairly hot with average highs in the nineties and lows in the seventies. The region is also often susceptible to turbulent weather when warm, wet air from the Gulf of Mexico is pushed up into the region to mix with cooler air coming down from across the continent which can result in severe weather conditions. This is particularly true in the spring when seasons are changing and diverse weather patterns interact. The region is also subject to hurricanes and tropical storms from June to October.

FIGURE A.1: GEORGE COUNTY ORIENTATION MAP



POPULATION AND DEMOGRAPHICS

Population counts from the U.S. Census Bureau for 1990, 2000,2010, and 2020 for the county and participating jurisdictions are presented in Table A.1.

TABLE A.1: POPULATION COUNTS FOR GEORGE COUNTY

Jurisdiction	2000 Census Population	2010 Census Population	2020 Population Cenus	% Change 2010-2020
George County	19,144	22,578	24,350	-7.8%
Lucedale	2,458	2,923	2,910	-0.4%

Source: United States Census Bureau, 2000, 2010, 2020 Census

TABLE A.2: DEMOGRAPHICS OF GEORGE COUNTY

Jurisdiction	White, Percent (2021)	Black or African American, Percent (2021)	American Indian or Alaska Native, Percent (2021)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2021)	Two or More Races, percent (2021)	Persons of Hispanic Origin, Percent (2021)*
George County	89.1%	8.0%	0.5%	0.7%	Z	1.6%	3.1%
Lucedale	64.9%	31.2%	0.3%	0.0%	0.0%	3.5%	1.4%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau, 2021 estimates

HOUSING
According to the 2010 US Census, there are 9,527 housing units in George County. Housing information for the county and one municipality is presented in Table A.3.

TABLE A.3: HOUSING CHARACTERISTICS OF GEORGE COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Housing Units (2020)	Median Home Value (2017-2021)
George County	7,513	9,330	10,320	$101,300
Lucedale	1,052	1,130	1,214	$96,000

Source: United States Census Bureau, 2000 and 2010 Census, 2021American Community Survey 5-Year Estimates

INFRASTRUCTURE
TRANSPORTATION

In George County, U.S. Highway 98 runs roughly northwest to southeast across allowing transportation in the northeastern part of the county. Mississippi Highway 57 and 63 both run north-south through the county and Mississippi 26 runs east-west.

There are no public-use airports in George County. The Gulfport-Biloxi International Airport, located in Harrison County, serves the county. This airport is served by five major airlines with direct flights to Atlanta, Charlotte, Dallas/Ft. Worth, and Houston as well as connections to hundreds of locations in the U.S. and worldwide.

In terms of other transportation services, one Class-I Major and one Class-III Local railway also serve the county.

UTILITIES

Electrical power in George County is mainly provided by electric power associations. Mississippi Power Company also provides power to some parts of the county.

CenterPoint Energy Resources is the natural gas supplier that serves George County.

Water and sewer service is provided by a number of different sources, but unincorporated areas often rely on septic systems and wells in George County.

COMMUNITY FACILITIES

There are a number of buildings and community facilities located throughout George County. According to the data collected for the vulnerability assessment (Section 6.4.1), there area total of 17 critical assets identified within George

County as part of the hazard mitigation plan update process. The identified assets consist of 1 emergency operations center (EOC), 6 fire stations, 1 medical facility, 1 police station, 1 Sheriff's department, 7 schools, , and located within the county.

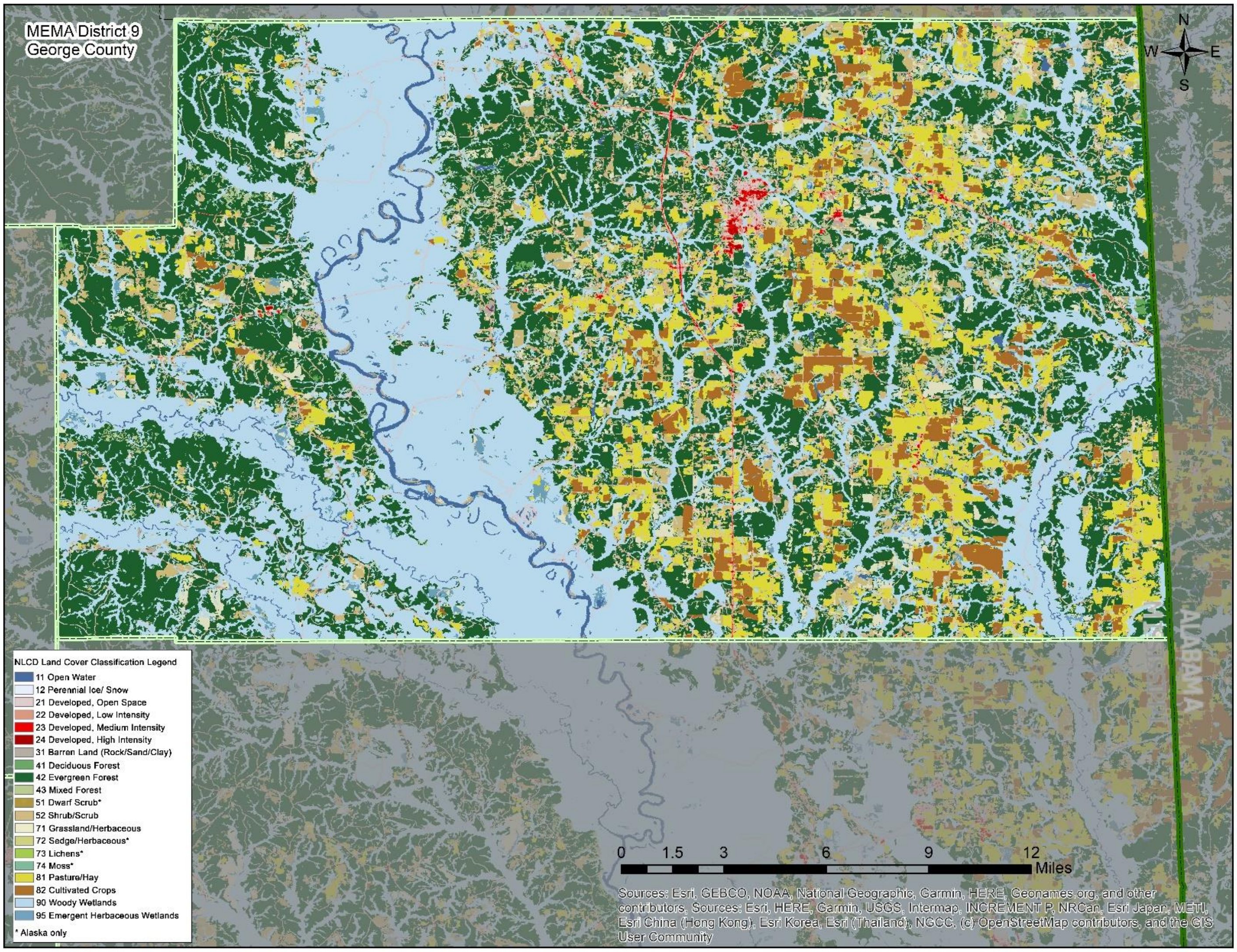
George County contains numerous local, state, and national parks and recreation areas, including the Mississippi Gulf Coast National Heritage Area and DeSoto National Forest. Golf courses and other recreational opportunities are also available in the county.

LAND USE

Many areas of George County are undeveloped or sparsely developed. There is one small incorporated municipality located in the county and a few unincorporated rural centers. There is a mix of protected lands, such as the DeSoto National Forest. Private lands are used for exurban housing, agriculture, and forestry. Consistent with its rural character, densities are very low and uses are not mixed, making motor vehicles the only viable mode for virtually all travel.

Local land use and associated regulations are further discussed in Section 7: Capability Assessment.

Figure A.2: George County Land Classification Map



EMPLOYMENT AND INDUSTRY

According to the 2019 American Community Survey (ACS), George County had an average annual employment of 9,658 workers and an average unemployment rate of 6.9 percent (compared to 4.2 percent for the state). In 2019, the average annual median household income in George County was $47,292 compared to $45,081 in the state of Mississippi.

GEORGE COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: Hazard Identification as they pertain to George County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: Hazard Profiles.

National Risk Index Scores:
The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather. Because not all hazards apply to the County, only those with a defined risk to the County are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability and Community Resilience, to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions but cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision-makers as they develop risk reduction strategies.

Social Vulnerability:
Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Per the FEMA National Risk Index, George County has a Social Vulnerability Rating of **"Very High"** and a Social Vulnerability Score of **"80.9"** (FEMA, 2023).

The "Social Vulnerability Score" and "Rating" represent the relative level of a community's social vulnerability compared to all other communities at the same level. A community's Social Vulnerability Score is also proportional to a community's risk. A higher Social Vulnerability Score results in a higher Risk Index Score (FEMA, 2023).

Social vulnerability is also one of five components included in the formulation of the "National Risk Index Score" in addition to community resilience, estimated annual loss (EAL) based on exposure, annualized frequency, and historic Loss Ratio (HLR) factors (FEMA, 2023).

Table A.4: Social Vulnerability FEMA NRI Score

GEORGE COUNTY, MS FEMA NRI SOCIAL VULNERABILITY SCORE	
Social Vulnerability Score	Social Vulnerability Rating
80.9	Very High
Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).	
Source: hazards.fema.gov/nri/social-vulnerability	

Community Resilience:
Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Table A.5:. Community Resilience FEMA NRI Score

GEORGE COUNTY, MS FEMA NRI COMMUNITY RESILIENCE SCORE

Community Resilience Score	Community Resilience Rating
21.1	Relatively Low
Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).	
Source: hazards.fema.gov/nri/community-resilience	

Expected Annual Loss:

Table A.6: Expected Annual Loss FEMA NRI Score (All Natural Hazards)

EXPECTED ANNUAL LOSS FOR GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS SCORE	
Expected Annual Loss Score	Expected Annual Loss Rating
84.2	Relatively Moderate
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio).	
Source: hazards.fema.gov/nri/expected-annual-loss	

FEMA National Risk Index Score:

Table A.7: Overall FEMA NRI Score

FEMA OVERALL NRI SCORE FOR GEORGE COUNTY,MS FEMA OVERALL NRI SCORE	
FEMA Overall NRI Score	FEMA Overall NRI Rating
87.1	Relatively Moderate
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience. (Expected Annual Loss X Social Vulnerability / Community Resilience = Risk Index).	
Source: hazards.fema.gov/nri/determining-risk	

George County Overall Risk Scores:

The following tables represent the new overall risk scores for George County based on the described methodology above. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores. FEMA NRI Scores were used as appropriate and applicable to inform the analysis.

Table A.8: 2023 Hazard Risk Scores George County

Hazard Event	Probability	Consequence				Total Risk Score (Probability x Consequence)
	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Factors	Sum of Weighted Impact Factors	Consequence Score	
Dam and Levee Failure	0	0	1	-	1	0
Erosion	2	0	2	8	10	13
Flood	3	8	12	31	51	77
Storm Surge	0	0	0	-	-	0
Drought	2	8	11	16	35	39
Lightning	3	7	11	19	37	59
Wildfire	3	8	6	21	35	56
Earthquake	0	0	3	12	15	0
Extreme Cold	1	1	5	18	24	16
Extreme Heat/Heat Wave	3	8	10	21	39	61

Hailstorm	2	1	2	10	13	17
Hurricane and Tropical Storm	2	12	17	36	65	67
Severe Thunderstorm/High Wind	3	11	16	28	55	82
Tornado	3	5	12	34	51	77
Winter Weather	2	0	5	24	29	33
Climate Change/Sea Level Rise	1	0	3	13	16	11
Hazardous Materials/ Transportation Incident	1	4	6	19	29	18
Infectious Disease	1	8	8	21	37	23

TableA.9: Hazard Risk Scores Legend

Probability Factor		Sum of Weighted Extent Factors		Sum of Weighted Vulnerability Factors		Sum of Weighted Impact Factors		Consequence Score		Total Risk Score	
1	Low (L)	0–6	Low (L)	0–6	Low (L)	0–12	Low (L)	0–25	Low (L)	0–24	Low (L)
2	Medium (M)	7–12	Medium (M)	7–12	Medium (M)	13–26	Medium (M)	26–50	Medium (M)	25–59	Medium (M)
3	High (H)	13–18	High (H)	13–18	High (H)	27–39	High (H)	51–75	High (H)	60–100	High (H)

** The **Legend** – specifically the assignment of low, medium, and high—provides an additional means to qualitatively assess the probability factor, sum of weighted factors, and the total risk scores for each hazard.*

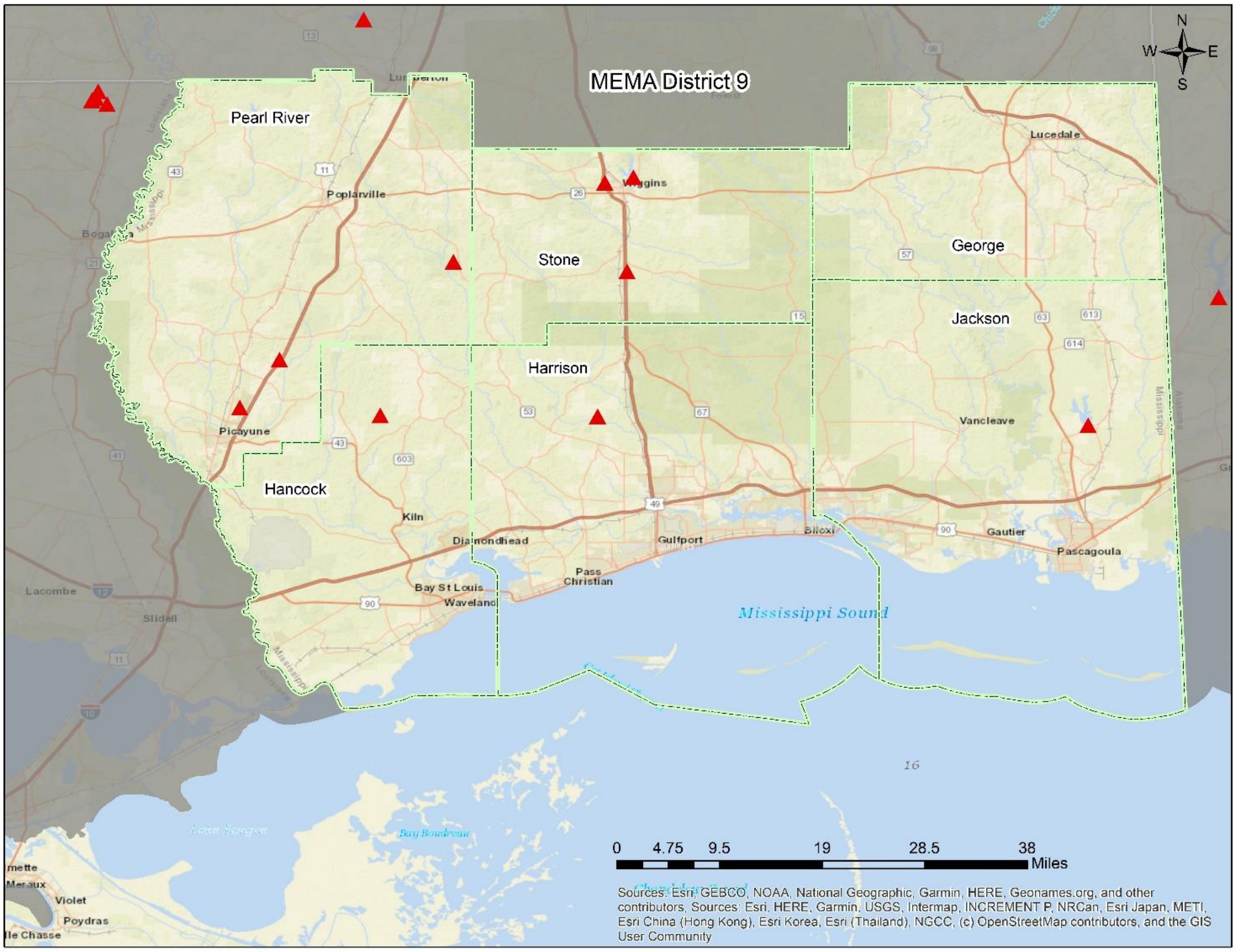
*The **Consequence Score** represents the sum of the Extent, Vulnerability, and Impact Factors.*

*The **Total Risk Score** is a measure of Probability and Consequence.*

FLOOD-RELATED HAZARDS
DAM AND LEVEE FAILURE
LOCATION AND SPATIAL EXTENT

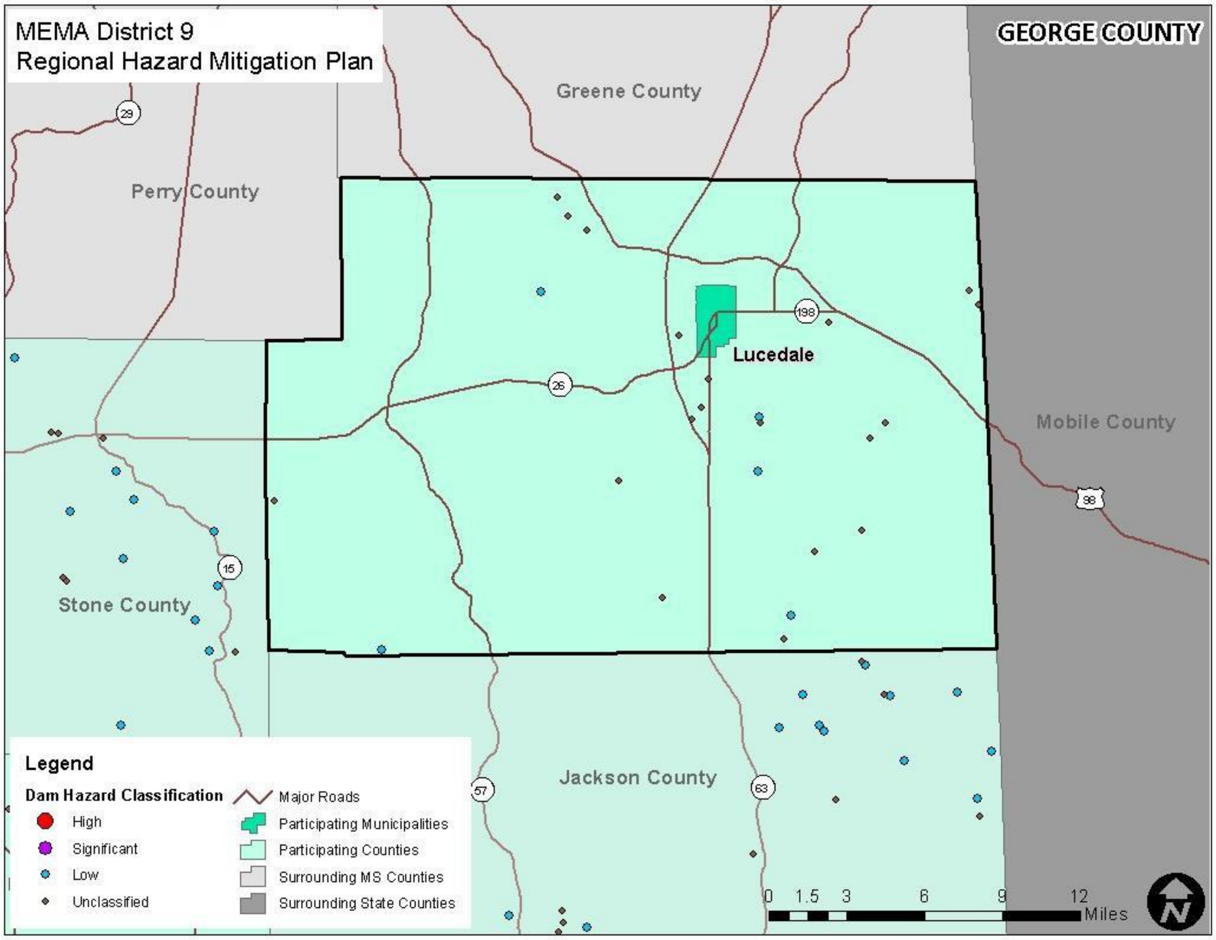
According to the Mississippi Department of Environmental Quality, there are no high hazard dams in George County (Table A.10).[1] Figure A.3 and Figure A.4 show the location of high hazard dams as well as mapped dam inundation areas located nearby.

FIGURE A.3: GEORGE COUNTY HIGH HAZARD DAM LOCATIONS



Source: United State Corps of Engineers

FIGURE A.4: GEORGE COUNTY DAM INUNDATION AREAS



Source: Mississippi Department of Environmental Quality

TABLE A.10: GEORGE COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential
George County	
NONE	N/A

Source: Mississippi Department of Environmental Quality

HISTORICAL OCCURRENCES

According to the Mississippi State Hazard Mitigation Plan, there have been no dam failures reported in George County (Table A.11). However, several breach scenarios in the region could be catastrophic.

TABLE A.11: GEORGE COUNTY DAM FAILURES (1982-2022)

Date	County	Structure Name	Cause of Failure
None reported	George	--	--

Source: Mississippi State Hazard Mitigation Plan

PROBABILITY OF FUTURE OCCURRENCES

Given the current dam inventory, lack of High Hazard dams and historic data, a dam breach is possible (between 1 and 10 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

The FEMA NRI does not assess high-hazard dam failure events.

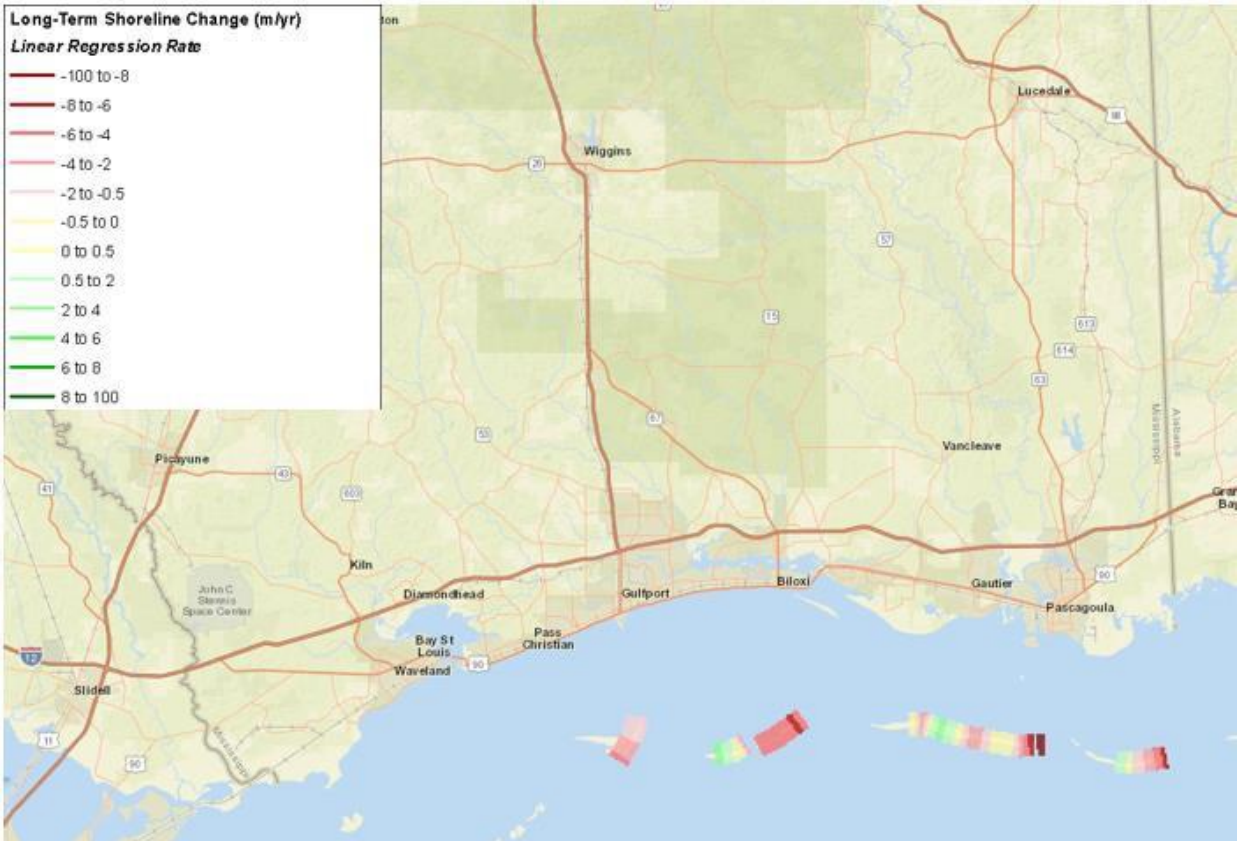
EROSION

LOCATION AND SPATIAL EXTENT

For the most part, major erosion in the MEMA District 9 Region is typically caused by coastal tides, ocean currents, and storm events. Although the region also experiences riverine erosion in many of its inland areas, including George County, these are of somewhat less concern than coastal erosion areas which historically have had larger impacts. Unlike inland areas, where the soil has greater organic matter content, coastal soils are mainly composed of fine grained particles such as sand. This makes coastal soils much more susceptible to erosion. Although some areas of the MEMA District 9 Region coast are protected and natural erosion processes are allowed to take place for the most part, many areas near where development has occurred are especially susceptible.

At this time, there is limited data available on localized areas of erosion. Most of the information collected by the United States Geological Survey (USGS) is focused on the barrier islands that are just off the coast of the mainland. The long-term shoreline change for the barrier islands as calculated by the USGS can be found in Figure A.5 It should be noted that many areas of the coast are protected through the use of structural techniques. Also, a great deal of renourishment activities are carried out along the mainland coastal communities.

FIGURE A.5: LONG-TERM SHORELINE CHANGE (M/YR) IN THE MEMA DISTRICT 9 REGION



Source: United States Geological Survey

HISTORICAL OCCURRENCES

Several sources were vetted to identify areas of erosion in George County. This includes searching local newspapers, interviewing local officials, and reviewing previous hazard mitigation plans. Because dramatic, short-term erosion tends to take place after major storm events such as hurricanes, flooding, or storm surge, the erosion events often correspond directly with those events. Conversely, with long- term erosion, it is difficult to identify a specific historic occurrence because these events are by nature occurring at all times over a long period at a very gradual rate. Therefore, long-term historic erosion events cannot be confined to a specific timeframe or occurrence.

PROBABILITY OF FUTURE OCCURRENCES

Erosion remains a natural, dynamic, and continuous process for George County, and it will continue to occur. The annual probability level assigned for erosion is likely (between 10 and 100 percent annually).

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

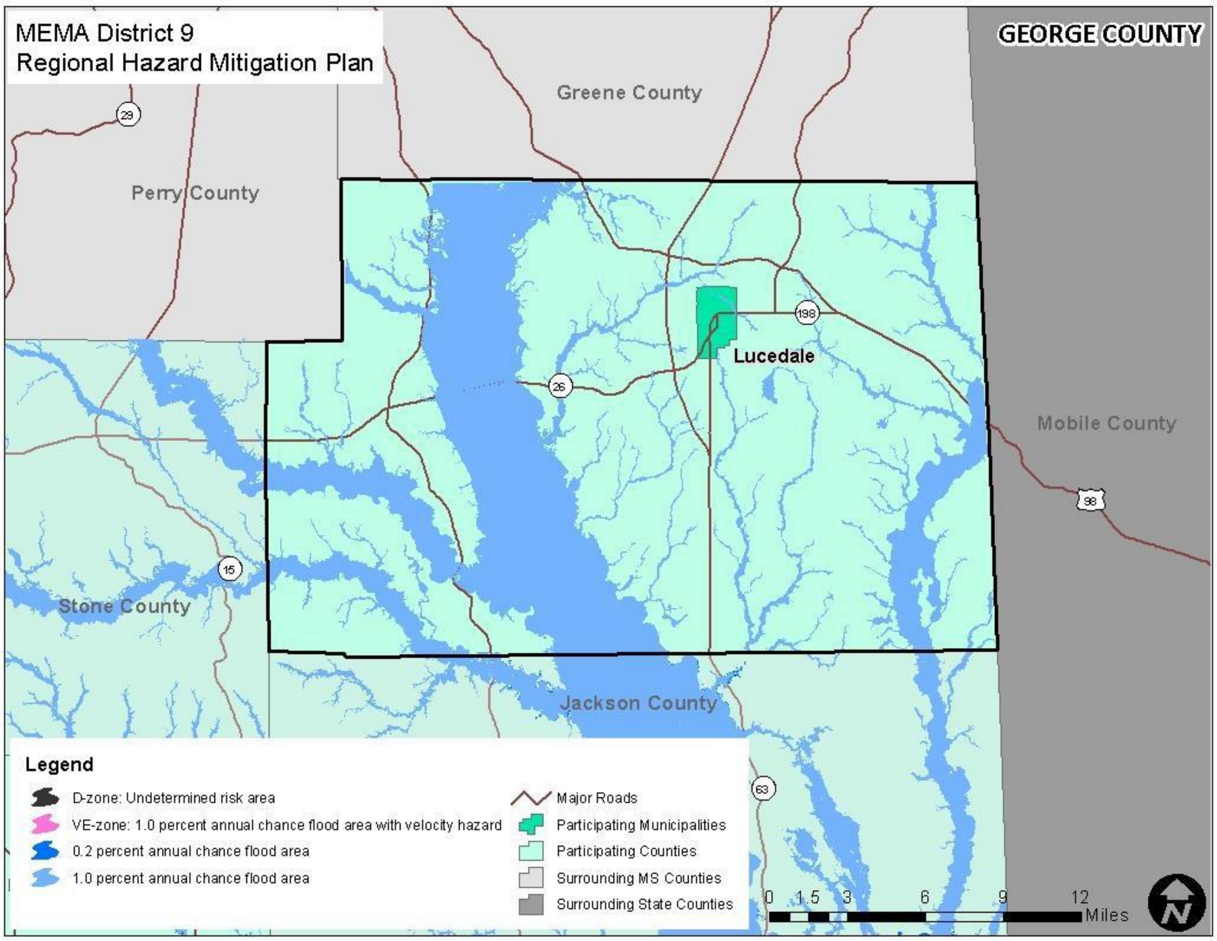
The FEMA NRI does not assess high-hazard dam failure events.

FLOOD

LOCATION AND SPATIAL EXTENT

There are areas in George County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM). This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevations), Zone VE (1-percent annual chance floodplain with additional hazards due to storm-induced velocity wave action), Zone X500 (0.2-percent annual chance floodplain), and Zone D (undetermined risk area). Figure A.6 illustrates the location and extent of currently mapped special flood hazard areas for the county based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

FIGURE A.6: SPECIAL FLOOD HAZARD AREAS IN GEORGE COUNTY



Source: Federal Emergency Management Agency

Figure A.7: George County National Flood Hazard Layer Map (No Facilities)

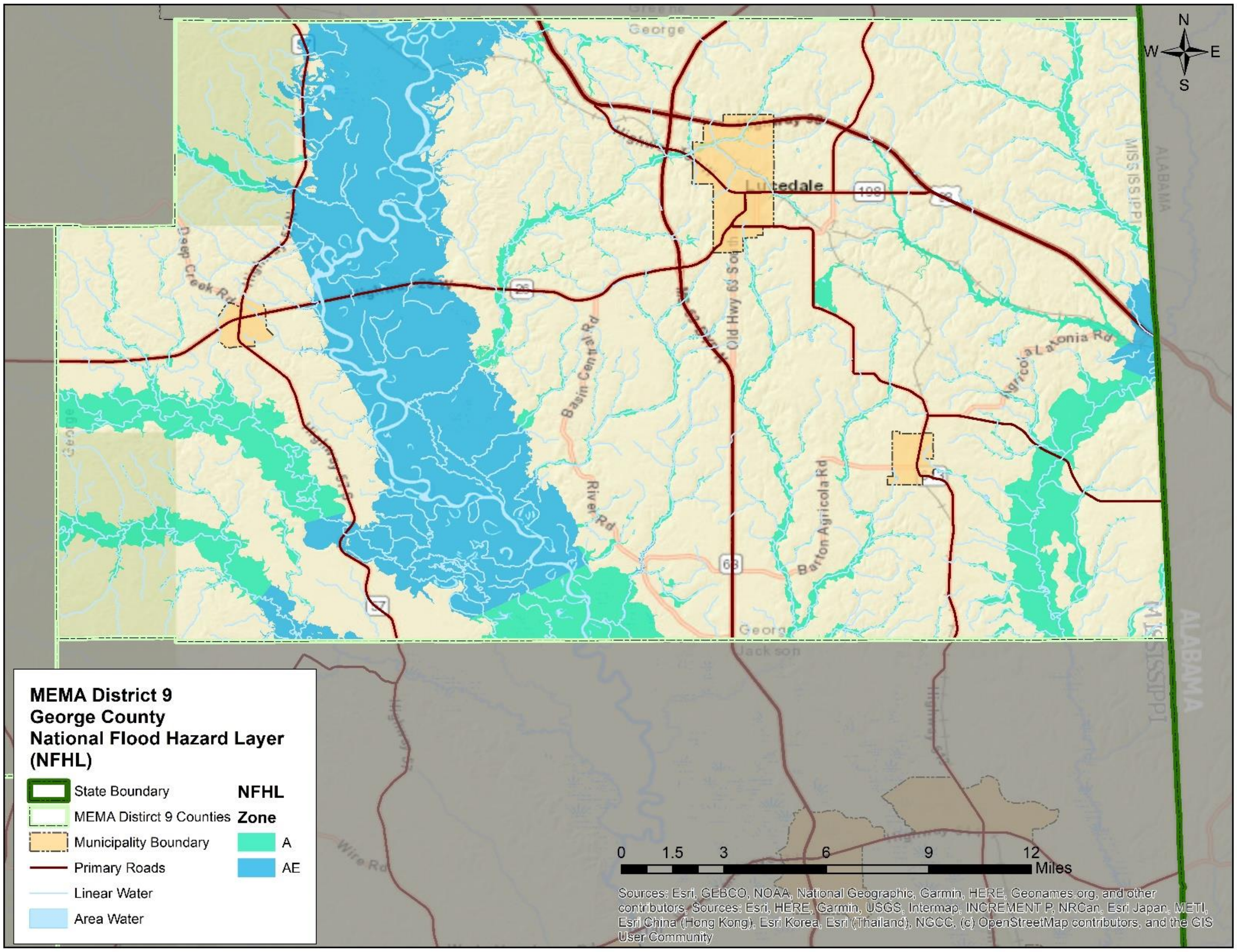
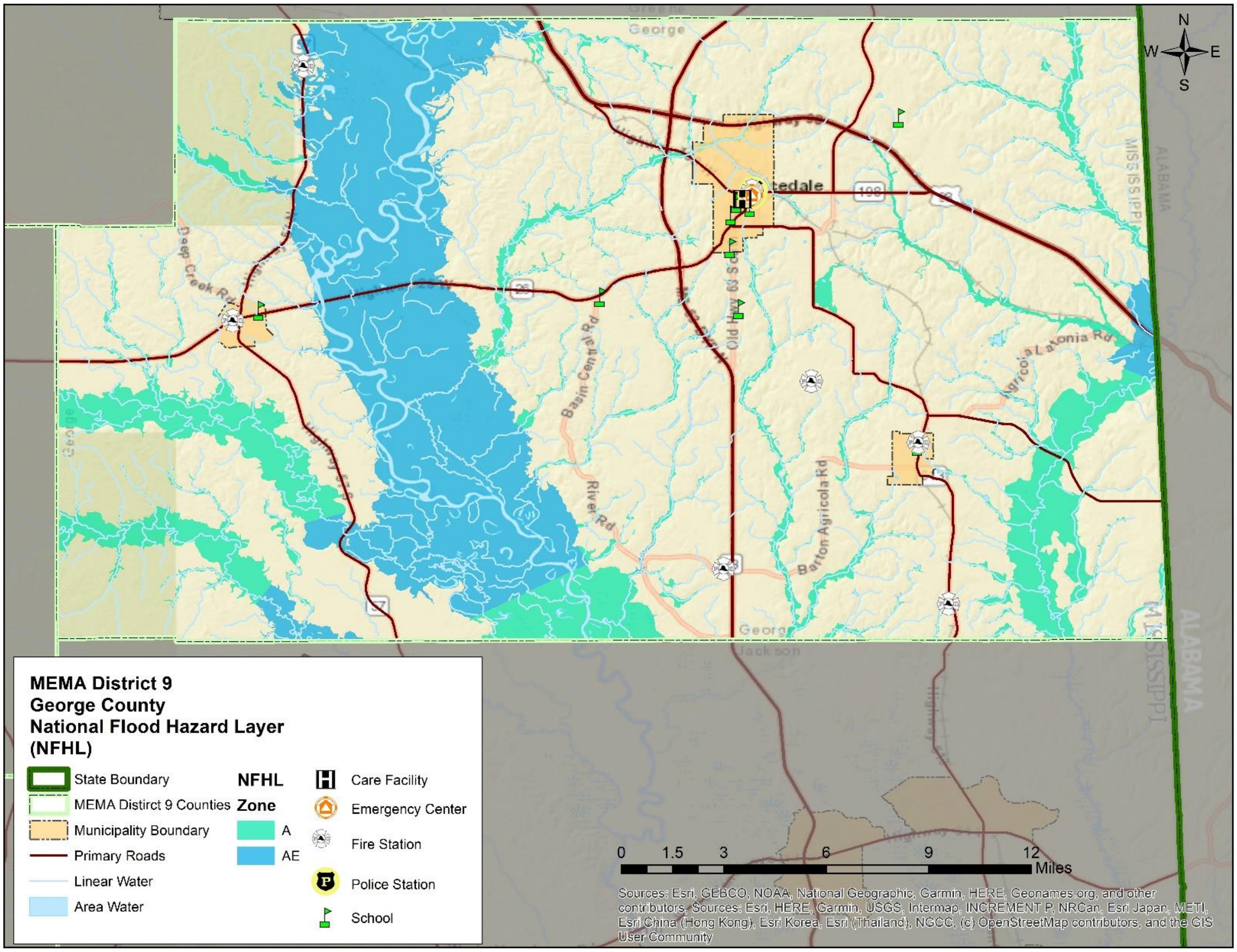


Figure A.8: George County National Flood Hazard Layer Map (Facilities)



HAZUS 100-year Flood Analysis

Hazus estimates that there are 9,819 buildings in the region which have an aggregate total replacement value of 1,575 million dollars.

Table A.12: 100-year Flooding Building Exposure by Occupancy Type for the Scenario

Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	304,509	89.6%
Commercial	13,043	3.8%
Industrial	6,099	1.8%
Agricultural	2,128	0.6%
Religion	7,460	2.2%
Government	2,751	0.8%
Education	3,785	1.1%
Total	**339,775**	**100%**

Pie Chart 1: 100-year Flooding Building Exposure by Occupancy Type for the Scenario

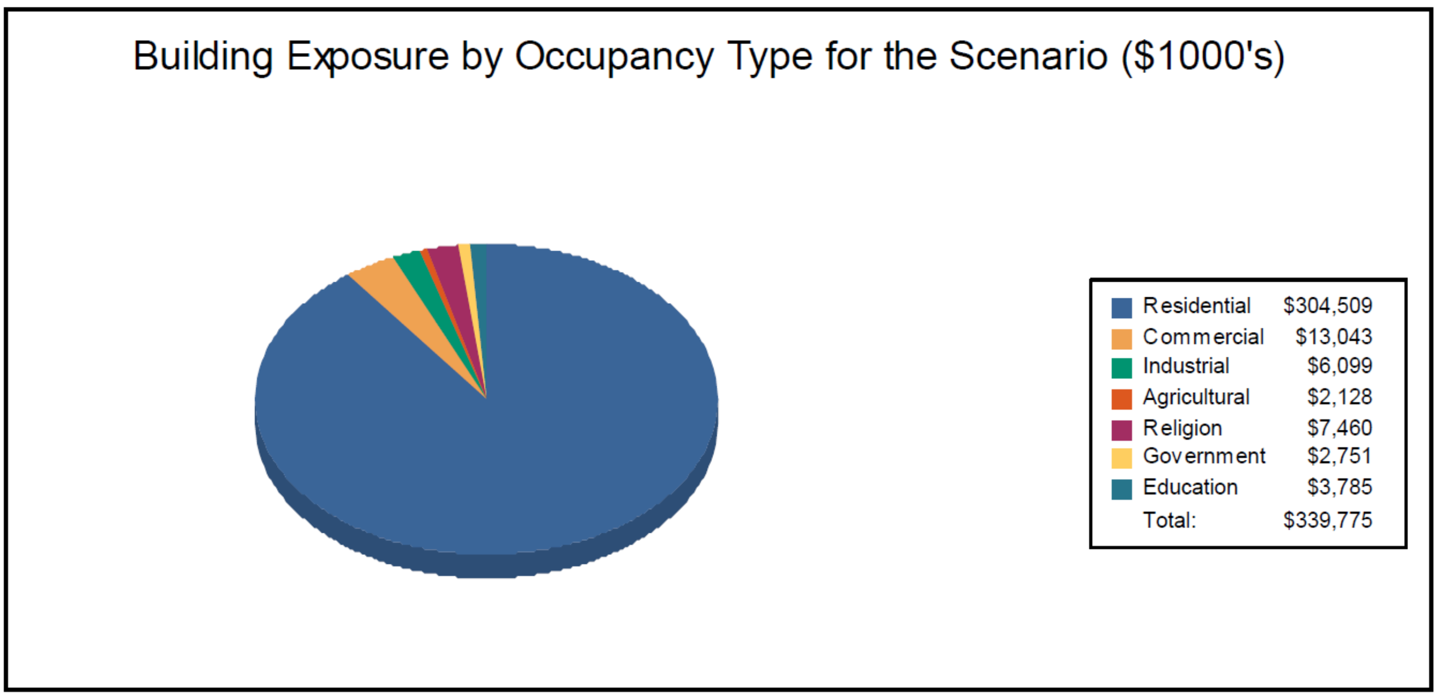


Figure A.9: George County HAZUS 100-year Flood Scenario (No Facilities)

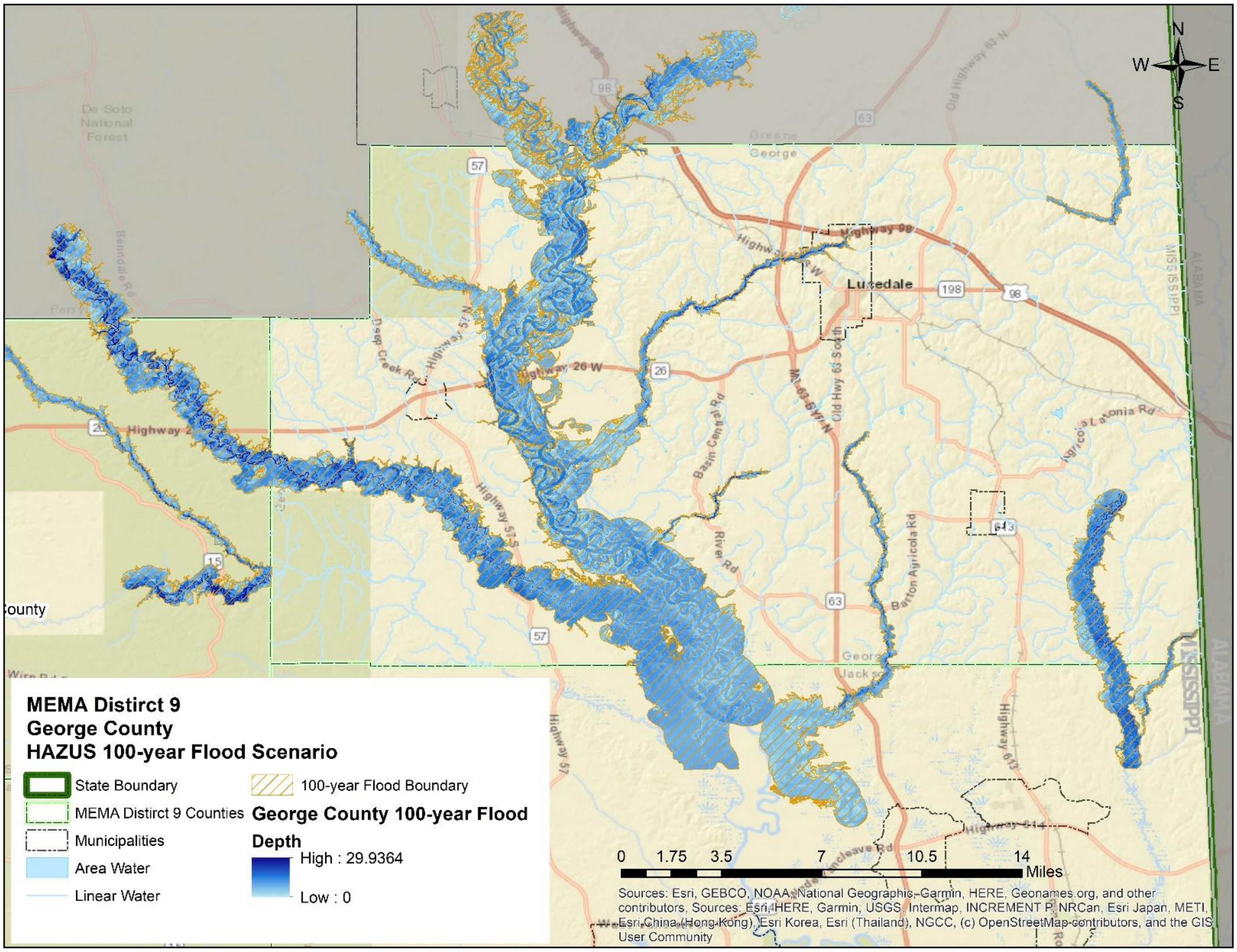
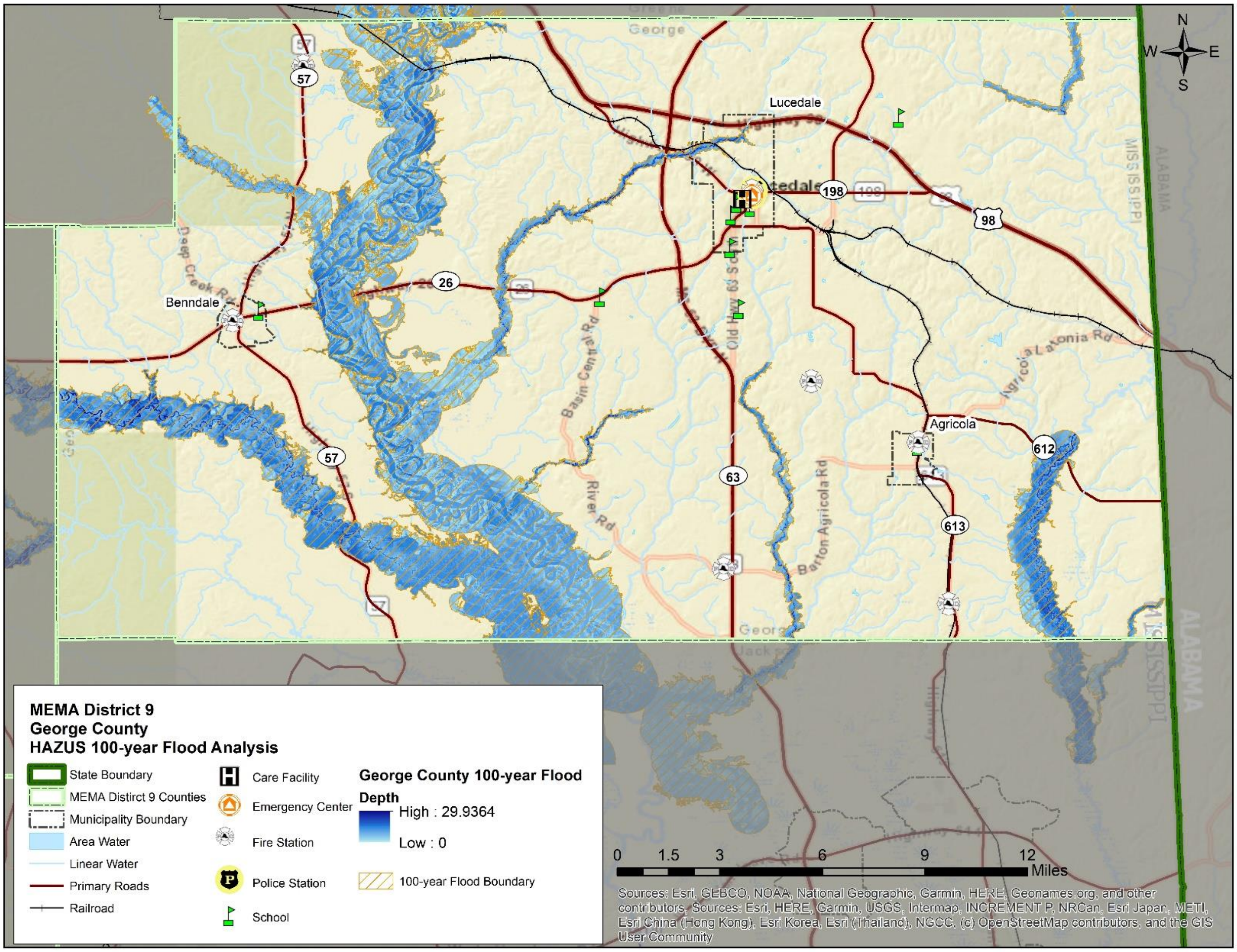


Figure A.10: George County HAZUS 100-year Flood Scenario (Facilities)



HAZUS General Building Stock

Hazus estimates that about 86 buildings will be at least moderately damaged. This is over 62% of the total number of buildings in the scenario. There are an estimated 4 buildings that will be completely destroyed.

HAZUS Economic Loss

The total economic loss estimated for the flood is 34.19 million dollars, which represents 10.06 % of the total replacement value of the scenario buildings.

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 19.62 million dollars. 43% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 61.66% of the total loss. Table 13 below provides a summary of the losses associated with the building damage.

HISTORICAL OCCURRENCES

Floods were at least partially responsible for five disaster declarations in George County in 1974, 1980, 1990, 1991, and 2016. Information from the National Center for Environmental Information (NCEI) was used to ascertain additional historical flood events. The (NCEI) reported a total of 31 events in George County since 1998. These events accounted for approximately $2,349,000 in property damage in the county. Based on historic occurrences, George County has experienced individual flood events ranging up to 8-12'' of rainfall from a single event with rainfall rates of up to 2'' per hour. Based on damage estimates flood depths range from a few inches to feet of water within floodways, for specific flood depths additional analyses is required through hydrologic and hydraulic studies. A summary of these events is presented in Table A.13. Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in Table A.14.

TABLE A.13: SUMMARY OF FLOOD OCCURRENCES IN GEORGE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Lucedale	6	0/0	$5,000	$208
Unincorporated Area	25	3/7	$2,343,618	$97,651
GEORGE COUNTY TOTAL	31	0/0	$2,348,618	$97,859

Source: National Center for Environmental Information

TABLE A.14: HISTORICAL FLOOD EVENTS IN GEORGE COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Lucedale				
LUCEDALE	1/31/2008	Flash Flood	0/0	$0
LUCEDALE	3/28/2009	Flash Flood	0/0	$0
LUCEDALE	2/4/2010	Flash Flood	0/0	$0
LUCEDALE	5/1/2013	Flash Flood	0/0	$0
LUCEDALE	5/1/2013	Flash Flood	0/0	$0
LUCEDALE	3/11/2016	Flash Flood	0/0	$5,000
Unincorporated Area				
COUNTYWIDE	9/28/1998	Flash Flood	0/0	$0
COUNTYWIDE	3/3/2001	Flash Flood	0/0	$20,400
CENTRAL PORTION	10/27/2002	Flash Flood	0/0	$0
COUNTYWIDE	10/28/2002	Flash Flood	0/0	$0
COUNTYWIDE	10/28/2002	Flash Flood	0/0	$0
COUNTYWIDE	12/31/2002	Flash Flood	0/0	$0
COUNTYWIDE	6/30/2003	Flash Flood	0/0	$0
SOUTHWEST PORTION	5/12/2004	Flash Flood	0/0	$0
SOUTH PORTION	4/1/2005	Flash Flood	0/0	$0
COUNTYWIDE	7/6/2005	Flash Flood	0/0	$0

COUNTYWIDE	8/29/2005	Flash Flood	0/0	$0
BENNDALE	10/22/2007	Flash Flood	0/0	$0
MERRILL	4/5/2008	Flash Flood	0/0	$0

Location	Date	Type	Deaths/Injuries	Property Damage*
LATONIA	9/1/2008	Flash Flood	0/0	$2,237
AGRICOLA	8/10/2010	Flash Flood	0/0	$0
BENNDALE	3/9/2011	Flash Flood	0/0	$0
BASIN	8/29/2012	Flood	0/0	$0
AGRICOLA	8/29/2012	Flash Flood	0/0	$10,490
LATONIA	8/29/2012	Flash Flood	0/0	$10,490
BEXLEY	6/22/2017	Flash Flood	0/0	$0
RUBLE	4/14/2018	Flash Flood	0/0	$500,000
BASIN	5/11/2019	Flash Flood	0/0	$0
AGRICOLA	6/19/2021	Flash Flood	0/0	$0
BENNDALE	8/30/2021	Flash Flood	3/7	$1,800,000
EVANSTON	2/03/2022	Flash Flood	0/0	$0

*All damage may not have been reported.
Source: National Centers for Environmental Information

HISTORICAL SUMMARY OF INSURED FLOOD LOSSES

According to FEMA flood insurance policy records as of October 2016, there have been 43 flood losses reported in George County through the National Flood Insurance Program (NFIP) since 1978, totaling almost $397,000 in claims payments. A summary of these figures for the county is provided in Table A.15. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in George County were either uninsured, denied claims payment, or not reported. During the 2022 HMP update process updated NFIP/Repetitive Loss was data was requested; however, no new data was made available. The 2016 data is considered best available data for the plan update. With a lack of data provided via FEMA the National Resource Defense Council (NRDC) was utilized to provide unofficial NFIP/RL data. Based on data available via the (NRDC), George County has experienced a total of 76 NFIP claims totaling $432,809 in payments.
Losing Ground: Severe Repetitive Flooding in the United States (nrdc.org)

TABLE A.15: (Official) SUMMARY OF INSURED FLOOD LOSSES IN GEORGE COUNTY

Location	Number of Policies	Flood Losses	Claims Payments
Lucedale	10	1	$385,792
Unincorporated Area	112	42	$11,000
GEORGE COUNTY TOTAL	122	43	$396,792

Source: National Flood Insurance Program

REPETITIVE LOSS PROPERTIES

According to the Mississippi Emergency Management Agency, there are three non-mitigated repetitive loss properties located in George County, which accounted for seven losses and almost $133,000 in claims payments under the NFIP. The average claim amount for these properties is $18,940. All three properties are single family. Without mitigation, these properties will likely continue to experience flood losses. Table A.16 presents detailed information on repetitive loss properties and NFIP claims and policies for George County.

TABLE A.16: REPETITIVE LOSS PROPERTIES IN GEORGE COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Lucedale	0	--	0	$0	$0	$0	$0
Unincorporated Area	3	3 single family	7	$101,381	$31,200	$132,581	$18,940
GEORGE COUNTY TOTAL	3		7	$101,381	$31,200	$132,581	$18,940

Source: Federal Emergency Management Agency, National Flood Insurance Program

PROBABILITY OF FUTURE OCCURRENCES

Flood events will remain a threat in George County, and the probability of future occurrences will remain highly likely (100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figure above, which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain). Further, as described in other hazard profiles, it is highly likely that George County will continue to experience inland flooding associated with large tropical storms and hurricanes.

It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county. For example, the western half of the county has more floodplain and thus a higher risk of flood than the rest of the county. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

It should also be noted that anticipated sea level rise will increase the probability and intensity of future tidal flooding events in years to come. Rising sea level over time will shorten the return period (increasing the frequency) of significant flood events. This hazard is discussed elsewhere in this section.

FEMA NRI Expected Annual Loss Estimates

Table A.17: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR FLOODING EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1	0.01	$123,404	$28,270	$3,827	$155,502	32.4	Very Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table A.18: George County Hazard Specific Risk Index Table

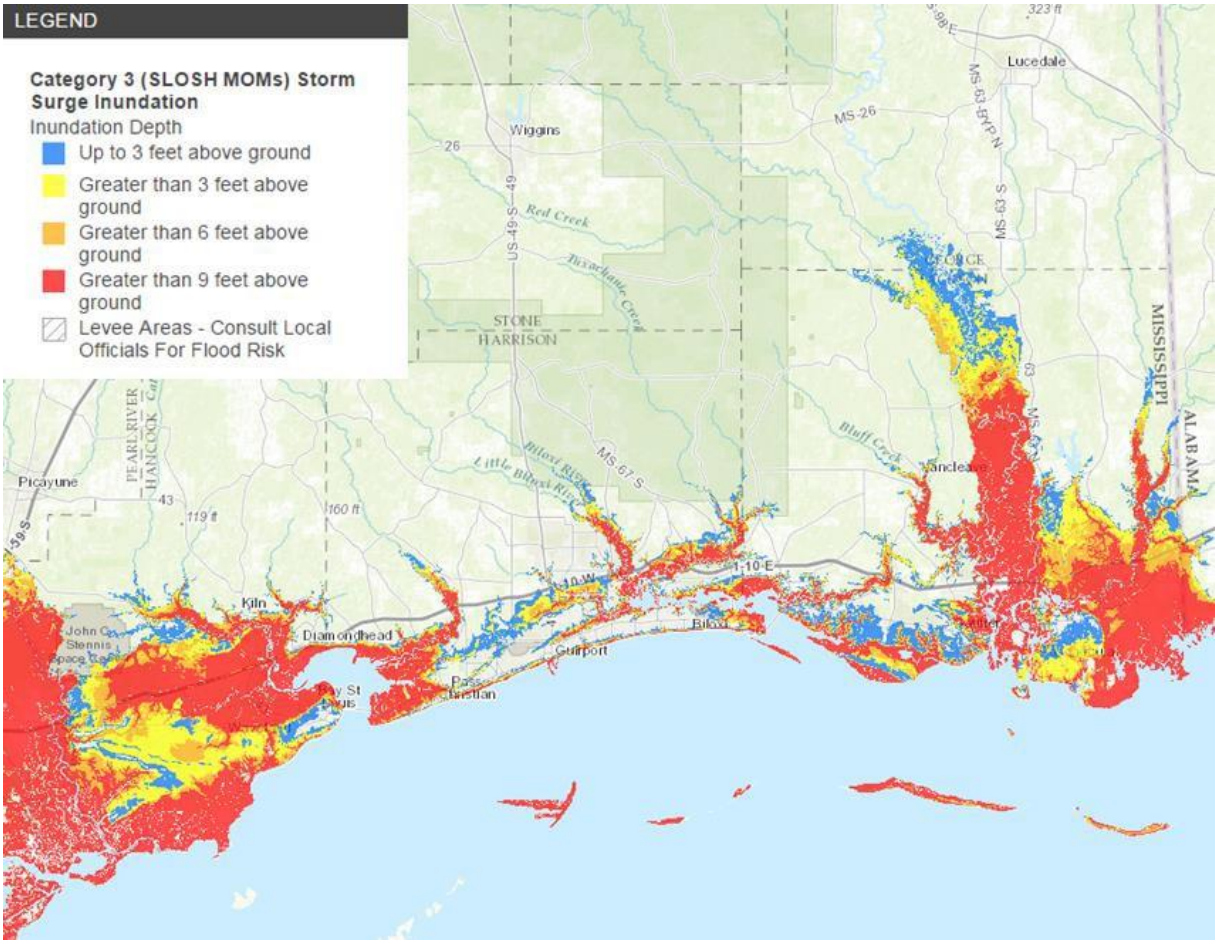
GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – FLOODING	
Risk Index Score	Risk Index Rating
33.4 / 100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

STORM SURGE

LOCATION AND SPATIAL EXTENT

There is a small area in George County that is subject to potential storm surge inundation as modeled and mapped by the National Oceanic and Atmospheric Administration (NOAA). Figure A.11 illustrates hurricane storm surge inundation zones based on a Category 3 storm. The illustration is derived from geo- referenced SLOSH (Sea, Lake, and Overland Surge from Hurricanes) data produced by the USACE in coordination with NOAA. SLOSH is a modeling tool used to estimate storm surge for coastal areas resulting from historical, hypothetical, or predicted hurricanes taking into account maximum expected levels for pressure, size, forward speed, track, and winds. Therefore, the SLOSH data is best used for defining the potential maximum surge associated with various storm intensities for any particular location. As shown in the figure, a small area in southern George County is at risk to storm surge inundation. Inland areas may also experience substantial flooding during a storm event.

FIGURE A.11: STORM SURGE RISK AREAS IN THE MEMA DISTRICT 9 REGION



Source: NOAA

HISTORICAL OCCURRENCES

According to the National Centers for Environmental Information, no storm surge events have been reported for George County since 1996. A summary of these events is presented in Table A.19. Detailed information on the recorded storm surge events can be found in Table A.20.

TABLE A.19: SUMMARY OF STORM SURGE EVENTS IN GEORGE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Lucedale	0	0/0	$0	$0
Unincorporated Area	0	0/0	$0	$0
GEORGE COUNTY TOTAL	0	0/0	$0	$0

Source: National Center for Environnemental Information

TABLE A.20: HISTORICAL STORM SURGE EVENTS IN GEORGE COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Lucedale				
None reported	--	--	--	--
Unincorporated Area				
None reported	--	--	--	--

Source: National Center for Environnemental Information

PROBABILITY OF FUTURE OCCURRENCES

It is possible (between 1 and 10 percent annual probability) that George County will experience storm surge associated with large tropical storms, hurricanes, and squalls combined with high tides. As noted in the preceding section (under Flood), anticipated sea level rise will increase the probability and intensity of future storm surge events in years to come. This rise in sea level will not only increase the probability and intensity of tidal flooding events but will also contribute to the loss of coastal wetlands and erosion of sand beaches that act as protective buffers against storm surge events.

FEMA NRI Expected Annual Loss Estimates

Table A.21: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR COASTAL FLOODING/STORM SURGE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0 Events/year	0.00	$113	$85	N/A	$197	24.1	Very Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table A.22: George County Hazard Specific Risk Index Table

GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – COASTAL FLOODING/STORM SURGE	
Risk Index Score	Risk Index Rating
21.1/ 100	Very Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

FIRE-RELATED HAZARDS

DROUGHT

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that George County would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment but may exacerbate wildfire conditions.

HISTORICAL OCCURRENCES

According to the U.S. Drought Monitor, George County had drought levels of Severe or worse in 8 of the last 22 years (January 2000-October 2022). Table A.23 shows the most severe drought classification for each year, according to U.S. Drought Monitor classifications. It should be noted that the U.S. Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

TABLE A.23: HISTORICAL DROUGHT OCCURRENCES IN GEORGE COUNTY

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

	George County
2000	EXCEPTIONAL
2001	MODERATE
2002	SEVERE

	George County
2003	ABNORMAL
2004	MODERATE
2005	ABNORMAL
2006	EXTREME
2007	SEVERE
2008	ABNORMAL
2009	MODERATE
2010	EXTREME
2011	EXCEPTIONAL
2012	SEVERE
2013	MODERATE
2014	SEVERE
2015	MODERATE
2016	MODERATE
2017	NONE
2018	NONE
2019	NONE
2020	NONE
2021	NONE
2022	NONE

Source: United States Drought Monitor

No anecdotal information was available from the National Centers for Environmental Information on droughts in George County.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that George County has a probability level of likely (between 10 and 100 percent annual probability) for future drought events. However, the extent (or magnitude) of drought and the amount of geographic area covered by drought, varies with each year. Historic information indicates that there is a much lower probability for extreme, long-lasting drought conditions.

FEMA NRI Expected Annual Loss Estimates

Table A.24: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR DROUGHT EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
15 events per year	NA	NA	NA	$15,214,192	$15,214,192	63.4	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table A.25: George County Hazard Specific Risk Index Table

GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – DROUGHT	
Risk Index Score	**Risk Index Rating**
64.9 / 100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

LIGHTNING

LOCATION AND SPATIAL EXTENT

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of George County is uniformly exposed to lightning.

HISTORICAL OCCURRENCES

According to the National Centers for Environmental Information, there have been five recorded lightning events in George County since 1996. These events resulted in almost $201,000 in damages. Furthermore, lightning has caused one fatality in the county. A summary of these events is presented in Table A.26. Detailed information on historical lightning events can be found in Table A.27.

It is certain that more than five events have impacted the county. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE A.26: SUMMARY OF LIGHTNING OCCURRENCES IN GEORGE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Lucedale	3	0/0	$186,563	$7176
Unincorporated Area	2	1/0	$14,197	$546
GEORGE COUNTY TOTAL	5	1/0	$200,760	$7,722

Source: National Centers for Environmental Information

TABLE A.27: HISTORICAL LIGHTNING OCCURRENCES IN GEORGE COUNTY

Location	Date	Deaths/ Injuries	Property Damage*	Details
Lucedale				
LUCEDALE	7/3/1996	0/0	$76,754	Lightning struck the Crossroads United Methodist Church. The church was the oldest in George county. The lightning strike caused a fire to start and the church burned. The church is located on State Hwy 26 about 10 miles west of Lucedale.
LUCEDALE	6/5/1998	0/0	$103,434	Lightning struck an apartment building and the residence burned to the ground. No one was injured.
LUCEDALE	6/21/2004	0/0	$6,375	Lightning struck a home near Lucedale. The strike caused a fire in the home which was quickly extinguished.
Unincorporated Area				
AGRICOLA	7/28/1997	0/0	$7,503	Lightning struck a pecan tree during the afternoon and killed nine cattle huddled beneath it. Eight of the nine cows were due to give birth in a month and one had a two week old calf. The calf was not injured by the lightning strike.
				A 31 year old female was struck and killed by lightning near Bexley. The woman was going to her automobile to roll up the windows during a thunderstorm. She had just rolled the windows up and was returning to her home when lightning struck a nearby tree. The strike ran through the root system of the tree and into puddles of water that she was standing barefoot in and killed her. She was taken to a local hospital where she was DOA. Around the same time and near the same

BEXLEY	8/19/2002	1/0	$6,694	place, lightning struck and killed a cow. A home also was struck with several electrical appliances damaged.

Source: National Centers for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

Although there was not a high number of historical lightning events reported in George County via NCDC data, it is a regular occurrence accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN), George County is located in an area of the country that experienced an average of 4 to 12 lightning flashes per square kilometer per year between 2005 and 2014. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table A.28: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR LIGHTNING EVENTS							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
132.4 events per year	.02	$271,387	$13,420	NA	$284,808	80.1	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table A.29: George County Hazard Specific Risk Index Table

GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – LIGHTNING	
Risk Index Score	**Risk Index Rating**
82.6 / 100	Relatively Moderate
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

WILDFIRE

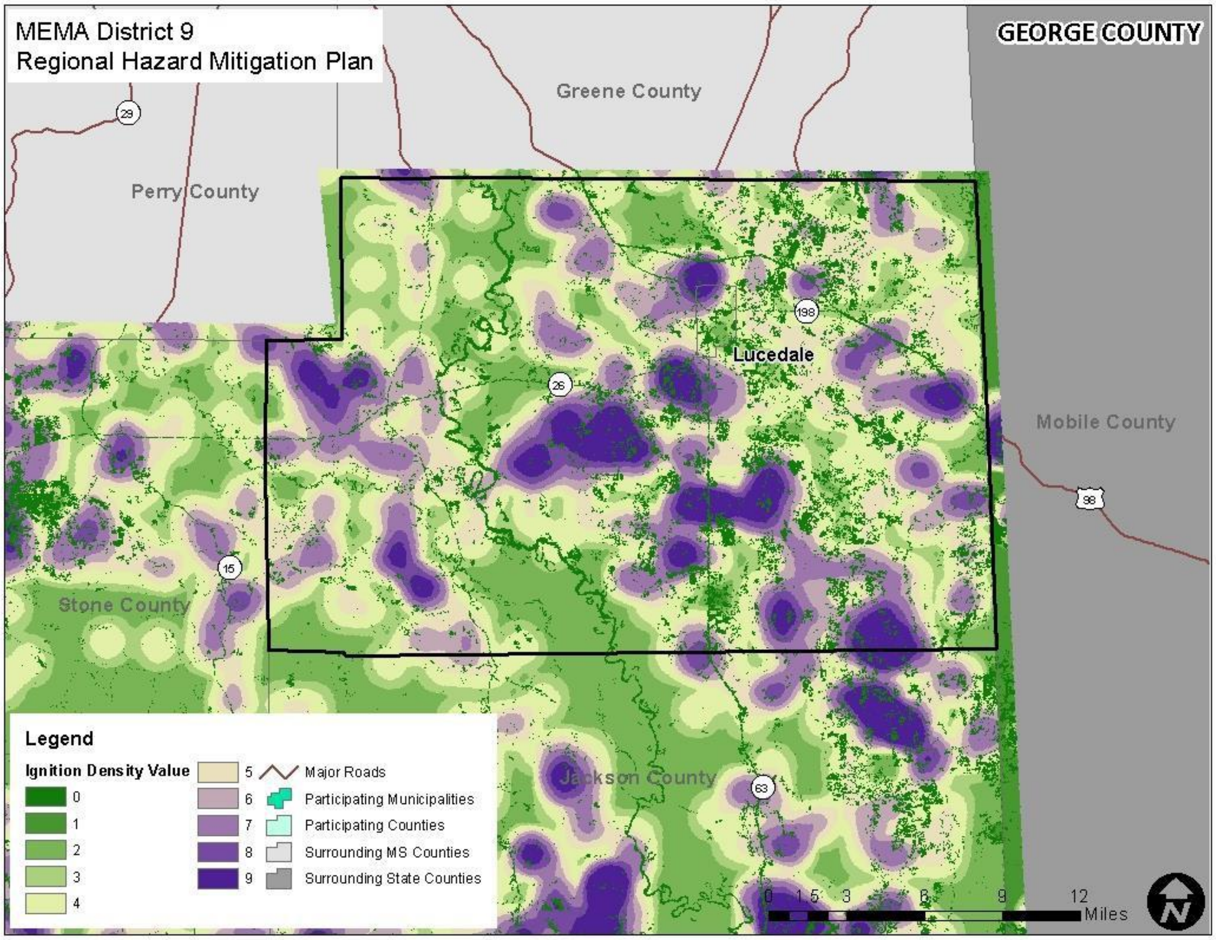
LOCATION AND SPATIAL EXTENT

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban- wildland interface are particularly susceptible to fire hazard as populations about formerly undeveloped areas. The Wildfire Ignition Density data shown in the figure below give an indication of historic location.

HISTORICAL OCCURRENCES

Figure A.12 shows the Wildfire Ignition Density in George County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.10

FIGURE A.12: WILDFIRE IGNITION DENSITY IN GEORGE COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the Mississippi Forestry Commission from 2007 to 2022, George County experiences an average of 47 wildfires annually which burn a combined 429 acres, on average per year. The data indicates that most of these fires are small, averaging nine acres per fire. Table A.30 provides a summary of wildfire occurrences in George County and Table A.31 lists the number of reported wildfire occurrences in the county between the years 2007 and 2016.

TABLE A.30: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2007 -2022)*

	George County
Average Number of Fires per year	46.7
Average Number of Acres Burned per year	428.5
Average Number of Acres Burned per fire	9.2

*These values reflect averages over a 10-year period.
Source: Mississippi Forestry Commission

TABLE A.31: HISTORICAL WILDFIRE OCCURRENCES IN GEORGE COUNTY

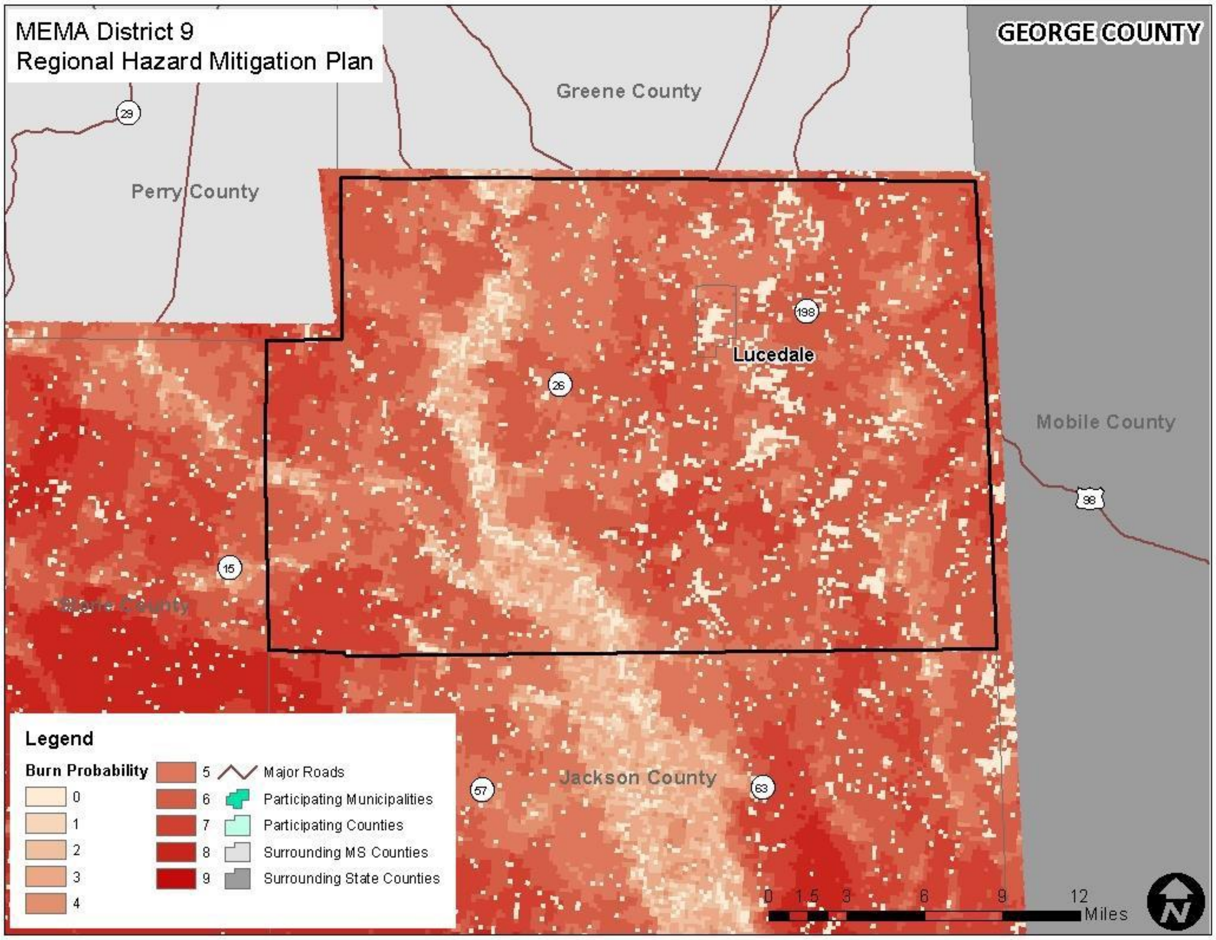
Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Jackson County																
Number of Fires	79	39	60	40	78	35	36	33	43	24	14	18	19	12	18	23
Number of Acres Burned	789	264	777	266	718	218	439	313	325	176	125	263	306	123	468	246

Source: Mississippi Forestry Commission

PROBABILITY OF FUTURE OCCURRENCES

Wildfire events will be an ongoing occurrence in George County. Figure A.13 shows that there is some probability a wildfire will occur throughout the county. However, the likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to George County for future wildfire events is highly likely (100 percent annual probability).

FIGURE A.13: BURN PROBABILITY IN GEORGE COUNTY



Source: Southern Wildfire Risk Assessment

Figure A.14: George County Wildfire Hazard Potential

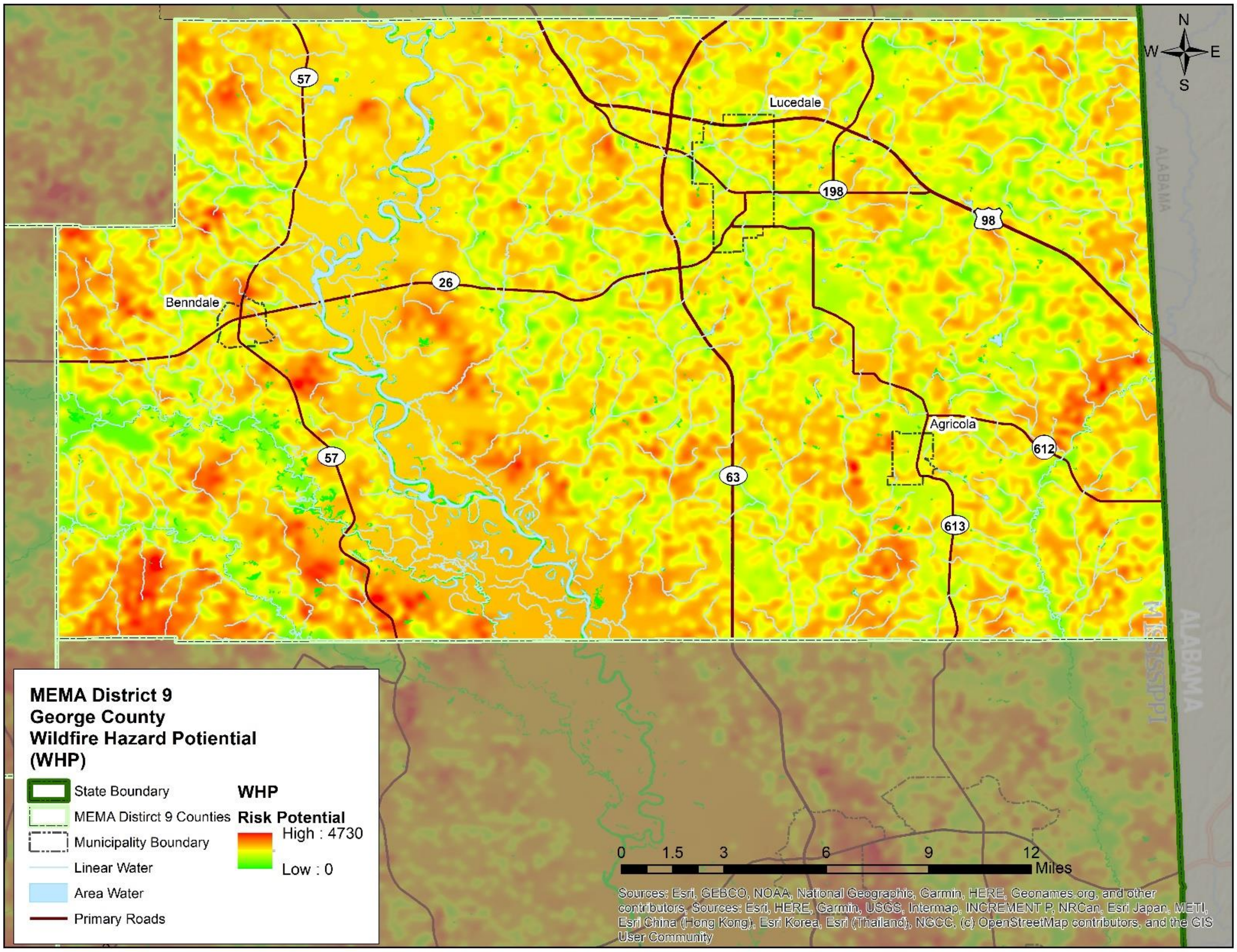
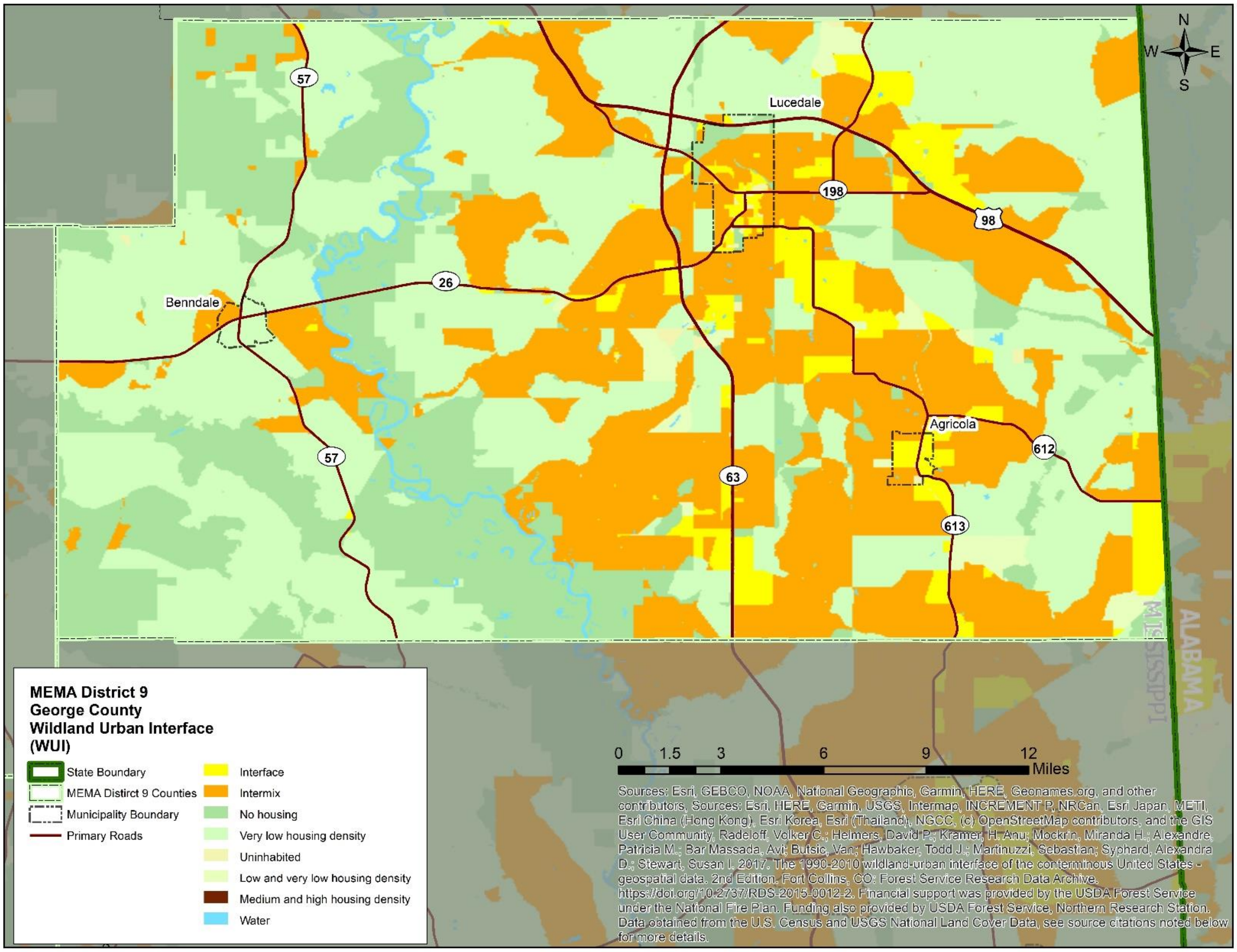


Figure A.15: George County Wildland Urban Interface



FEMA NRI Expected Annual Loss Estimates

Table A.32: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WILDFIRE EVENTS							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
0.303% chance per year	.01	$ 78,127	$ 546,093	$69	$624,288	83.7	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table A.33: George County Hazard Specific Risk Index Table

GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WILDFIRE	
Risk Index Score	**Risk Index Rating**
84.7 / 100	Relatively Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

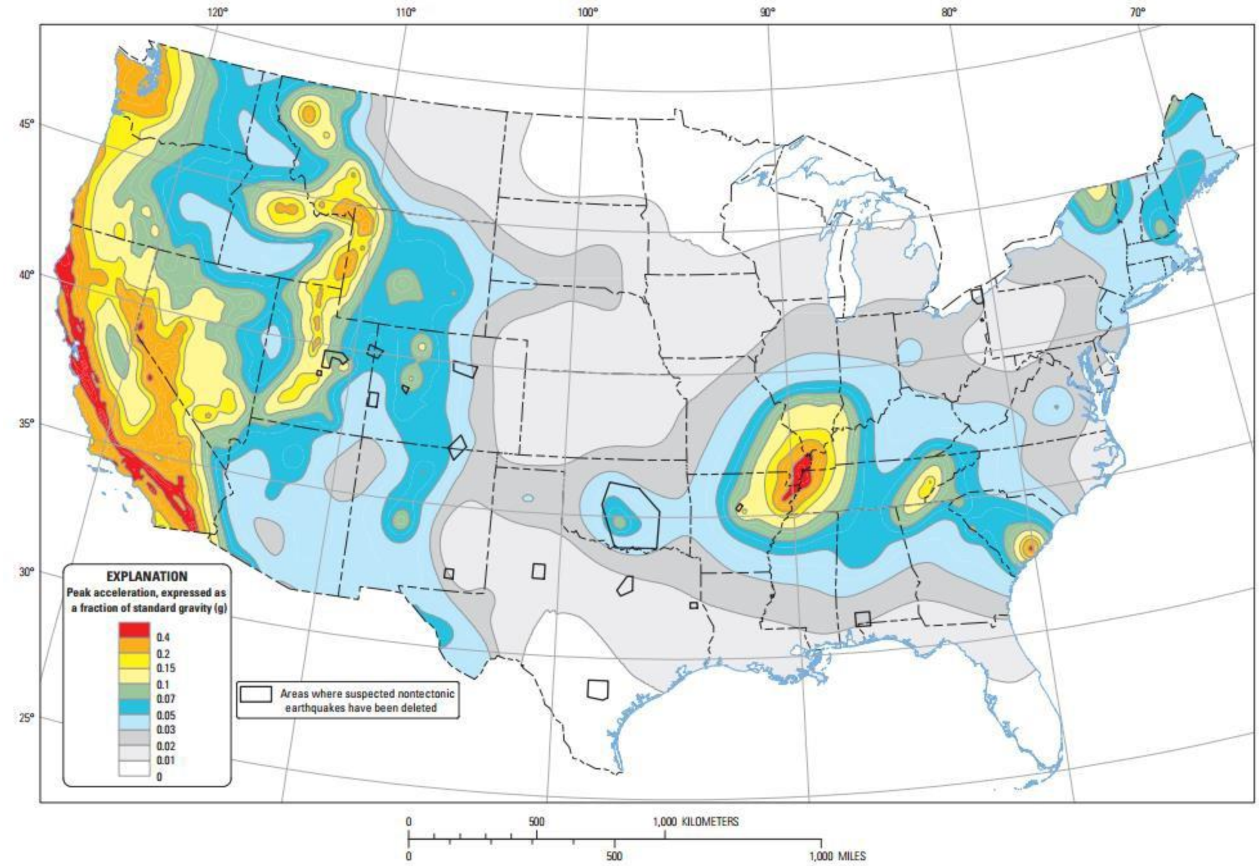
GEOLOGIC HAZARDS

EARTHQUAKE

LOCATION AND SPATIAL EXTENT

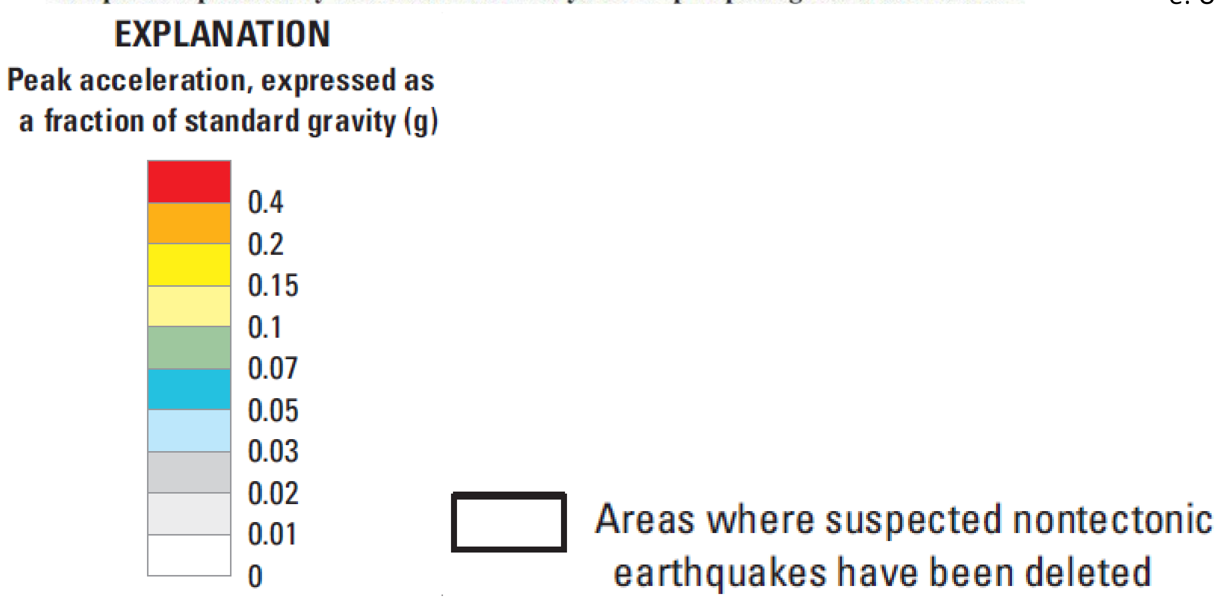
Figure A.16 shows the intensity level associated with George County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, George County lies within an approximate zone of level "1" to "3" ground acceleration. This indicates that the county exists within an area of low seismic risk.

Figure A.16: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



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

e: United



States Geological Survey, 2014

The primary source of potential damage to George County from an earthquake is the New Madrid Seismic Zone (NMSZ). Historically, a series of earthquakes in 1811 and 1812 demonstrated that this fault zone can produce high magnitude seismic events, sometimes on the scale of a 7.5-8.0 on the Richter scale. The biggest challenge with earthquakes that occur in this area of seismic activity is predicting the recurrence of earthquakes emanating from this zone. Although the magnitude of earthquakes from the NMSZ can be large, they occur very irregularly and fairly infrequently. This makes it extremely difficult to project when they will occur.

It should also be noted that the State of Mississippi Hazard Mitigation Plan identifies certain areas of concern for liquefaction and lists the counties and corresponding zones within those counties that have the highest liquefaction potential. George County does not have any identified liquefaction potential risk.

HISTORICAL OCCURRENCES

No earthquakes are known to have affected George County since 1638. Table A.34 provides a summary of earthquake events reported by the National Centers for Environmental Information (formerly National Geophysical Data Center) between 1638 and 1985, and Figure A.17 presents a map showing earthquakes whose epicenters have occurred near the county between 1985 and 2022 (no earthquakes occurred within the county boundaries during this period). A detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known) can be found in Table A.35

TABLE A.34: SUMMARY OF SEISMIC ACTIVITY IN GEORGE COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Lucedale	0	--	--
Unincorporated Area	0	--	--
GEORGE COUNTY TOTAL	0	--	--

Source: National Geophysical Data Center

TABLE A.35: SIGNIFICANT SEISMIC EVENTS IN GEORGE COUNTY (1638 -2022)

Location	Date	Epicentral Distance	Magnitude	MMI
Lucedale				
None reported	--	--	--	--
Unincorporated Area				
None reported	--	--	--	--

Source: National Geophysical Data Center

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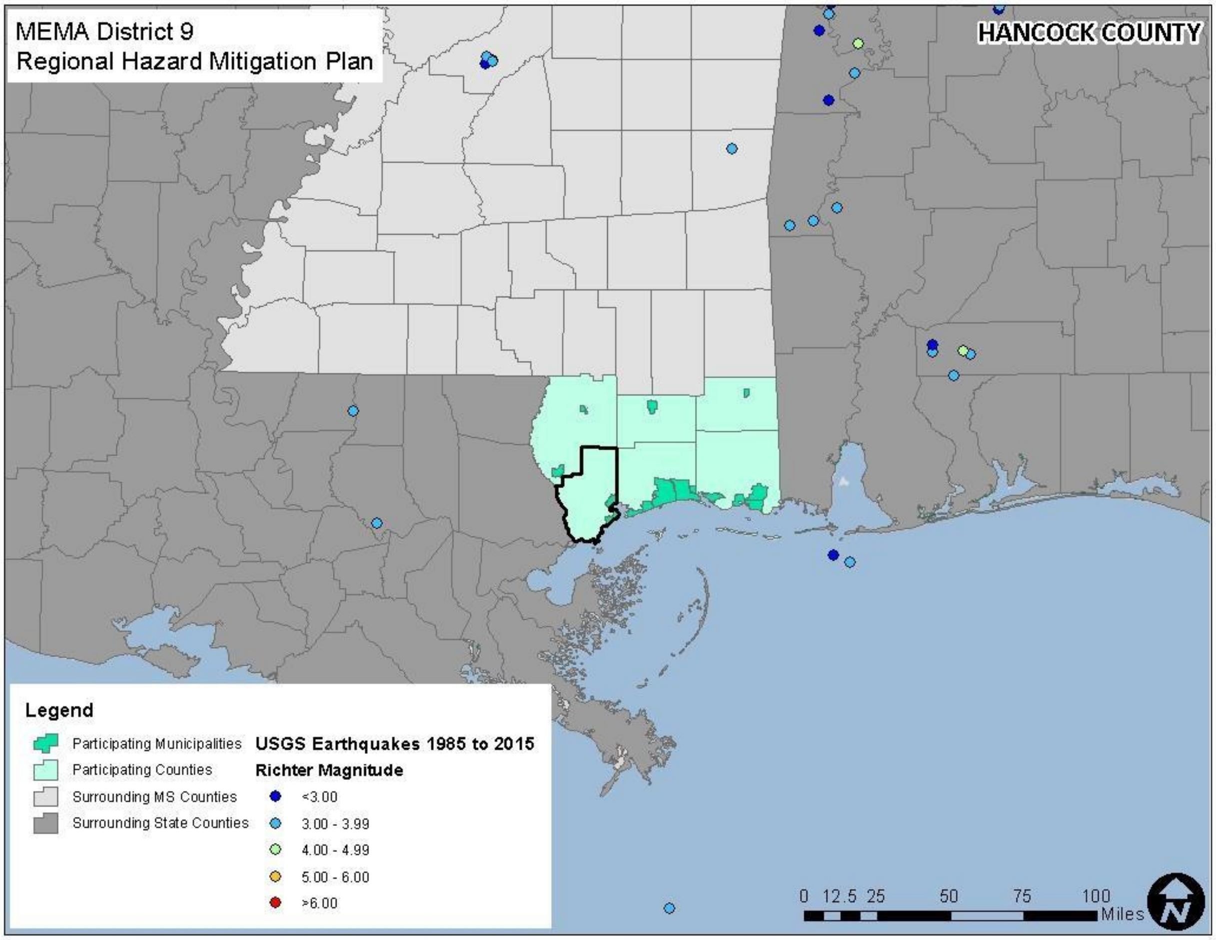
FIGURE A.17: HISTORIC EARTHQUAKES WITH EPICENTERS NEAR GEORGE COUNTY (1985-2022)



2022

Source: United States Geological Survey

PROBABILITY OF FUTURE OCCURRENCES

The probability of significant, damaging earthquake events affecting George County is unlikely. However, it is possible that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated to be between 1 and 10 percent (possible).

FEMA NRI Expected Annual Loss Estimates

Table A.36: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR EARTHQUAKE EVENTS							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
0.035% chance per year	.00	$ 11,561	$ 40,602	NA	$52,163	35.6	Very Low

***Annualized Frequency**: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population**: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss** scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table A.37: George County Hazard Specific Risk Index Table

GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – EARTHQUAKE	
Risk Index Score	**Risk Index Rating**
38.2 / 100	Very Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

WIND-RELATED HAZARDS

EXTREME COLD

Extreme cold typically impacts a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme cold conditions.

HISTORICAL OCCURRENCES

Data from the National Centers for Environmental Information was used to determine historical extreme cold events in George County. No events specific to the county were reported, however, two events were reported elsewhere in the region. Similar events and impacts can be expected in George County.

February 2, 1996 – Cold/Wind Chill – An arctic airmass overspread much of south Mississippi bringing the longest extended period of cold weather since 1989. In Amite County, 4SW Gillsburg, a 67 year old man died from hypothermia on the 4th after the fire in a wood burning heater went out. Considerable property damage resulted from broken pipes due to the extended period of subfreezing temperatures. In Jackson County, Moss Point and Gautier had broken pipes in 100 and 147 houses, respectively.

December 18, 1996 – Cold/Wind Chill – An arctic airmass overspread south Mississippi resulting in three consecutive nights with subfreezing minimum temperatures. Temperatures lowered into the mid-teens over the southwest section of the state and near 20 degrees along the Gulf Coast.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of George County has a probability level of possible (between 1 and 10 percent annual probability) for future extreme cold events to impact the county.

EXTREME HEAT

Heat waves typically impact a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme heat conditions.

HISTORICAL OCCURRENCES

The National Centers for Environmental Information was used to determine historical heat wave occurrences in the county.

July 2000 – July was a hot and dry month in Southeast Mississippi. In Beaumont the temperature was 100 degrees or higher eleven days during the month with the hottest being 105 degrees. In Richton the temperature was 100 degrees or higher three days during the month with the hottest being 102 degrees. In Waynesboro the temperature was 100 degrees or higher four days during the month with the hottest being 103 degrees. In Wiggins the temperature was 100 degrees or higher nine days during the month with 105 degrees being the hottest. In addition to being hot it was also a dry month across the area. Most stations ended up with below normal rainfall totals for the month. In Jackson County, a 68 year old man died from heat exhaustion while sitting in his pickup truck in a parking lot with the windows rolled up, and 10 days later, a 58 year old male was found dead from heat exhaustion while sitting in his truck in the driveway of his home with the windows rolled up.

August 2007 – Heat advisories were issued for a combination of high temperatures and high humidities. Heat index vales were between 110 and 115 degrees. Several public buildings and churches allowed people to come in and cool off during the heat of the day.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of George County has a probability level of highly likely (100 percent annual probability) for future heat wave events.

FEMA NRI Expected Annual Loss Estimates

Table A.38: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HEAT WAVE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.7 Events/Year	0.01	$79,482	$9	$14	$79,506	52.8	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table A.39: George County Hazard Specific Risk Index Table

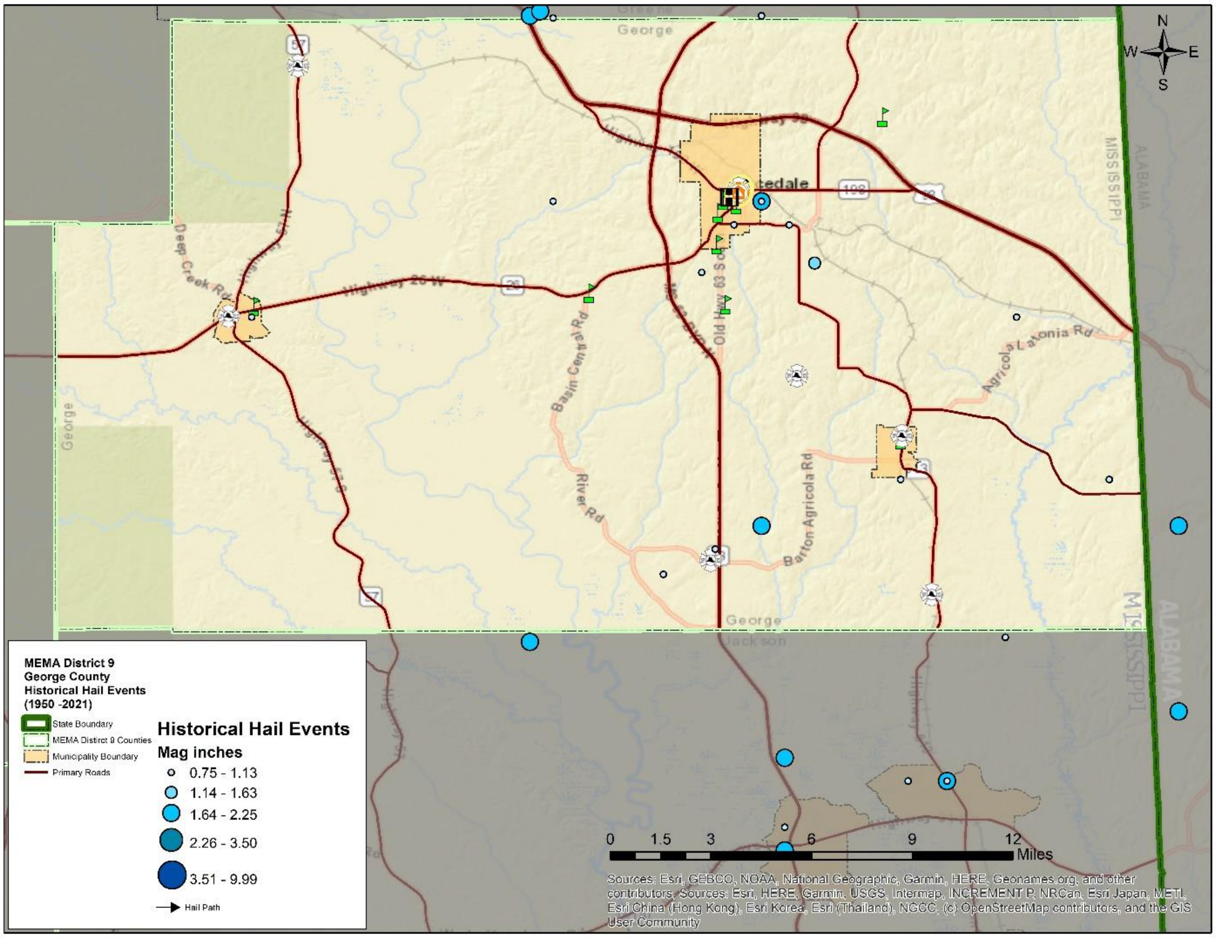
GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HEAT WAVE	
Risk Index Score	**Risk Index Rating**
54.0/ 100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

HAILSTORM

LOCATION AND SPATIAL EXTENT

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that George County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms. With that in mind, Figure A.18 shows the location of hail events that have impacted the county between 1955 and 2022.

FIGURE A.18: HAILSTORM TRACKS IN GEORGE COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

According to the National Centers for Environmental Information, 36 recorded hailstorm events have affected George County since 1959. In all, hail occurrences resulted in approximately $800 in property damages. Hail ranged in diameter from 0.5 inches to 2.0 inches. Table A.40 provides a summary of the hail events in George County. Detailed information about each event that occurred in the county is provided in Table A.41.

It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Centers for Environmental Information. Therefore, it is likely that damages are greater than the reported value.

TABLE A.40: SUMMARY OF HAIL OCCURRENCES IN GEORGE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage)	Annualized Property Losses
Lucedale	19	0/0	$790	$12
Unincorporated Area	17	0/0	$0	$0
GEORGE COUNTY TOTAL	36	0/0	$790	$12

Source: National Centers for Environmental Information

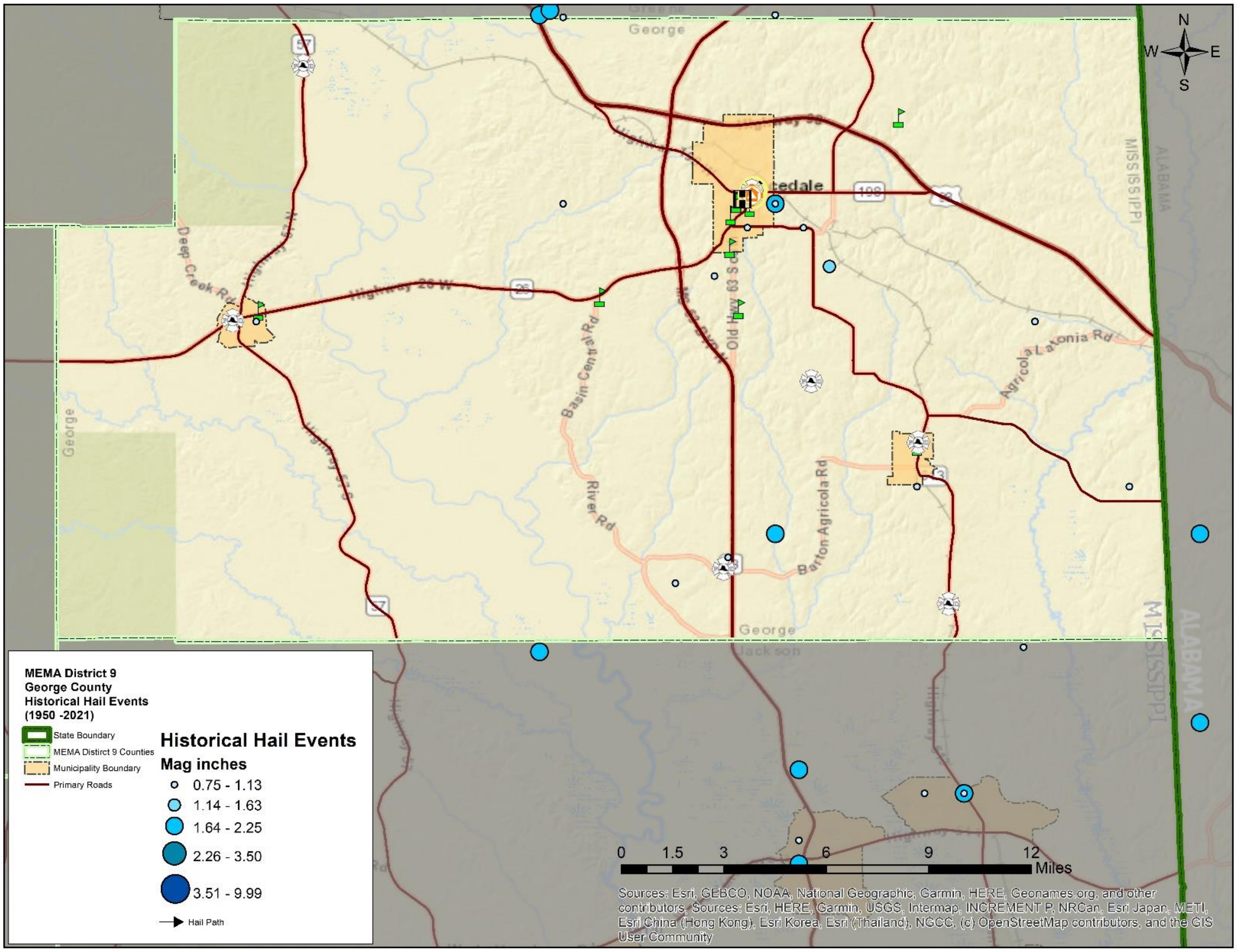
TABLE A.41: HISTORICAL HAIL OCCURRENCES IN GEORGE COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Lucedale				
Lucedale	3/25/1994	0.88 in.	0/0	$0
Lucedale	3/15/1995	0.50 in.	0/0	$0
Lucedale	5/12/1995	0.75 in.	0/0	$790
LUCEDALE	2/19/1996	0.75 in.	0/0	$0
LUCEDALE	4/22/1997	0.75 in.	0/0	$0
LUCEDALE	3/7/1998	0.75 in.	0/0	$0
LUCEDALE	6/8/1999	0.75 in.	0/0	$0
LUCEDALE	7/30/1999	1.00 in.	0/0	$0
LUCEDALE	3/11/2000	1.75 in.	0/0	$0
LUCEDALE	8/30/2000	0.75 in.	0/0	$0
LUCEDALE	3/9/2003	0.75 in.	0/0	$0
LUCEDALE	5/3/2003	1.00 in.	0/0	$0
LUCEDALE	3/29/2008	1.75 in.	0/0	$0
LUCEDALE	4/24/2010	0.75 in.	0/0	$0
LUCEDALE	4/24/2010	1.00 in.	0/0	$0
LUCEDALE	6/3/2011	1.00 in.	0/0	$0
LUCEDALE	3/17/2016	1.00 in.	0/0	$0
LUCEDALE	6/16/2017	1.00 in.	0/0	$0
LUCEDALE	1/09/2022	1.75 in.	0/0	$0

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Unincorporated Area				
GEORGE CO.	4/29/1959	1.00 in.	0/0	$0
GEORGE CO.	5/5/1960	1.75 in.	0/0	$0
GEORGE CO.	3/11/1968	2.00 in.	0/0	$0
GEORGE CO.	4/18/1988	0.75 in.	0/0	$0
Agricola	3/28/1995	0.88 in.	0/0	$0
BARTON	3/30/1996	0.75 in.	0/0	$0
AGRICOLA	1/8/1997	0.75 in.	0/0	$0
BENNDALE	7/30/1999	0.75 in.	0/0	$0
AGRICOLA	4/24/2000	0.75 in.	0/0	$0
BENNDALE	1/19/2001	0.75 in.	0/0	$0
BENNDALE	3/31/2002	0.75 in.	0/0	$0
AGRICOLA	7/7/2002	1.00 in.	0/0	$0
SHIPMAN	4/25/2003	0.75 in.	0/0	$0
AGRICOLA	2/24/2004	0.75 in.	0/0	$0
AGRICOLA	4/29/2004	0.75 in.	0/0	$0
BEXLEY	3/17/2016	1.00 in.	0/0	$0
AGRICOLA	4/03/2017	1.00 in.	0/0	$0
Evanston	5/17/2018	1.50 in.	0/0	$0

Source: National Centers for Environmental Information

Figure A.19: George County Historic Hail Events (1950-2021)



PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard, it is assumed that George County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table A.42: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HAIL EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
2.4 Events/year	0.00	$22,497	$396	$9	$22,902	23.9	Very Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table A.43: George County Hazard Specific Risk Index Table

GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HAIL	
Risk Index Score	Risk Index Rating
24.2/ 100	Very Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

HURRICANE AND TROPICAL STORM

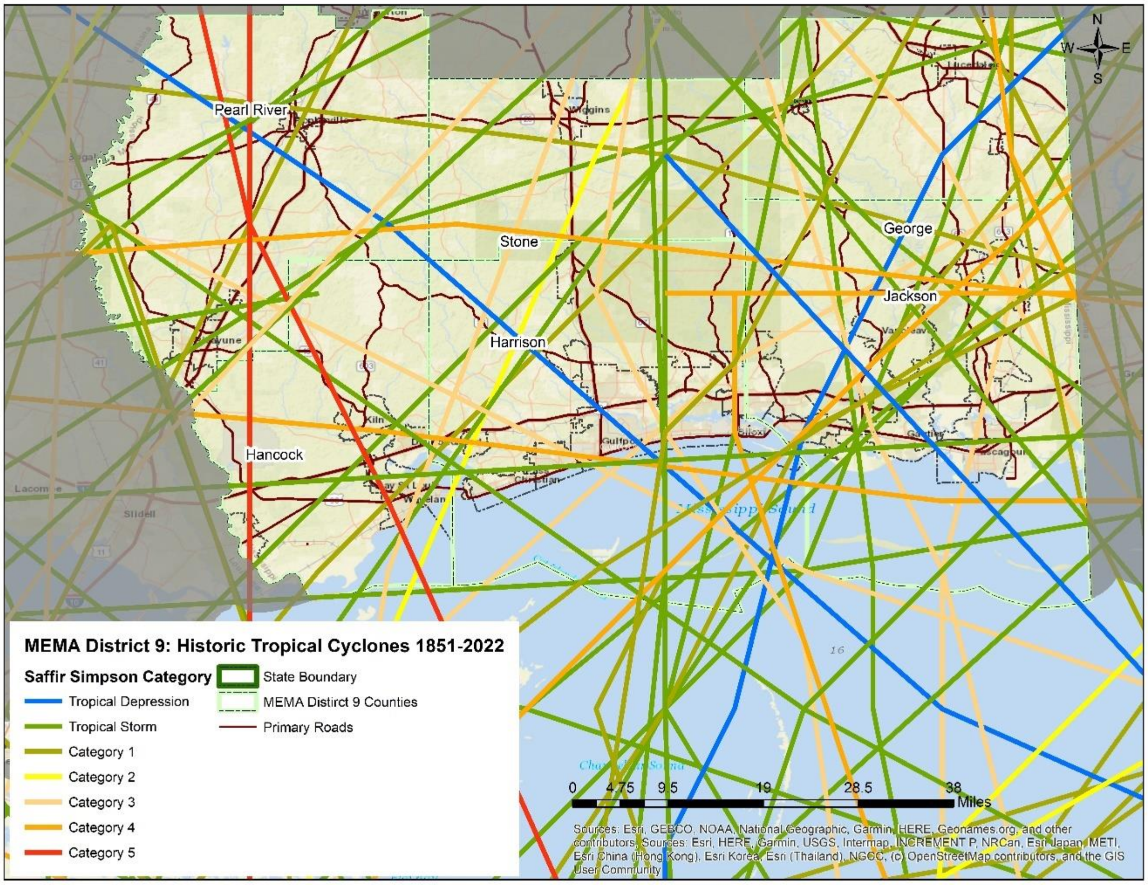
LOCATION AND SPATIAL EXTENT

Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States, and while coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland. George County is located in a region of the country that is susceptible to all of the hazards wrought by hurricanes and tropical storms. All areas throughout George County are susceptible to the accompanying hazard effects of extreme wind, flooding, and tornadoes.

HISTORICAL OCCURRENCES

According to the National Hurricane Center's historical storm track records, 119 hurricane or tropical storm/depression tracks have passed within 100 miles of the MEMA District 9 Region since 1855.15 This includes: 4 Category 3 hurricanes, 15 Category 2 hurricanes, 28 Category 1 hurricanes, 29 tropical storms,

FIGURE A.20: HISTORICAL HURRICANE STORM TRACKS WITHIN 100 MILES OF THE MEMA DISTRICT 9 REGION



and 43 tropical depressions. Additionally, four other major storms had large-scale impacts on the region and are not included in these totals. These storms are listed below and range in Category from 1 to 4.

Of the recorded storm events, 61 hurricane or tropical storm/depression events traversed directly through the region as shown in Figure A.20. Notable storms include Hurricane Camille (1969), Hurricane Frederic (1979), and Hurricane Katrina (2005). Table A.44 provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 100 miles of the MEMA District 9 Region) and category of the storm based on the Saffir-Simpson Scale.

Source: National Oceanic and Atmospheric Administration, National Hurricane Center

TABLE A.44: HISTORICAL STORM TRACKS WITHIN 100 MILES OF THE MEMA 9 DISTRICT REGION (1842–2020)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/25/1852	UNNAMED	93	Category 2
8/3/1855	NOT NAMED	--	Tropical Depression
9/16/1855	UNNAMED	96	Category 2

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
6/24/1857	NOT NAMED	--	Tropical Depression
9/15/1859	UNNAMED	79	Category 1
8/11/1860	UNNAMED	96	Category 2
9/15/1860	UNNAMED	89	Category 2
8/17/1861	NOT NAMED	--	Tropical Depression
11/1/1861	NOT NAMED	--	Tropical Depression
9/15/1862	NOT NAMED	--	Tropical Depression
9/16/1862	NOT NAMED	--	Tropical Depression
10/1/1863	UNNAMED	43	Tropical Storm
6/3/1866	NOT NAMED	--	Tropical Depression
9/16/1867	NOT NAMED	--	Tropical Depression
10/5/1867	UNNAMED	89	Category 2
10/3/1868	NOT NAMED	--	Tropical Depression
9/5/1869	UNNAMED	79	Category 1
7/30/1870	NOT NAMED	--	Tropical Depression
7/11/1872	UNNAMED	59	Tropical Storm
9/18/1875	UNNAMED	18	Tropical Depression
9/18/1877	UNNAMED	79	Category 1
9/1/1879	UNNAMED	89	Category 2
10/7/1879	UNNAMED	59	Tropical Storm
8/31/1880	UNNAMED	70	Category 1
8/2/1881	NOT NAMED	--	Tropical Depression
8/3/1881	UNNAMED	59	Tropical Storm
8/30/1885	UNNAMED	59	Tropical Storm
9/26/1885	UNNAMED	70	Category 1
6/15/1886	UNNAMED	50	Tropical Storm
6/14/1887	UNNAMED	33	Tropical Depression
10/19/1887	UNNAMED	82	Category 1
6/27/1888	NOT NAMED	--	Tropical Depression
9/23/1889	UNNAMED	79	Category 1
8/27/1890	UNNAMED	43	Tropical Storm
9/21/1891	NOT NAMED	--	Tropical Depression
9/12/1892	UNNAMED	59	Tropical Storm
9/7/1893	UNNAMED	79	Category 1
10/2/1893	UNNAMED	97	Category 3
8/7/1894	UNNAMED	59	Tropical Storm
8/15/1895	UNNAMED	59	Tropical Storm
9/13/1900	UNNAMED	43	Tropical Storm
8/14/1901	UNNAMED	82	Category 1
10/9/1905	UNNAMED	43	Tropical Storm
9/27/1906	UNNAMED	93	Category 2
9/21/1907	UNNAMED	43	Tropical Storm
8/11/1911	UNNAMED	79	Category 1
6/13/1912	UNNAMED	59	Tropical Storm
7/17/1912	UNNAMED	5	Tropical Depression

9/13/1912	UNNAMED	82	Category 1

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/18/1914	UNNAMED	33	Tropical Depression
9/29/1915	UNNAMED	96	Category 2
7/5/1916	UNNAMED	95	Category 2
10/17/1922	UNNAMED	18	Tropical Depression
6/26/1923	UNNAMED	43	Tropical Storm
10/17/1923	UNNAMED	59	Tropical Storm
9/20/1926	UNNAMED	93	Category 2
9/1/1932	UNNAMED	82	Category 1
10/15/1932	UNNAMED	59	Tropical Storm
7/27/1936	UNNAMED	43	Tropical Depression
8/22/1936	UNNAMED	5	Tropical Depression
6/16/1939	UNNAMED	59	Tropical Storm
9/26/1939	UNNAMED	50	Tropical Depression
9/24/1940	UNNAMED	18	Tropical Depression
9/10/1944	UNNAMED	64	Category 1
9/5/1945	UNNAMED	18	Tropical Depression
9/19/1947	UNNAMED	92	Category 2
9/4/1948	UNNAMED	79	Category 1
9/4/1949	UNNAMED	43	Tropical Storm
8/31/1950	BAKER	82	Category 1
8/1/1955	BRENDA	70	Category 1
8/27/1955	UNNAMED	50	Tropical Storm
9/24/1956	FLOSSY	82	Category 1
9/18/1957	ESTHER	64	Category 1
10/8/1959	IRENE	43	Tropical Storm
9/15/1960	ETHEL	85	Category 2
9/26/1960	FLORENCE	1	Tropical Depression
10/4/1964	HILDA	70	Category 1
9/10/1965	BETSY	117	Category 4
9/29/1965	DEBBIE	33	Tropical Depression
8/18/1969	CAMILE	100	Category 3
8/8/1971	UNNAMED	5	Tropical Depression
9/4/1971	FERN	5	Tropical Depression
9/16/1971	EDITH	70	Category 1
7/29/1975	UNNAMED	18	Tropical Depression
10/17/1975	UNNAMED	5	Tropical Depression
9/24/1976	UNNAMED	5	Tropical Depression
7/19/1977	UNNAMED	18	Tropical Depression
9/6/1977	BABE	18	Tropical Depression
10/25/1977	UNNAMED	18	Tropical Depression
8/10/1978	UNNAMED	5	Tropical Depression
7/11/1979	BOB	74	Category 1
9/12/1979	FREDERIC	97	Category 3
7/20/1980	UNNAMED	5	Tropical Depression
10/27/1984	UNNAMED	18	Tropical Depression

9/2/1985	ELENA	95	Category 2
Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
10/31/1985	JUAN	64	Category 1
8/12/1987	UNNAMED	5	Tropical Depression
8/8/1988	BERYL	5	Tropical Depression
8/9/1988	BERYL	50	Tropical Storm
9/10/1988	FLORENCE	79	Category 1
8/3/1995	ERIN	82	Category 1
7/19/1997	DANNY	79	Category 1
9/27/1998	GEORGES	92	Category 2
9/20/1998	HERMINE	33	Tropical Depression
6/11/2001	ALLISON	43	Tropical Storm
8/5/2002	BERTHA	33	Tropical Depression
9/14/2002	HANNA	59	Tropical Storm
9/26/2002	ISIDORE	64	Category 1
6/30/2003	BILL	59	Tropical Storm
7/1/2003	BILL	18	Tropical Depression
9/16/2004	IVAN	96	Category 2
6/11/2005	ARLENE	59	Tropical Storm
7/6/2005	CINDY	74	Category 1
7/10/2005	DENNIS*	100	Category 3
8/29/2005	KATRINA	98	Category 3
9/22/2007	TEN	5	Tropical Depression
8/24/2008	FAY	18	Tropical Depression
9/1/2008	GUSTAV*	87	Category 2
11/10/2009	IDA	70	Category 1
7/25/2010	BONNIE	5	Tropical Depression
8/12/2010	FIVE	5	Tropical Depression
9/5/2011	LEE	43	Tropical Storm
8/28/2012	ISAAC*	70	Category 1
10/07/2017	Nate	85	Category 1
9/04/2018	Gordon	70	Tropical Storm
10/28/2020	Zeta	110	Category 2

*It should be noted that the track of several major hurricanes that impacted the region fell outside of the 100-mile buffer. These storms were included in the table due to their significant impact (Betsy, 1965; Dennis, 2005; Gustav, 2008; and Isaac, 2012), but it should be noted that wind speed and storm category are estimated based on anecdotal information.

Source: National Hurricane Center

Federal records indicate that 12 disaster declarations were made in 1969 (Hurricane Camille), 1979 (Hurricane Frederic), 1998 (Hurricane Georges), 2001 (Tropical Storm Allison), 2002 (Tropical Storm Isidore), 2004 (Hurricane Ivan), 2005 (Hurricane Dennis and Hurricane Katrina), 2008 (Hurricane Gustav), 2012 (Hurricane Isaac), 2017 (Hurricane Nate) and 2021 (Hurricane Ida). Hurricane and tropical storm events can cause substantial damage in the area due to high winds and flooding.

Flooding and high winds from hurricanes and tropical storms can cause damage throughout the county. Anecdotes are available from NCEI for the major storms that have impacted the county as found below:

Hurricane Georges – September 25-29, 1998

Hurricane Georges, a strong Category 2 hurricane moved slowly northwest across the Gulf of Mexico toward southeast Louisiana and coastal Mississippi on the September 25 and September 26. As the hurricane approached the mouth of the Mississippi River on September 27, it slowly turned toward the north making landfall along the Mississippi Coast just to the east of Biloxi, MS at 0400 CST on September 28. The hurricane moved only slowly north during the morning hours, at times becoming nearly stationary. The hurricane finally was downgraded to a tropical storm at 1500CST on September 28 when it was located north of Biloxi. The tropical storm then moved very slowly eastward into southern Alabama on September 29.

Most of the inland counties in Southeast Mississippi had damage from heavy rains and from trees and power lines being blown down by the persistent winds. One of the hardest hit areas by the high winds was in Stone County Mississippi near where the center of the hurricane moved. Eighty five homes were damaged in Stone County by the wind. Fifty four homes had minor damage, twenty six had major damage and five were destroyed. Most of the damage was along and east of U. S. Highway 49.

Throughout the area, agriculture took a beating with the cotton, soybean and pecan crop almost totally destroyed.

Hurricane Katrina – August 24-30, 2005
Hurricane Katrina was one of the strongest and most destructive hurricanes on record to impact the coast of the United States. It will likely be recorded as one the worst natural disaster in the history of the United States to date resulting in catastrophic damage and numerous casualties in southeast Louisiana and along the Mississippi coast. Damage and casualties resulting from Hurricane Katrina extended as far east as Alabama and the panhandle of Florida. Katrina developed from a tropical depression southeast of the Bahamas on August 24th. After moving through the Bahamas as a tropical storm, Katrina strengthened to a category 1 hurricane prior to landfall in south Florida around the Miami area on the 25th of August. Katrina crossed south Florida and entered the Gulf of Mexico and began to strengthen. Hurricane Katrina strengthened to a category 5 storm on August 28th about 250 miles south southeast of the mouth of the Mississippi River with winds reaching their peak intensity of 175 mph and a central pressure of 902 mb. Post event analysis by the National Hurricane Center indicates that Katrina weakened slightly before making landfall as a strong category 3 storm in initial landfall in lower Plaquemines Parish. Maximum sustained winds were estimated at 110 knots or 127 mph and a central pressure of 920 mb around 610 AM CDT on August 29th in southeast Louisiana just south of Buras in Plaquemines Parish. The storm continued on a north northeast track with the center passing about 40 miles southeast of New Orleans with a second landfall occurring near the Louisiana and Mississippi border around 945 AM CDT as a category 3 storm with maximum sustained winds estimated around 105 knots or 121 mph. Katrina continued to weaken as it moved north northeast across Mississippi during the day, but remained at hurricane strength 100 miles inland near Laurel, Mississippi. Katrina weakened to a tropical depression near Clarksville, Tennessee on August 30th.

Due to the failure of power and equipment prior to the peak of the storm, data for wind, storm surge, pressure, and rainfall are incomplete. The lowest pressure on the Mississippi coast was estimated to be 928 mb where the hurricane made landfall near the Louisiana Mississippi border. A pressure of 976 mb was recorded at 0951 CDT by a university weather station deployed in Pascagoula, well east of the landfall location. At approximately the same time, the pressure at the NWS office in Slidell, just to the west of landfall location, recorded a pressure of 934.1 mb at 0938 AM CDT.

The highest wind gusts recorded in Mississippi and the adjacent coastal waters were 117 knots (134 mph) at the Pearl River County EOC office in Poplarville and 102 knots (118 mph) at 1000AM CDT by a university wind tower deployed at the Stennis Space Center in Hancock County. Maximum sustained winds in

Mississippi were estimated around 105 knots (121 mph) near the storm's second landfall along the Mississippi and Louisiana border. Unofficial wind observations before the gage failed included a wind gust of 106 kt, (122 mph) at 0615 CDT by an amateur radio operator in Long Beach and a wind gust of 108 kt (124 mph) at the EOC in Pascagoula.

High winds from Katrina caused significant tree and power line damage to the counties that border the Mississippi and Alabama state line. Wind gusts of 80-100 mph were estimated across Stone County and 70-90 mph across George County. Many of the fallen trees fell on structures and caused damage. Stone County received the most damage.

Storm total rainfall amounts generally ranged from 10 to 16 inches across coastal and south Mississippi with much lower amounts observed over southwest Mississippi. The highest observed storm total rainfall was 11 inches at Stennis Space Center and near Picayune.

Hurricane Nate-October 7, 2017
Hurricane Nate quickly moved north northwest out of the northwest Caribbean Sea and across the Gulf of Mexico, making landfall near Biloxi, MS just after midnight on October 8th as a Category 1 hurricane with maximum winds of 85 mph. Nate quickly weakened as it moved inland across inland southeast Mississippi and southwest Alabama and was downgraded to a tropical depression over central Alabama by 10am CDT on October 8th.

The remnant eastern eyewall of Nate moved across George and Greene Counties between midnight and 3am. Tropical storm force winds, with maximum gusts estimated at 60 to 70 mph, resulted in numerous downed trees and power lines in George County. Several homes reported minor roof and shingle damage. One mobile was destroyed due to a tree falling on it. A total of 7,000 power outages were reported. Further north in Greene and Wayne Counties, scattered downed trees and power lines were reported.

The fast movement of Nate resulted in limited, if any, impacts from flooding. 2 to 5 inches of rain was reported across inland southeast Mississippi. One EF-0 tornado was reported in Wayne County.

Hurricane Zeta-October 28, 2020
Hurricane Zeta made landfall in southeast Louisiana during the late afternoon hours of Wednesday, October 28th as a strong category 2 hurricane with maximum sustained winds of 110 mph. Zeta quickly raced northeast and moved across inland southeast Mississippi and inland southwest Alabama during the evening hours. Shortly after midnight, Thursday, October 29th, Zeta weakened to a tropical storm while moving across central Alabama. Since Zeta was moving at a rapid 25-30 mph across the area, it brought frequent hurricane force wind gusts and extensive wind damage to inland southeast Mississippi and inland southwest Alabama. Hurricane force gusts extended as far east as coastal Alabama, which contributed to a significant storm surge that impacted portions of Mobile and Baldwin Counties. Sustained minimal tropical storm force winds extended as far east as portions of the western Florida Panhandle.

Widespread tree and power line damage was reported across inland southeast Mississippi into inland southwest Alabama as these areas experienced sustained moderate to strong tropical storm force winds and frequent hurricane force wind gusts. Despite a lack of observations, peak gusts of 80 to 100 mph very likely occurred. In fact, the Mobile Regional Airport measured the highest wind gust in the local area of 91 mph. A station in Grove Hill measured a peak gust of 80 mph. Several counties in this area experienced near or 100% power outages. Many homes also suffered minor roof damage, with numerous homes suffering moderate to major damage, many of which were the result of trees falling onto homes.

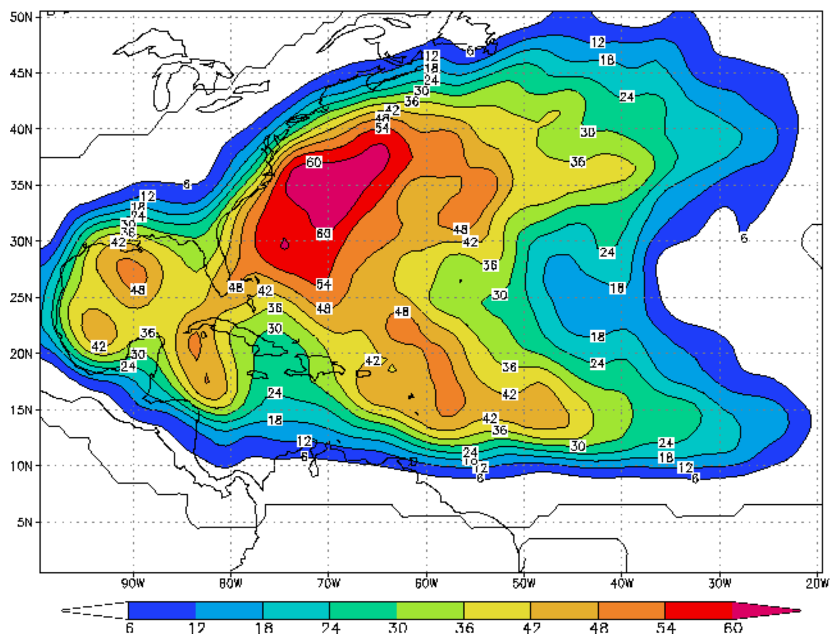
The highest storm surge occurred in Mobile Bay, along the immediate shores of Baldwin County, as well as southern Mobile County along the Mississippi Sound, as well as Dauphin Island. Peak storm surge inundation was surveyed to be 7 to 9 feet across parts of Bayou La Batre and Coden, as well as the Baldwin County side of Mobile Bay from the Mobile

Bay Causeway to south of Point Clear. A few isolated areas approached 10 feet. These higher water levels are a combination of storm surge and wave action.

PROBABILITY OF FUTURE OCCURRENCES

According to NOAA statistical data, the region is located in an area with an annual probability of a named storm between 30 and 42 percent as presented in Figure A.21. This illustration was created by the National Oceanic and Atmospheric Administration's Hurricane Research Division using data from 1944 to 1999 and counting hits when a storm or hurricane was within approximately 100 miles (165 km) of each location. As a reference point, the tip of Florida's outline can be found near the 25N, 80W intersection, and the MEMA District 9 Region is near the 30N, 90W intersection. This empirical probability is fairly consistent with other scientific studies and observed historical data made available through a variety of federal, state, and local sources.

FIGURE A.21: EMPIRICAL PROBABILITY OF A NAMED HURRICANE OR TROPICAL STORM



Source: National Oceanic and Atmospheric Administration

The probability of storm occurrences will vary significantly based on the return interval for different categories of magnitude. The probability of less intense storms (lower return periods) is higher than more intense storms (higher return periods). Table A.45 profiles the potential peak gust wind speeds that can be expected in the MEMA District 9 Region during a hurricane event for various return periods according to FEMA's HAZUS-MH®.

TABLE A.45: POTENTIAL PEAK GUST WIND SPEEDS PER RETURN PERIOD

50-Year	100-Year	500-Year	1,000-Year
119.4 mph	133.9 mph	160.3 mph	170.0

Source: Federal Emergency Management Agency (Hazus-MH 3.2)

Overall, the probability level of future hurricane and tropical storm occurrence for George County is highly likely (100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table A.46: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HURRICANE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.3 Events/year	0.05	$598,589	$20,086 ,586	$221,395	$20,906, 569	91.6	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table A.47: George County Hazard Specific Risk Index Table

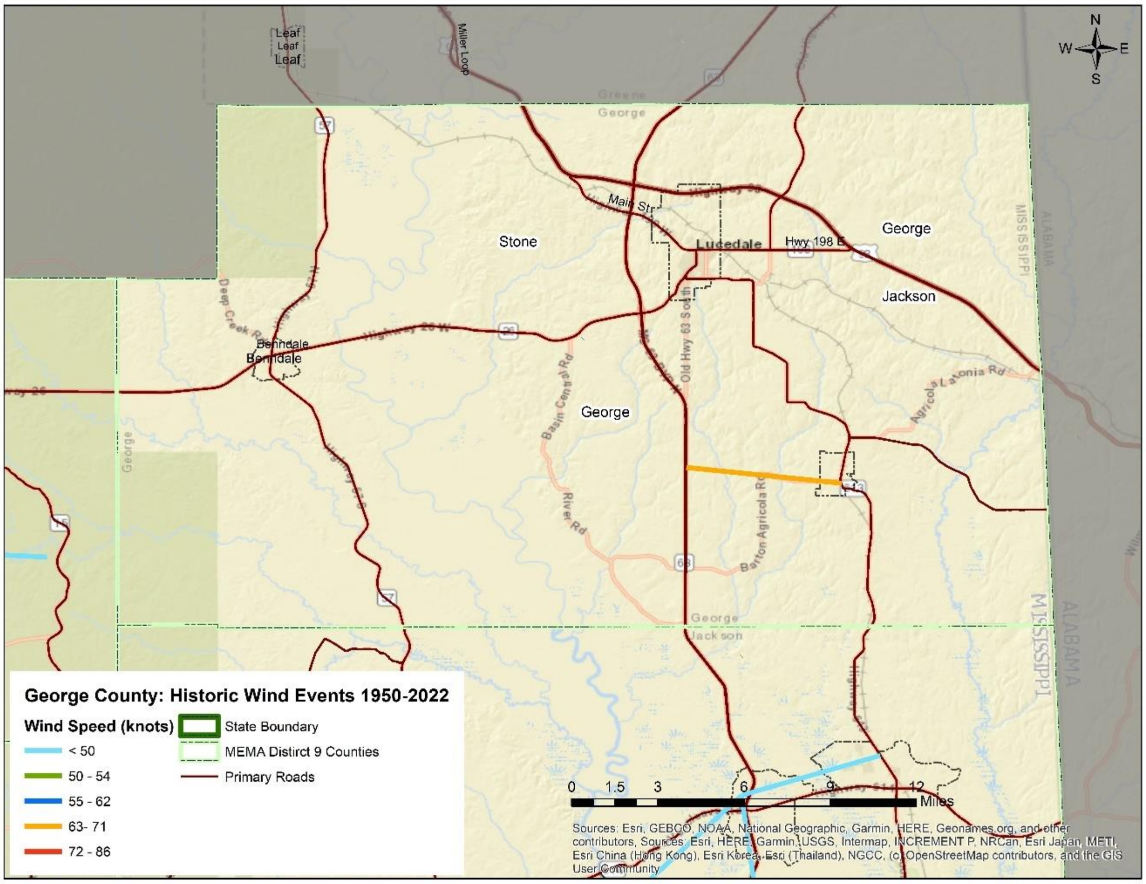
GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HURRICANE	
Risk Index Score	Risk Index Rating
93.6/ 100	Relatively Moderate
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

SEVERE THUNDERSTORM/HIGH WIND

LOCATION AND SPATIAL EXTENT

A thunderstorm event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. It is assumed that George County has uniform exposure to an event and the spatial extent of an impact could be large. With that in mind, Figure A.22 shows the location of wind events that have impacted the county between 1955 and 2022.

FIGURE A.22: SEVERE THUNDERSTORM TRACKS IN GEORGE COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Severe storms were at least partially responsible for five disaster declarations in George County in 1980, 1990, 1991, 2016 and 2020. According to NCEI, there have been 83 reported thunderstorm and high wind events since 1968 in George County. These events caused over $977,000 in damages. There were also reports of 16 injuries. Table A.48 summarizes this information. Detailed thunderstorm and high wind event reports including date, magnitude, and associated damages for each event are presented in Table A.49.

TABLE A.48: SUMMARY OF THUNDERSTORM/HIGH WIND OCCURRENCES IN GEORGE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Lucedale	24	0/6	$550,223	$10,189
Unincorporated Area	59	0/10	$426,779	$7,903
GEORGE COUNTY TOTAL	83	0/16	$977,002	$18,092

Source: National Centers for Environmental Information

TABLE A.49: HISTORICAL THUNDERSTORM/HIGH WIND OCCURRENCES IN GEORGE COUNTY

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
Lucedale					
Lucedale	3/25/1994	Thunderstorm Wind	0 kts.	0/0	$8,126
Lucedale	3/25/1994	Thunderstorm Wind	0 kts.	0/1	$81,259
Lucedale	6/28/1995	Thunderstorm Wind	0 kts.	0/0	$158
Lucedale	7/9/1995	Thunderstorm Wind	0 kts.	0/0	$2,371
LUCEDALE	1/26/1996	Thunderstorm Wind	50 kts.	0/0	$3,070
LUCEDALE	7/3/1996	Thunderstorm Wind	55 kts.	0/0	$3,070
LUCEDALE	1/24/1997	Thunderstorm Wind	50 kts.	0/0	$4,502
LUCEDALE	5/28/1997	Thunderstorm Wind	50 kts.	0/0	$1,501
LUCEDALE	6/20/1997	Thunderstorm Wind	50 kts.	0/0	$1,501
LUCEDALE	11/1/1997	Thunderstorm Wind	50 kts.	0/0	$0
LUCEDALE	7/22/2000	Thunderstorm Wind	55 kts. E	0/0	$6,993
LUCEDALE	9/1/2000	Thunderstorm Wind	55 kts. E	0/0	$6,993
LUCEDALE	3/12/2001	Thunderstorm Wind	70 kts. E	0/0	$27,200
LUCEDALE	6/11/2001	Thunderstorm Wind	85 kts. E	0/5	$339,996
LUCEDALE	12/19/2002	Thunderstorm Wind	50 kts. E	0/0	$6,694
LUCEDALE	12/31/2002	Thunderstorm Wind	50 kts. E	0/0	$10,711
LUCEDALE	6/30/2003	Thunderstorm Wind	50 kts. EG	0/0	$6,545
LUCEDALE	1/31/2008	Thunderstorm Wind	50 kts. EG	0/0	$13,424
LUCEDALE	3/9/2011	Thunderstorm Wind	61 kts. EG	0/0	$10,707
LUCEDALE	6/3/2011	Thunderstorm Wind	52 kts. EG	0/0	$5,354
LUCEDALE	12/28/2015	Thunderstorm Wind	52 kts. EG	0/0	$3,049
LUCEDALE	3/17/2016	Thunderstorm Wind	52 kts. EG	0/0	$5,000
LUCEDALE	4/25/2019	Thunderstorm Wind	52 kts. EG	0/0	$2,000
LUCEDALE	3/31/2020	Thunderstorm Wind	70 kts. EG	0/0	$0
Unincorporated Area					
GEORGE CO.	11/3/1968	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	2/26/1971	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	2/21/1974	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	8/1/1976	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	3/7/1980	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	2/10/1981	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	9/23/1985	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	3/17/1987	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	5/24/1988	Thunderstorm Wind	0 kts.	0/0	$0

GEORGE CO.	7/3/1988	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	3/15/1990	Thunderstorm Wind	0 kts.	0/5	$0
GEORGE CO.	5/21/1990	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	6/3/1990	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	12/3/1990	Thunderstorm Wind	0 kts.	0/1	$0
GEORGE CO.	12/3/1990	Thunderstorm Wind	0 kts.	0/1	$0
GEORGE CO.	12/3/1990	Thunderstorm Wind	0 kts.	0/3	$0
GEORGE CO.	6/5/1991	Thunderstorm Wind	0 kts.	0/0	$0
GEORGE CO.	6/5/1991	Thunderstorm Wind	0 kts.	0/0	$0
Benndale	3/7/1995	Thunderstorm Wind	0 kts.	0/0	$0
Agricola	3/7/1995	Thunderstorm Wind	0 kts.	0/0	$3,161
Benndale	4/21/1995	Thunderstorm Wind	0 kts.	0/0	$2,371
Benndale	5/9/1995	Thunderstorm Wind	0 kts.	0/0	$790
Agricola	5/9/1995	Thunderstorm Wind	0 kts.	0/0	$1,580
Shipman	5/12/1995	Thunderstorm Wind	0 kts.	0/0	$790
GEORGE CO.	7/8/1995	Thunderstorm Wind	0 kts.	0/0	$3,161
Lucedale to Benndale 12/18/1995 Thunderstorm Wind 0 kts. 0/0	$4,741				
RUBLE	2/19/1996	Thunderstorm Wind	65 kts.	0/0	$15,351
BENNDALE	1/22/1998	Thunderstorm Wind	50 kts.	0/0	$4,433
COUNTYWIDE	6/5/1998	Thunderstorm Wind	60 kts.	0/0	$147,763
AGRICOLA	1/2/1999	Thunderstorm Wind	50 kts.	0/0	$7,228
BENNDALE	6/8/1999	Thunderstorm Wind	50 kts.	0/0	$5,783
AGRICOLA	7/20/2000	Thunderstorm Wind	55 kts. E	0/0	$9,791
BENNDALE	10/13/2001	Thunderstorm Wind	60 kts. E	0/0	$20,400
MOVELLA	10/13/2001	Thunderstorm Wind	60 kts. E	0/0	$13,600
AGRICOLA	4/8/2002	Thunderstorm Wind	50 kts. E	0/0	$9,372
MOVELLA	6/30/2003	Thunderstorm Wind	50 kts. EG	0/0	$6,545
AGRICOLA	11/15/2006	Thunderstorm Wind	50 kts. EG	0/0	$17,921
MERRILL	1/31/2008	Thunderstorm Wind	50 kts. EG	0/0	$16,780
BEXLEY	1/31/2008	Thunderstorm Wind	50 kts. EG	0/0	$13,424
BENNDALE	3/9/2011	Thunderstorm Wind	52 kts. EG	0/0	$1,071
BASIN	4/4/2011	Thunderstorm Wind	50 kts. EG	0/0	$53,537
AGRICOLA	6/10/2011	Thunderstorm Wind	52 kts. EG	0/0	$5,354
BENNDALE	12/20/2012	Thunderstorm Wind	61 kts. EG	0/0	$7,343
AGRICOLA	12/25/2012	Thunderstorm Wind	70 kts. EG	0/0	$10,490
LATONIA	2/15/2016	Thunderstorm Wind	52 kts. EG	0/0	$6,000
BENNDALE	5/19/2016	Thunderstorm Wind	52 kts. EG	0/0	$3,000
BASIN	5/19/2016	Thunderstorm Wind	52 kts. EG	0/0	$3,000
EVANSTON	5/19/2016	Thunderstorm Wind	52 kts. EG	0/0	$3,000
BASIN	5/17/2018	Thunderstorm Wind	52 kts. EG	0/0	$5,000
SHIPMAN	4/14/2019	Thunderstorm Wind	52 kts. EG	0/0	$10,000
BENNDALE	4/18/2019	Thunderstorm Wind	52 kts. EG	0/0	$5,000
BENNDALE	4/23/2020	Thunderstorm Wind	61 kts. EG	0/0	$0

AGRICOLA	4/10/2021	Thunderstorm Wind	52 kts. EG	0/0	$0
MOVELLA	4/24/2021	Thunderstorm Wind	52 kts. EG	0/0	$0
EVANSTON	6/06/2021	Thunderstorm Wind	52 kts. EG	0/0	$0
AGRICOLA	12/30/2022	Thunderstorm Wind	52 kts. EG	0/0	$0

all damage may not have been reported.
†E = estimated; EG = estimated gust; ES = estimated sustained; MG = measured gust; MS = measured sustained
Source: National Centers for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

Given the high number of previous events, it is certain that thunderstorm events, including straight-line wind events, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for the entire county.

FEMA NRI Expected Annual Loss Estimates

Table A.50: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HIGH WIND EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
2.1 Events/Year	0.01	$168,638	$89,679	$68	$258, 384	44.5	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

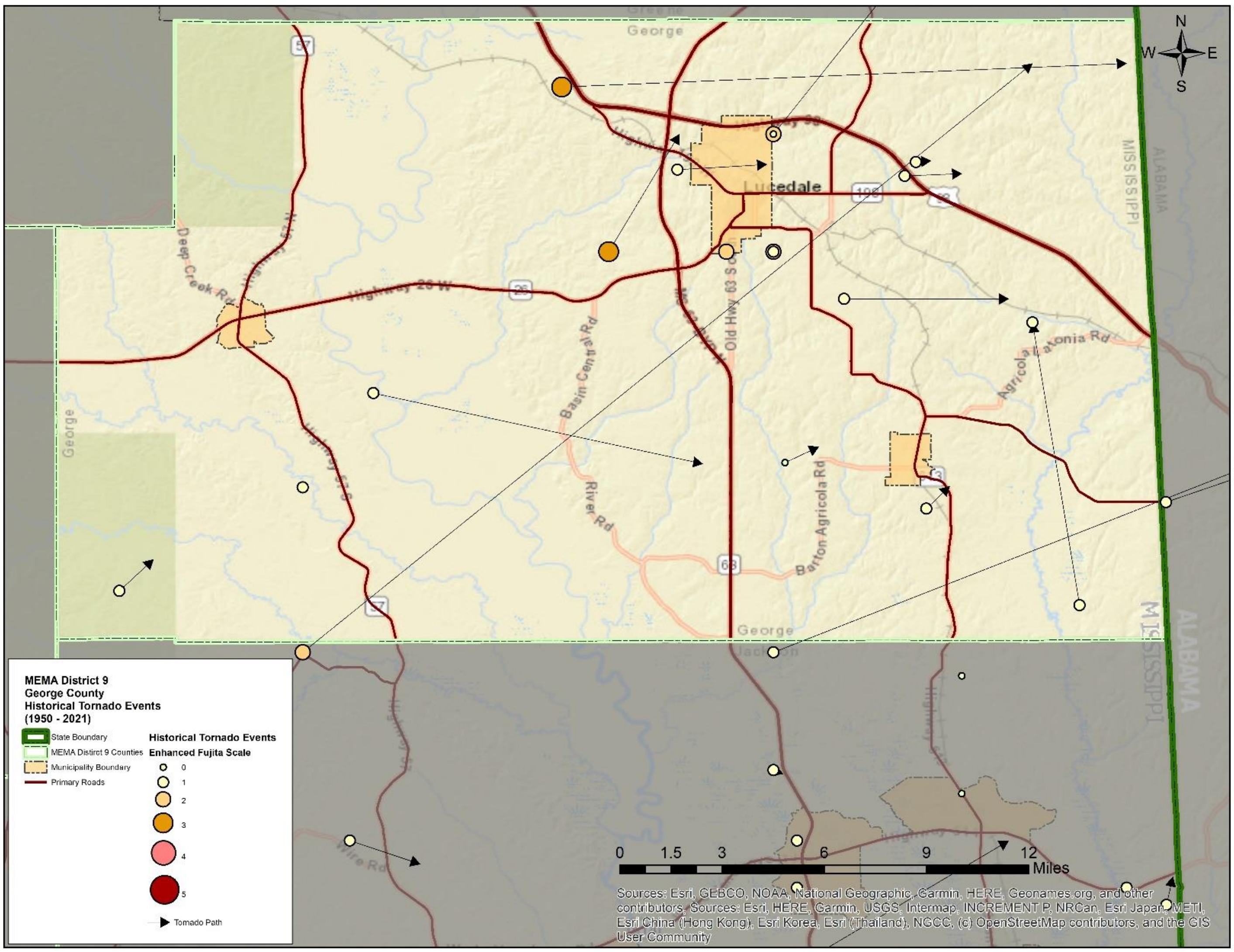
Table A.51: George County Hazard Specific Risk Index Table

GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HIGH WIND	
Risk Index Score	Risk Index Rating
46.9/ 100	Relatively Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

TORNADO
LOCATION AND SPATIAL EXTENT

Tornadoes occur throughout the state of Mississippi, and thus in George County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that George County is uniformly exposed to this hazard. With that in mind, Figure A.23 shows tornado track data for many of the major tornado events that have impacted the county between 1950 and 2021. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

Figure A.23: George County Historical Tornado Events: (1950-2021)



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Tornadoes were at least partially responsible for three disaster declarations in George County in 1980, 1990, and 1991. According to the National Centers for Environmental Information, there have been a total of 16 recorded tornado events in George County since 1967, resulting in almost $4.9 million in property damages. In addition, 15 injuries were reported. The magnitude of these tornadoes ranged from F0 to F3 in intensity. A summary of these events is presented in Table A.52. Detailed information on historic tornado events can be found in Table A.53.

TABLE A.52: SUMMARY OF TORNADO OCCURRENCES IN GEORGE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Lucedale	3	0/0	$12,750	$232
Unincorporated Area	13	0/15	$4,871,848	$88,579
GEORGE COUNTY TOTAL	16	0/15	$4,884,598	$88,811

Source: National Centers for Environmental Information

TABLE A.53: HISTORICAL TORNADO IMPACTS IN GEORGE COUNTY

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Lucedale					
LUCEDALE	10/19/2004	F0	0/0	$12,750	A weak tornado briefly touched down just north of Lucedale. The tornado damaged several storage buildings at a nursery. Several trees and power lines were also blown down.
Unincorporated Area					
GEORGE CO.	5/2/1967	F2	0/0	$0	--
GEORGE CO.	2/12/1971	F2	0/1	$148,675	--
GEORGE CO.	2/12/1971	F2	0/2	$1,486,747	Tornado dipped down irregularly for about 25 miles with varying amounts of damage, first west of Pascagoula River near Old Wilkerson Ferry crossing, then through Central community, to just S of Lucedale and leaving its last trace at the Hall residence, Brushy Creek (near U.S. Hwy. 98). At 2 S Lucedale on Highway 613 a mobile home lurched forward onto a car and the trailer was badly damaged, mother and 5-year old girl received bruises. Total damage estimated about $74,000.
GEORGE CO.	2/12/1971	F1	0/0	$0	Tornado reported in Broome community at approximately 9:40 a.m. Two trailers said to

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					have been toppled and 1 house unroofed. Newspaper noted, "Telephone communications were knocked out in the Broome community…." Area located near George and Jackson County line, north of Vestry.
GEORGE CO.	4/7/1973	F2	0/0	$13,562	--
GEORGE CO.	9/13/1973	F1	0/0	$135,615	Tornado touched down briefly and destroyed 2 barns and unroofed two houses. FPP 1??
GEORGE CO.	3/27/1976	F3	0/0	$1,058,229	The tornado leveled one acre of trees near Bexley 6 NW of Lucedale. Moving E the gym and teachers' home at the Rocky Creek School was damaged to the tune of $100,000 - roof and window damage. A nearby Baptist church had $75,000 damage to the roof, steeple, and heating/cooling system. Near Hwy 63 a barn was damaged. In Brushy Creek Community, a frame house was lifted off its foundation, the porch and part of the roof was blown off, 1 chicken house damaged and one mobile home overturned. "Lightning was a steady quiver." Damage $200,000.
GEORGE CO.	5/19/1980	F3	0/0	$730,743	A tornado touched down about 4 miles WSW of Lucedale, moving NNE across HWY 98 before lifting. Two houses were destroyed, 11 damaged, and 5 trailers and several barns and vehicles were damaged. Property damage estimated at $350,000.
GEORGE CO.	3/29/1987	F1	0/0	$530,046	A tornado touched down 3 miles southeast of Lucedale and traveled 3 miles eastward before dissipating. Several barns were damaged and fences laid flat. Although the tornado moved through a sparsely populated area, several homes and outbuildings were damaged.

GEORGE CO.	1/13/1992	F1	0/2	$429,175	Two homes and one mobile home were totally destroyed. Two people in the homes were injured and had to be taken to the hospital. The local fire station was severely damaged. Numerous other homes and businesses had minor damage. Numerous trees were also blown down.
AGRICOLA	10/25/1997	F1	0/7	$135,058	A mesocyclone intermittently produced a weak tornado as the storm tracked northeast across George county. The tornado first briefly touched down along River Road near the Barton community where trees were blown down. The tornado touched down again near Grain Elevator Road blowing down several century old Live Oak trees. The oak trees fell around a home which sustained only minor damage. The tornado touched down again just west of State Road 63 where it destroyed two mobile homes and caused major damage to another. Trees and some outbuildings were

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					also damaged. The tornado again briefly touched down along Barton Agricola Road where trees were blown down. The tornado then touched down in the Howell community on the edge of George county. Trees were blown down along County Road 612 where a mobile home was completely destroyed and another damaged. Six persons in the destroyed mobile home were injured. Most of the damage from the tornado was in the F0 range with F1 damage occurring with the destruction of the mobile homes in the Barton and Howell communities. A total of seven people were injured with two admitted to a hospital where they were later released. The tornado then moved into Mobile county just west of Wilmer.

MOVELLA	6/11/2001	F1	0/2	$203,997	A severe thunderstorm produced an F1 tornado in the southeast part of the county, first touching down near the Howell community about 3 miles east of Movella. The tornado first touched down just inside the George county line near Red Edwards Lane and Howell Road and moved north from there. Initially the tornado just produced tree damage, with some minor roof damage to a couple of homes. As the tornado moved north, it crossed Griffin Lane and totally destroyed a newer model manufactured home. The mobile home tie downs were pulled out of the ground and the home turned over and was torn apart as it rolled. The female occupant of the home was in the house at the time the tornado struck, and was injured, suffering a broken collarbone. The tornado then crossed Appaloosa Road and caused major damage to a two-story home. The family that lived at the home was upstairs when the tornado struck. They saw the tornado approaching and took shelter downstairs. They were not injured, but part of the roof of the house was ripped off, and the upstairs room that they were previously in was heavily damaged. The occupants said the tornado made very little noise as it approached. The tornado continued moving through a wooded area, crossing State Highway 612 just west of Walt Tanner Road. Here trees were blown down and a home received roof damage. The tornado continued moving north and destroyed four manufactured homes and blew down several trees near Sandy Hill Drive. The tornado then moved across a forested area and then did considerable damage along Lucas Road.

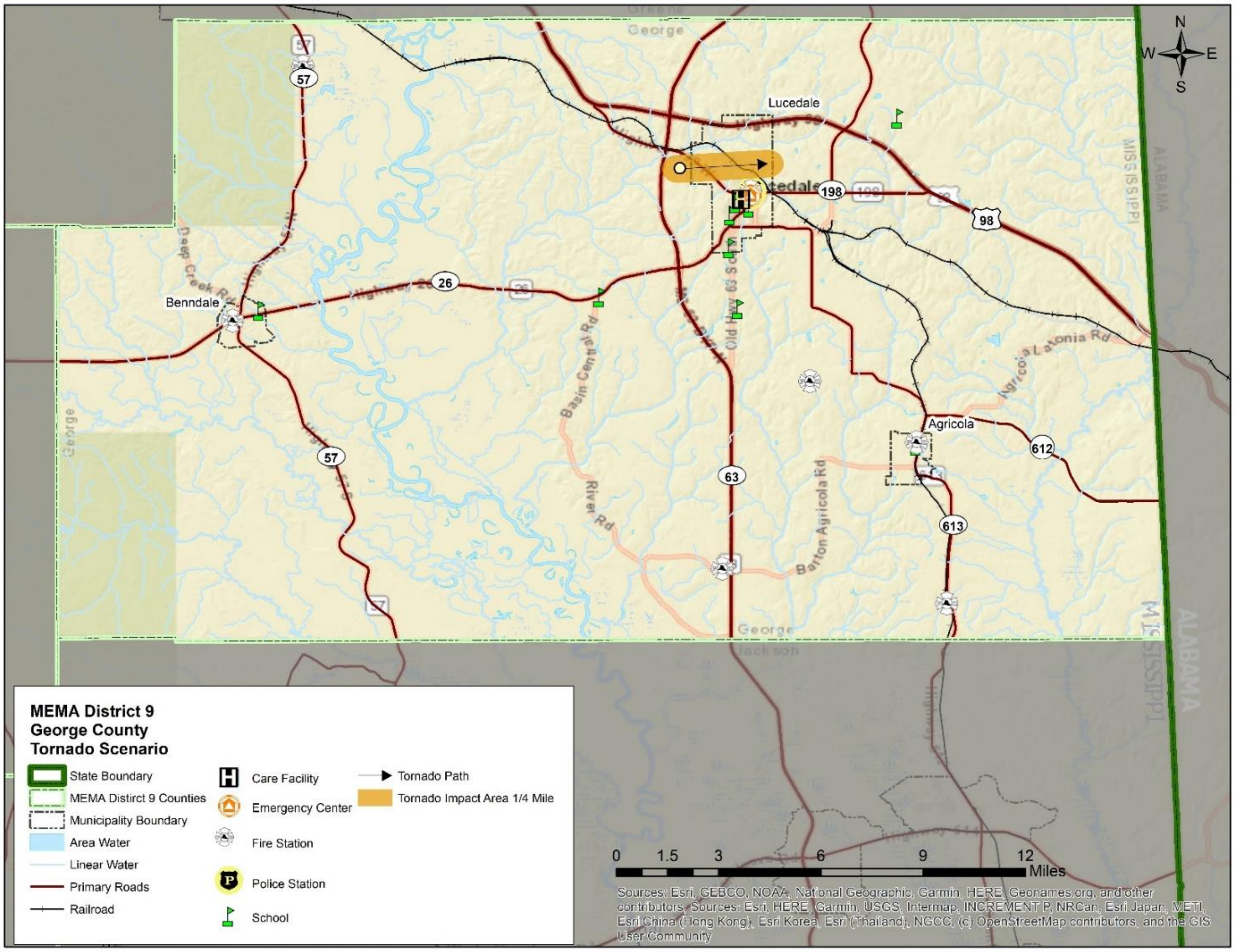
Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
GEORGE,CO	4/23/2020	Ef1	0/1	$0	Several homes were damaged and numerous trees were blown down in this area. The tornado then crossed U. S. Highway 98 and went back into the clouds near Moody Road. Damage to this area was mostly to trees. A strong spring storm system moved across southern states. High values of wind shear and instability combined to generate numerous severe thunderstorms that produced tornadoes and wind damage across southeast Mississippi. Just as the first tornado on David Wade Road lifted, another tornado touched down just west of Highway 98 and traveled east, paralleling just north of Old Mobile Highway and Gordon Road. The tornado lifted near Odom Road. This tornado resulted in significant tree damage, snapping a large amount of pine trees. Numerous large oak trees were also uprooted. The downed trees produced damage to a few homes. A few other homes suffered shingle and roof damage. There was also roof damage to a church at the split between Old Mobile Highway and Gordon Road. A travel trailer on Old Mobile Highway was flipped, resulting in a minor injury to one person.

all damage may not have been reported.
Source: National Centers for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

According to historical information, tornado events pose a significant threat to George County. The probability of future tornado occurrences affecting George County is highly likely (100 percent annual probability).

Figure A.24: George County Tornado Scenario



A tornado scenario was developed utilizing an existing EF1 tornado tract within George County a .25-mile buffer was added to the existing tract to illustrate potential impacts and distance from existing critical assets from a single tornadic event. The identified scenario places the tornadic event just north of the hospital and proximity to several schools.

FEMA NRI Expected Annual Loss Estimates

Table A.54: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR TORNADO EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.4 Events/year	0.06	$695,483	$416,745	$775	$1,113,004	54.8	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table A.55: George County Hazard Specific Risk Index Table

GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – TORNADO	
Risk Index Score	**Risk Index Rating**
57.7/ 100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

WINTER WEATHER

LOCATION AND SPATIAL EXTENT

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. George County is not accustomed to severe winter weather conditions and rarely receives severe winter weather, even during the winter months. Events tend to be mild in nature; however, even relatively small accumulations of snow, ice, or other wintery precipitation can lead to losses and damage due to the fact that these events are not commonplace. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

HISTORICAL OCCURRENCES

According to the National Centers for Environmental Information, there have been a total of six recorded winter storm events in George County since 2002. These events did not result in any property damage. A summary of these events is presented in Table A.56. Detailed information on the recorded winter storm events can be found in Table A.57.

TABLE A.56: SUMMARY OF WINTER STORM EVENTS IN GEORGE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
George County	4	0/0	$0	$0

Source: National Centers for Environmental Information

TABLE A.57: HISTORICAL WINTER STORM IMPACTS IN GEORGE COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Lucedale				
None reported	--	--	--	--
Unincorporated Area				
GEORGE (ZONE)	1/1/2002	Winter Storm	0/0	$0
GEORGE (ZONE)	12/11/2008	Winter Weather	0/0	$0
GEORGE (ZONE)	2/12/2010	Winter Storm	0/0	$0
GEORGE (ZONE)	2/3/2011	Winter Weather	0/0	$0
GEORGE (ZONE)	12/08/2017	Winter Weather	0/0	$0
GEORGE (ZONE)	1/16/2018	Winter Weather	0/0	$0

all damage may not have been reported.
Source: National Centers for Environmental Information

There have been several severe winter weather events in George County. The text below describes one of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

February 2010
An area of low pressure moved across the north central Gulf. Heavy rain changed over to snow across portions of the central gulf coast as the low moved to the east. Snowfall accumulations ranged from a dusting to as much as 4 inches across interior southeast Mississippi. Broadcast media reported 3 inches of snow on cars in Lucedale. The emergency manager reported 1 inch of snow across Stone County. Some power outages were also reported.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could catch fire or an accumulation of toxic fumes.

January 2018
Another winter weather event occurred across the area on the 16th into the 17th across the Gulf Coast. This marks only the 2nd time in recorded history that two measurable snow events occurred in one winter in Mobile. With low temperatures in the 20s, the winter accumulation resulted in very hazardous traveling conditions, particularly over bridges and overpasses. Several roads were closed throughout the area. Total snow amounts of 1 inch in Bexley and 1 inch in Lucedale.

PROBABILITY OF FUTURE OCCURRENCES

Winter storm events will continue to occur in George County. Based on historical information, the probability is likely (between 10 and 100 percent annual probability). Figure A.24 demonstrates a potential scenario.

FEMA NRI Expected Annual Loss Estimates

Table A.58: George County Expected Annual Loss Table

GEORGE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WINTER WEATHER EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.2 Events/year	0.00	$ 6,654	$5	$3	$6,662	14.4	Very Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table A.59: George County Hazard Specific Risk Index Table

GEORGE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WINTER WEATHER	
Risk Index Score	Risk Index Rating
12.9/ 100	Very Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

OTHER HAZARDS

CLIMATE CHANGE/SEA LEVEL RISE

LOCATION AND SPATIAL EXTENT

Climate Change

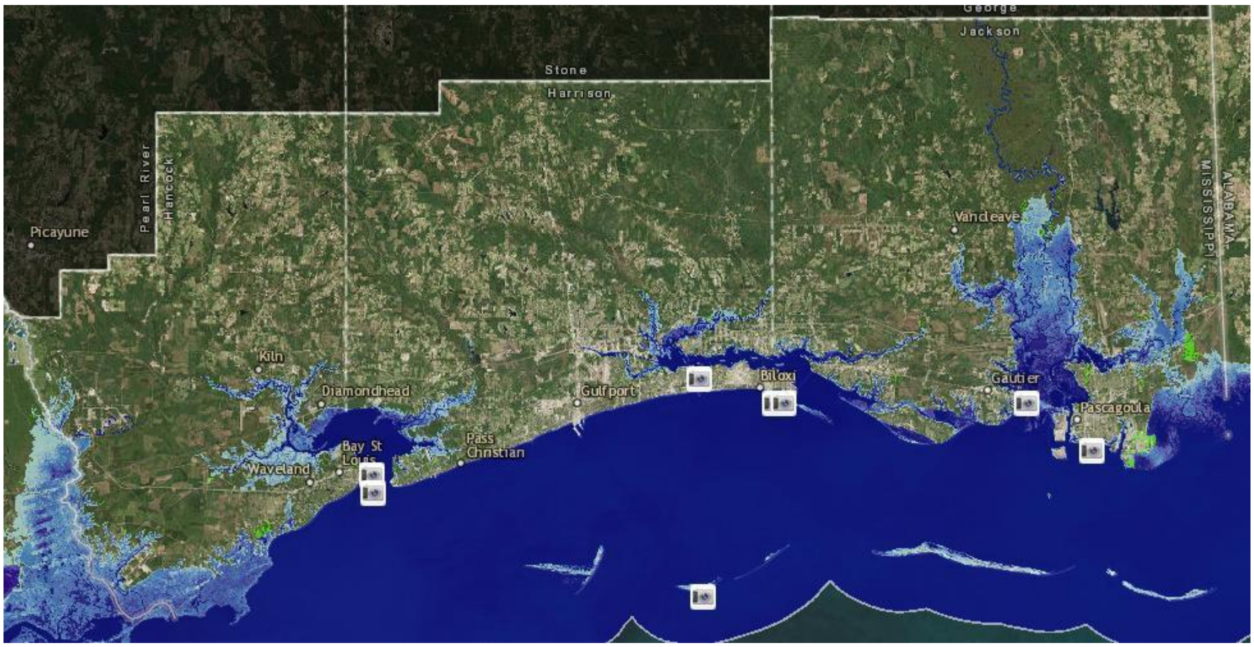
Climate change can have direct implications on many of the other hazards addressed in this plan since it has the potential to alter the nature and frequency of hazards, including increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, strong storms (wind, hurricane). Therefore, it is assumed that George County is uniformly exposed to this hazard.

Sea Level Rise

Sea level rise is occurring at a global scale. However, it does not affect areas uniformly and will be more severe in some places. Figure A.25 identifies areas in MEMA District 9 that would be inundated by water as a result of three feet in sea level rise as per projections by NOAA. The highest level of sea level rise projected by NOAA is shown in Figure A.26. This figure shows the inundation areas in the case of six feet of sea level rise. This demonstrates the additional areas that would be impacted beyond the three feet scenario.

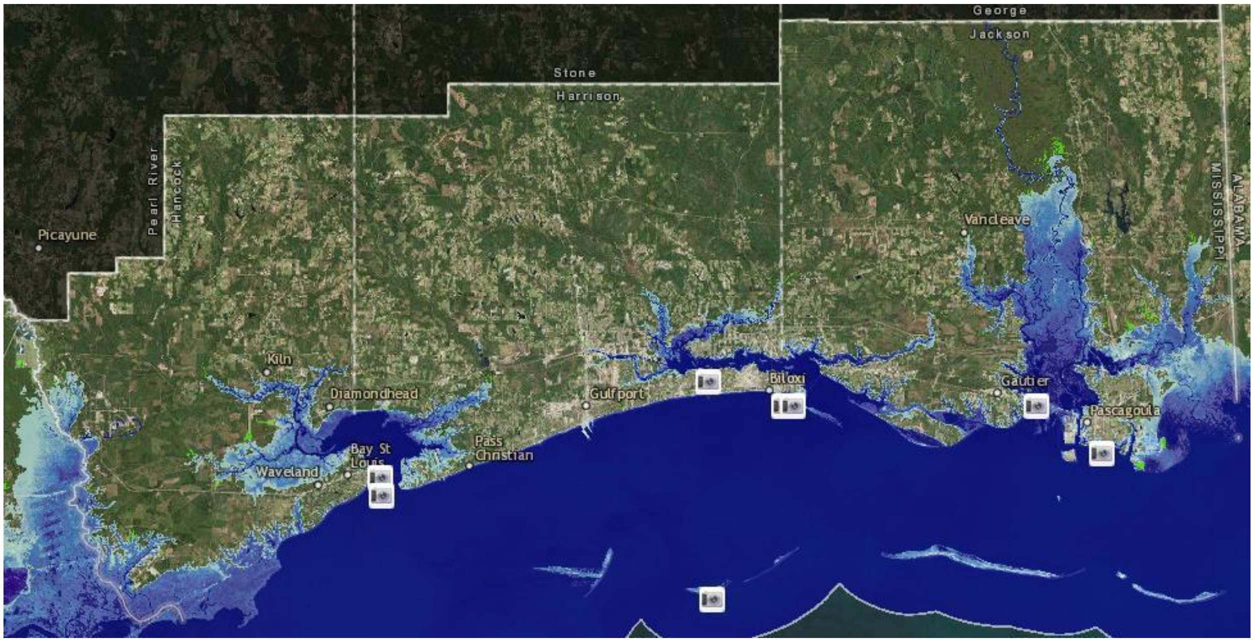
There are no areas in George County that would be impacted by projected sea level rise.

FIGURE A.25: THREE FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

FIGURE A.26: SIX FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

HISTORICAL OCCURRENCES

Climate Change
According to the National Climate Assessment, there have been increasing numbers of days above 95ºF and nights above 75ºF, and decreasing numbers of extremely cold days since 1970 in the Southeast. Daily and five-day rainfall intensities have also increased and summers have been either increasingly dry or extremely wet. The number of Category 4 and 5 hurricanes in the Atlantic basin has increased substantially since the early 1980s compared to the historic record that dates back to the mid-1880s. This can be attributed to both natural variability and climate change.

Sea Level Rise
Sea level rise is a slow-onset hazard and specific events/occurrences are not possible to determine.

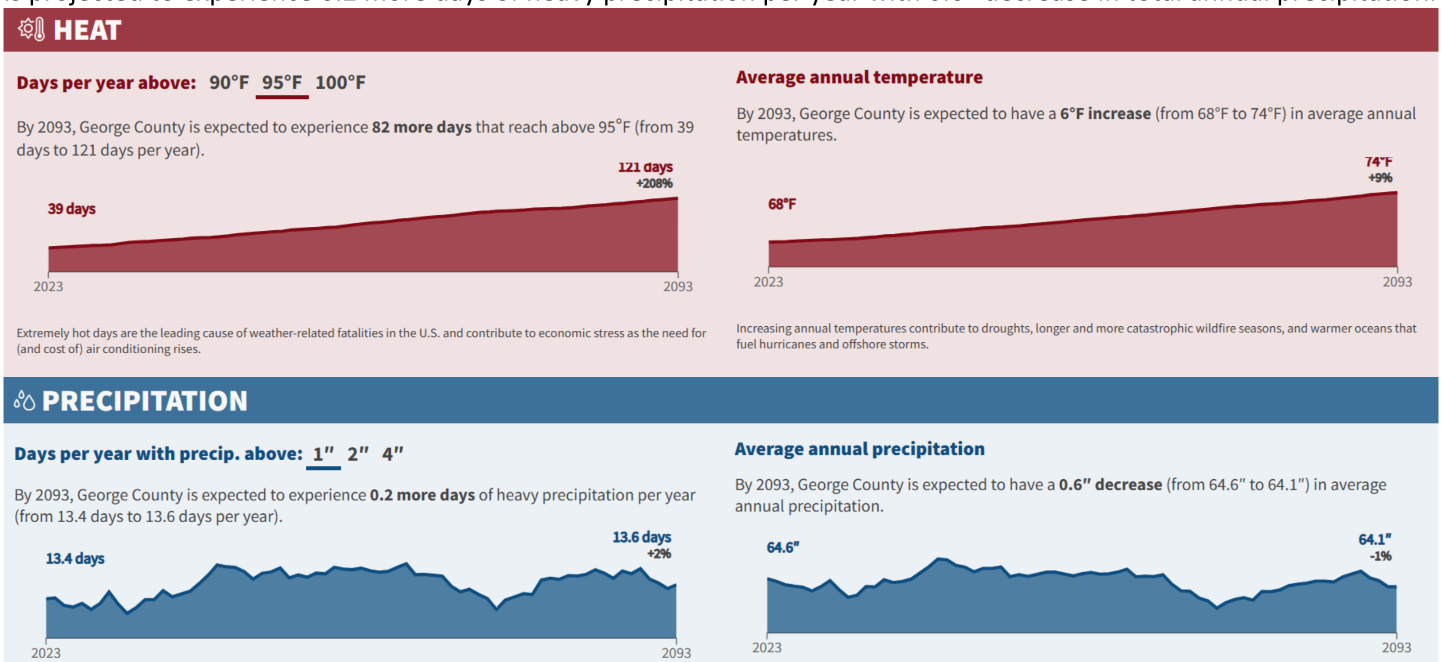
PROBABILITY OF FUTURE OCCURRENCES

Climate Change
According to the National Climate Assessment, temperatures across the Southeast are expected to increase during this century, with shorter-term (year-to-year and decade-to-decade) fluctuations over time due to natural climate variability. Major consequences of warming include significant increases in the number of hot days (95ºF or above) and decreases in freezing events. Regional average increases are in the range of 4ºF to 8ºF by the year 2100.

Projections of future precipitation patterns are less certain than projections for temperature increases. Because the Southeast is located in the transition zone between projected wetter conditions to the north and drier conditions to the southwest, many of the model projections show only small changes relative to natural variations. Additionally, projections further suggest that warming will cause tropical storms to be fewer in number globally, but stronger in force, with more Category 4 and 5 storms, and substantial further increases in extreme precipitation are projected as this century progresses.

Overall, future climate change is considered likely (between 10 and 100 percent annual probability).

According to Neighborhoods at Risk: George County can experience 82 more days per year reaching 95 degrees over the next 70 year projection with an overall 6 degree increase in average temperatures. In the same time period, the county is projected to experience 0.2 more days of heavy precipitation per year with 0.6” decrease in total annual precipitation.



[Neighborhoods at Risk (headwaterseconomics.org)](https://headwaterseconomics.org)

Sea Level Rise

There is still much debate regarding the probability of future occurrence of sea level rise. This section will be updated as more information becomes available. Future sea level rise is considered likely (between 10 and 100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

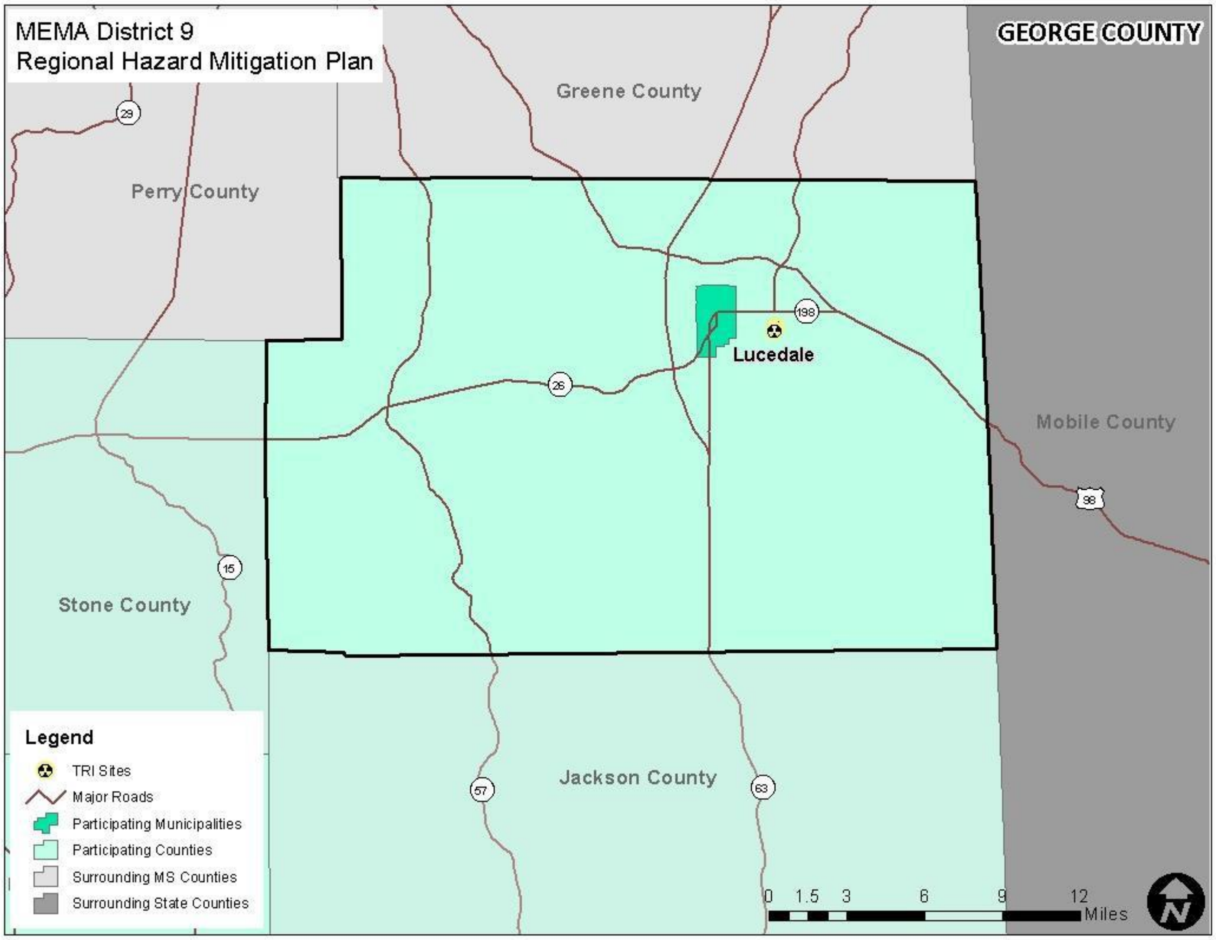
The FEMA NRI does not assess climate change or sea level rise.

<u>HAZARDOUS MATERIALS INCIDENT/TRAIN DERAILMENT</u>

LOCATION AND SPATIAL EXTENT

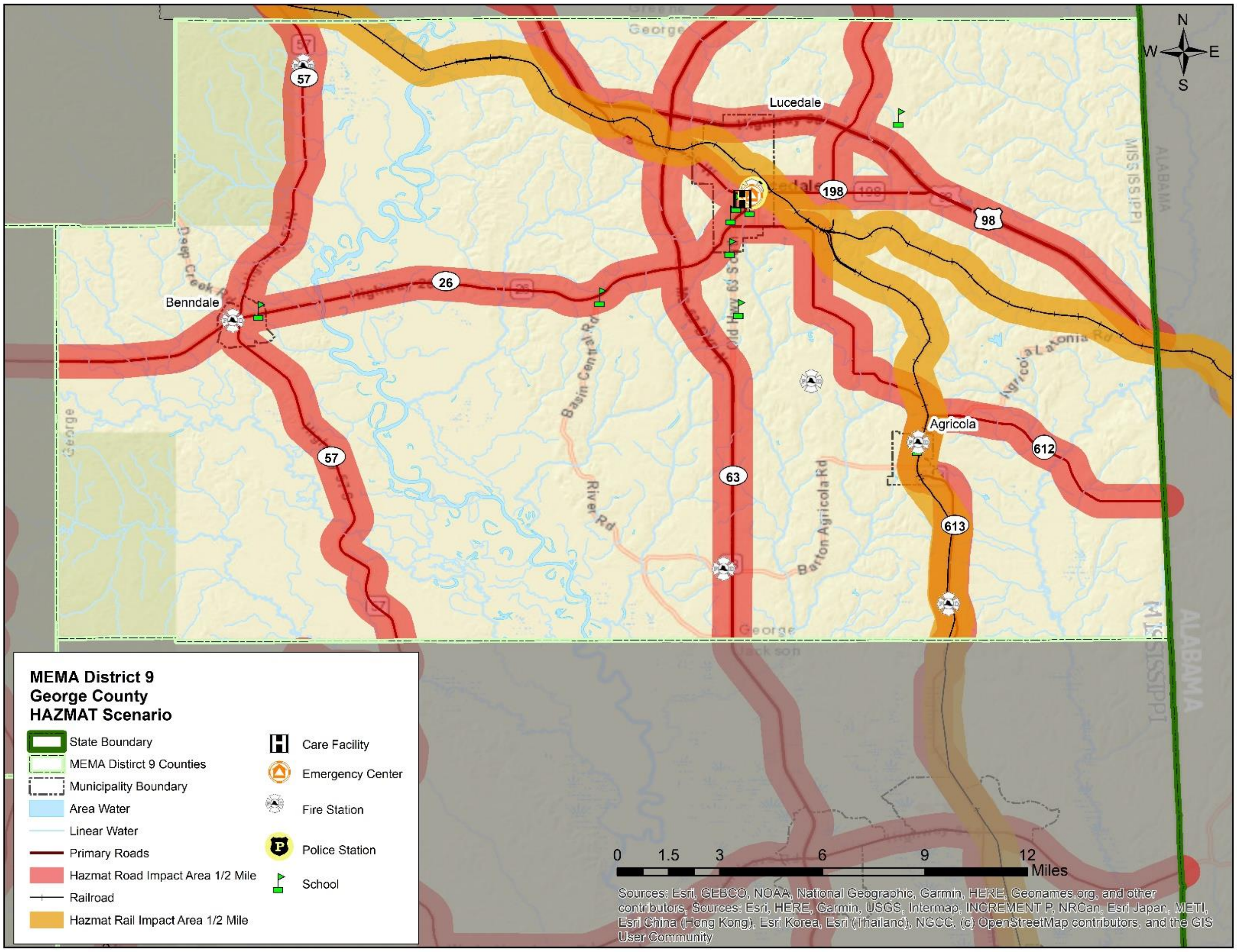
George County has two TRI sites. These sites are shown in Figure A.27.

FIGURE A.27: TOXIC RELEASE INVENTORY (TRI) SITES IN GEORGE COUNTY



Source: Environmental Protection Agency

Figure A.28: George County HAZMAT Scenario


MEMA District 9
George County
HAZMAT Scenario
State Boundary
MEMA Disitrct 9 Counties
Municipality Boundary
Area Water
Linear Water
Primary Roads
Hazmat Road Impact Area 1/2 Mile
Railroad
Hazmat Rail Impact Area 1/2 Mile
Care Facility
Emergency Center
Fire Station
Police Station
School
0 1.5 3 6 9 12 Miles
Lucedale
Benndale
Agricola
Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and railways. Many roads and railways in the county are subject to hazardous materials transport and all roads and railways that permit hazardous material transport are considered potentially at risk to an incident.

HISTORICAL OCCURRENCES

There have been a total of 11 recorded HAZMAT incidents in George County since 1972. These events resulted in more than $101,000 (2016 dollars) in property damage.25 Table A.60 summarizes the HAZMAT incidents in George County as reported by PHMSA. Detailed information on these events is presented in Table A.61.

TABLE A.60: SUMMARY OF HAZMAT INCIDENTS IN GEORGE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Lucedale	6	0/0	$10,174	$231
Unincorporated Area	5	0/0	$90,876	$3,635
GEORGE COUNTY TOTAL	11	0/0	$101,050	$3,866

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE A.61: HAZMAT INCIDENTS IN GEORGE COUNTY

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
Lucedale							
I-1973010274	12/20/1972	LUCEDALE	Highway	No	0/0	$0	0
I-1978060180	5/15/1978	LUCEDALE	Highway	No	0/0	$0	53 LGA
I-1984040054	3/22/1984	LUCEDALE	Highway	No	0/0	$0	100 LGA
I-1984040054	3/22/1984	LUCEDALE	Highway	No	0/0	$0	0
I-1995101092	10/11/1995	LUCEDALE	Highway	No	0/0	$0	3 LGA
E-2005090312	8/24/2005	LUCEDALE	Highway	No	0/0	$10,174	100 LGA
Unincorporated Area							
I-1991090732	8/26/1991	EVANSTON	Rail	No	0/0	$0	0
I-1996120803	12/4/1996	EVANSTON	Rail	No	0/0	$45,438	0
I-1996120803	12/4/1996	EVANSTON	Rail	No	0/0	$45,438	0
X-2009030224	3/9/2009	Crossroads	Highway	No	0/0	$0	0.0625 SLB
I-2012060438	5/27/2012	EVANSTON	Rail	No	0/0	$0	6.0156 GCF

all damage may not have been reported.
Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

PROBABILITY OF FUTURE OCCURRENCES

Given the location of two toxic release inventory sites in George County and prior roadway and railway incidents, it is highly likely (100 percent annual probability) that a hazardous material incident may occur in the county. County and city officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

The FEMA NRI does not assess HAZMAT events.

INFECTIOUS DISEASE

LOCATION AND SPATIAL EXTENT

Due to the nature of a public health/emerging disease threat, it is difficult to identify a precise location where this type of event would occur. Moreover, a large-scale event would have impacts that spread throughout the county. Therefore, all areas in George County are considered equally susceptible to infectious diseases.

HISTORICAL OCCURRENCES

Mosquito-borne illness in Mississippi include West Nile virus, Chikungunya virus, and Zika virus. These illnesses affect birds, animals, and humans, causing flu-like symptoms in people who are bitten by infected mosquitoes. Occasionally illness can be severe, leading to meningitis or encephalitis. According to the Mississippi State Department of Health (MSDH), there has been one reported case of West Nile Virus in George County as of November 2016 but this case did not result in death. Table A.62 summarizes the mosquito-borne illnesses in humans reported in the county.

TABLE A.62: SUMMARY OF MOSQUITO-BORNE ILLNESSES IN GEORGE COUNTY

Location	West Nile Virus	Chikungunya	Zika	Other*	Deaths
George County	1	0	0	0	0

*Other mosquito-borne illnesses include La Crosse encephalitis, St. Louis encephalitis, and Eastern Equine encephalitis.
Source: Mississippi State Department of Health

Diseases like influenza and norovirus are regularly occurring health issues in George County. These conditions are not legally reportable to county or state public health agencies, so data on disease incidence is not readily available. MSDH relies upon selected sentinel health practitioners across the state to report the percentage and total patient visits consistent with an influenza-like illness (ILI): fever of 100°F or higher and cough or sore throat. Reports are used to estimate the state's ILI rate and the magnitude of state's influenza activity on a weekly basis. Reports represent only the distribution of flu in the state, not an actual count of all flu cases statewide.

PROBABILITY OF FUTURE OCCURRENCES

Due to some recent incidents that have been recorded across the State of Mississippi and in George County, future occurrences are considered possible (between 1 and 10 percent annual probability).

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

The FEMA NRI does not assess infectious diseases.

CONCLUSIONS ON HAZARD RISK

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

HAZARD EXTENT

Table A.63 describes the extent of each hazard identified for George County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE A.63: EXTENT OF GEORGE COUNTY HAZARDS

<table>
<tr><th colspan="2">Flood-related Hazards</th></tr>
<tr><td>Dam and Levee Failure</td><td>Dam failure extent is defined using the Mississippi Division of Environmental Quality classifications which include Low, Significant, and High. No dams are classified as high-hazard
in George County.</td></tr>
<tr><td>Erosion</td><td>The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in George County.</td></tr>
<tr><td>Flood</td><td>Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest flood recorded for the county was at Pascagoula River at Merrill. The maximum historic crest was recorded at 32.5 feet, or 0.5 feet above the major flood stage (reported on April 1, 1900). Additional historic crest heights and the corresponding flood categories are in the table below.
<table>
<tr><th rowspan="2">Location/ Jurisdiction</th><th rowspan="2">Date</th><th rowspan="2">Maximum Historic Crest (ft)</th><th colspan="4">Flood categories</th></tr>
<tr><th>Action Stage (ft)</th><th>Flood Stage (ft)</th><th>Moderate Flood Stage (ft)</th><th>Major Flood Stage (ft)</th></tr>
<tr><td colspan="4">George County</td><td></td><td></td><td></td></tr>
<tr><td>PASCAGOULA RIVER AT MERRILL</td><td>April 1, 1900</td><td>32.50</td><td>12.5</td><td>22</td><td>25</td><td>32</td></tr>
<tr><td>ESCATAWPA RIVER NEAR AGRICOLA</td><td>n/a</td><td>n/a</td><td>16</td><td>18</td><td>n/a</td><td>n/a</td></tr>
</table></td></tr>
<tr><td>Storm Surge</td><td>Storm surge can be defined by the depth of inundation which is defined by the category of hurricane/tropical storm. Since the MEMA District 9 Region could easily be impacted by a Category 3 storm, depth of inundation could be at least 9 feet in many areas. However, there is only a small area in George County that could potentially be impacted.</td></tr>
</table>

Fire-related Hazards	
Drought	Drought extent is defined by the U.S. Drought Monitor classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought. According to the U.S. Drought Monitor classifications, the most severe drought condition is Exceptional. George County has received this ranking twice over the 17-year reporting period.
Lightning	According to the Vaisala's flash density map, George County is located in an area that experiences 4 to 12 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Wildfire	Wildfire data was provided by the Mississippi Forestry Commission and is reported annually by county from 2007-2022. The greatest number of fires to occur in George County in any year 79 in 2007. The greatest number of acres to burn in the county in a single year occurred in
	2007 when 789 acres were burned. Information on specific occurrences of wildfire and the most severe fires in each jurisdiction is not available. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale, the Modified Mercalli Intensity (MMI) scale, and the distance of the epicenter from George County. According to data provided by the National Centers for Environmental Information, no earthquakes were reported in George County.
Wind-related Hazards	
Extreme Cold	The extent of extreme cold can be defined by the minimum temperature reached. Official long term temperature records are not kept for any areas in George County. However, the temperature has previously ranged from 15 to 20 degrees Fahrenheit in southwest and coastal Mississippi (reported on December 18, 1996).
Extreme Heat	The extent of extreme heat can be measured by the record high temperature recorded. Official long term temperature records are not kept for any areas in George County. However, the highest recorded temperature in Beaumont (northwest of the county) was 105°F and heat index values were recorded as high as 115°F (reported in July 2000).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in George County was 2.00 inches (reported on March 11, 1968). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5. The greatest classification of hurricane to traverse directly through George County was Hurricane Frederic, a Category 3 storm which carried tropical force winds of 97 knots upon arrival in the county.
Severe Thunderstorm/High Wind	Thunderstorm extent is defined by wind speeds reported. The strongest recorded wind event in George County was 85 knots (reported on June 11, 2001). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by the Fujita/Enhanced Fujita. The greatest magnitude reported in George County was an F3 (last reported on May 19, 1980).
Winter Weather	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest snowfall reported in George County was 3 inches (reported on February 12, 2010).

Other Hazards	
Climate Change/Sea Level Rise	It is still uncertain what the extent of climate change will be in the future. However, increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, stronger storms (wind, hurricanes) can be expected. Sea level rise is defined by the areas impacted, but is more often associated with the amount of sea level rise that is expected to take place. Although it is difficult to predict an exact amount of rise, the Climate Change Surging Seas Report intermediate high sea level rise scenario projects 1 foot of rise locally by 2050 and 3.7 feet by 2100.
Hazardous Materials Incident/Train Derailment	According to USDOT PHMSA, the largest hazardous materials incident reported in George County was 100 LGA released on the highway (reported on March 22, 1984). It should be noted that larger events are possible.
Infectious Disease	An infectious disease threat could have large-scale effects throughout the county and may cause illness in many people. Possible impacts from a disease threat depend largely on the impacted population, but might include anything from absenteeism and loss of productivity in
	the workplace to death or serious illness to humans or livestock. A serious disease threat could affect many thousands of people.

PRIORITY RISK INDEX RESULTS

In order to draw some meaningful planning conclusions on hazard risk for George County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). More information on the PRI and how it was calculated can be found in Section 5.21.2.

Table A.64 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the qualitative risk rankings conducted at the jurisdictional workshops along with quantitative analyses conducted to include additional criteria associated with vulnerability, climate change , future development and underserved populations. Assigned risk levels were based on the detailed hazard profiles developed for this subsection, as well as input from the Regional Hazard Mitigation Council. The results were then used in calculating risk index values and making final determinations for the risk assessment.

TABLE A.64: SUMMARY OF PRI RESULTS FOR GEORGE COUNTY

		Probability	Consequence				Total Risk
No	Hazard Event	Probability Facto	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Factors	Sum of Weighted Impact Factors	Consequence Score	Total Risk Score (Probability x Consequence)
1	Dam and Levee Failure	0	0	1	-	1	0
2	Erosion	2	0	2	8	10	13
3	Flood	3	8	12	31	51	77
4	Storm Surge	0	0	0	-	-	0
5	Drought	2	8	11	16	35	39
6	Lightning	3	7	11	19	37	59
7	Wildfire	3	8	6	21	35	56
8	Earthquake	0	0	3	12	15	0
9	Extreme Cold	1	1	5	18	24	16
10	Extreme Heat/Heat Wave	3	8	10	21	39	61
11	Hailstorm	2	1	2	10	13	17
12	Hurricane Tropical Storm	2	12	17	36	65	67
13	Severe Thunderstorm/High W	3	11	16	28	55	82
14	Tornado	3	5	12	34	51	77
15	Winter Weather	2	0	5	24	29	33
16	Climate Change/Sea Level Ris	1	0	3	13	16	11
17	HAZMAT/Train Derailment	1	4	6	19	29	18
18	Infectious Disease	1	8	8	21	37	23

FINAL DETERMINATIONS ON HAZARD RISK

The conclusions drawn from the hazard profiling process for George County, including the risk index results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (Table A.65). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of George County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: Vulnerability Assessment and below in Section A.3. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

Some priorities have changed since the previous plans were adopted due to the merging of multiple local plans to form this regional plan; however, most priorities remain the same.

TABLE A.65: CONCLUSIONS ON HAZARD RISK FOR GEORGE COUNTY

HIGH RISK	Hurricane and Tropical Storm Flood Severe Thunderstorm/High Wind Tornado
MODERATE RISK	Hazardous Materials Incident/Train Derailment Extreme Heat Wildfire Drought Climate Change/Sea Level Rise Lightning
LOW RISK	Hailstorm Dam and Levee Failure Erosion Infectious Disease Winter Weather Extreme Cold Earthquake Storm Surge

SECTION 11 GEORGE COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of George County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: Vulnerability Assessment.

ASSET INVENTORY

Table A.66 lists the estimated number of buildings, parcels, and the total value of improvements for George County and its participating jurisdictions (study area of vulnerability assessment). Because digital parcel data was not available for every community, data obtained from Hazus-MH 3.2 inventory was utilized to supplement the analysis where gaps existed.

TABLE A.66: IMPROVED PROPERTY IN GEORGE COUNTY

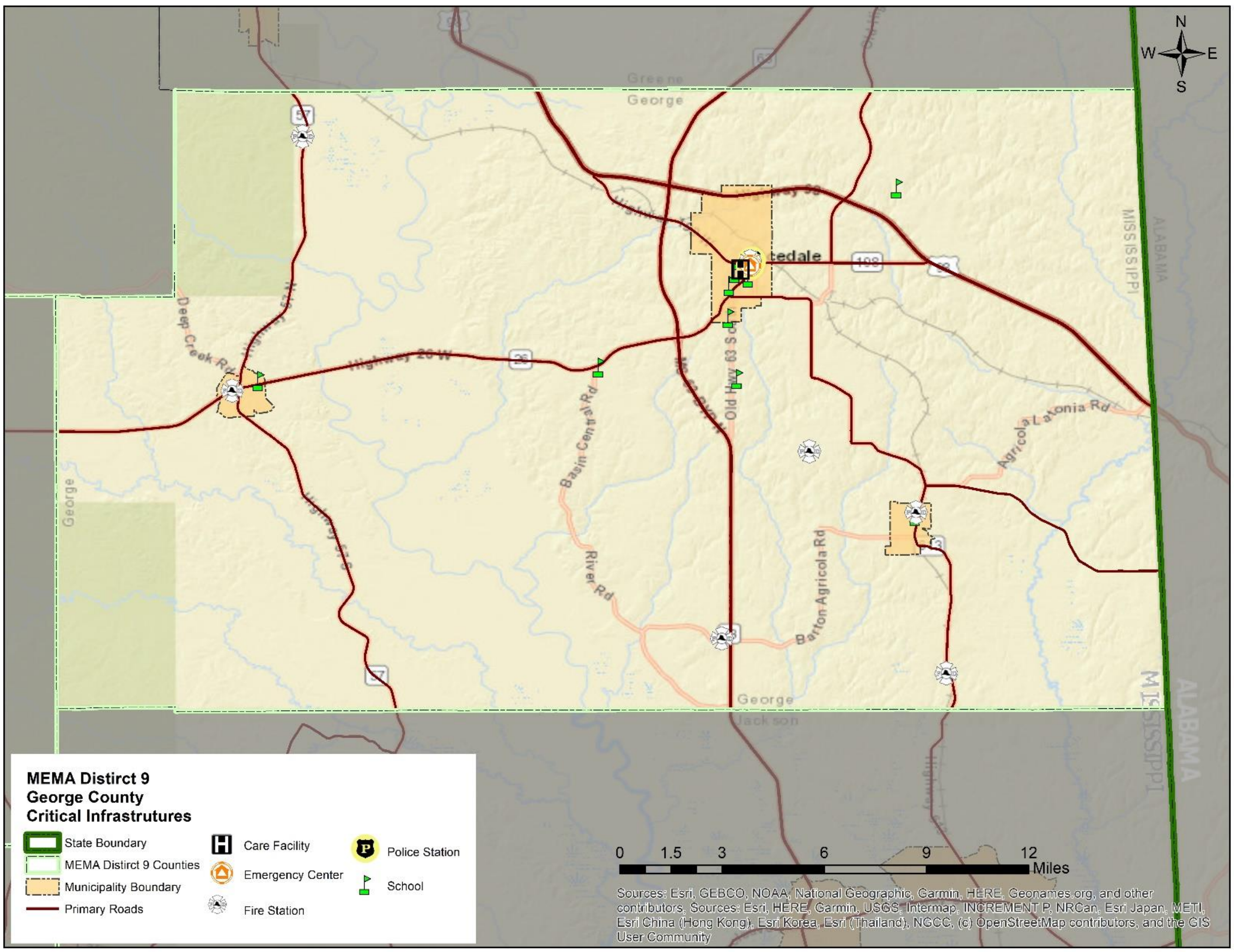
Location	Counts of Buildings	Counts of Parcels	Total Value of Improvements
Lucedale	1,538	--	$335,976,000

Location	Counts of Buildings	Counts of Parcels	Total Value of Improvements
Unincorporated Area	8,783	--	$1,463,942,000
GEORGE COUNTY TOTAL*	10,321	--	$1,799,918,000

*Parcel counts and improvement values for George County are based on Hazus 3.2 estimates at the Census Block level
Source: MDEQ, Hazus-MH 3.2

In addition, Figure A.29 shows the locations of critical facilities in George County. Table A.84, at the end of this subsection, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. Further, it should be noted that the table below may show that some communities do not have any critical facilities of in certain type, when in reality, that particular type of facility may actually be located within the community. This may occur because spatial data for that facility type was not available or because the facility may have been classified under a different category type for that particular community.

Figure A.29: George County Critical Infrastructure Map



Source: Local Governments

Social Vulnerability
In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in George County that are potentially at risk to these hazards.

Table A.69 lists the population by jurisdiction according to American Community Survey 2019 population estimates. The total population in George County according to Census data is 23,917 persons. Additional population estimates are presented above in Section A.1.

TABLE A.67: TOTAL POPULATION IN GEORGE COUNTY

Location	Total 2019 Population
Lucedale	2,910
Unincorporated Area	20,111
GEORGE COUNTY TOTAL	23,917

Source: United States Census Bureau, 2015-2019 American Community Survey 5-Year Estimates

Development Trends and Changes in Vulnerability

Since the previous local-level hazard mitigation plans were approved, George County has experienced moderate growth and development. Table A.70 shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey. Updated data from 2020 census data was unavailable at the existing level of detail for the 2022 HMP update. The previous data used is considered best available data.

TABLE A.68: BUILDING COUNTS FOR GEORGE COUNTY

Location	2010		2011	2012	2013	2014	2015	% Building Stock Built Post-2010
Lucedale	1,174		1,264	1,250	1,236	1,126	1,113	-5.2%

Location	2010	2011	2012	2013	2014	2015	% Building Stock Built Post-2010
Unincorporated Area	7,899	7,951	8,023	8,062	8,216	8,242	4.3%
GEORGE COUNTY TOTAL	9,073	9,215	9,273	9,298	9,342	9,355	3.1%

Source: United States Census Bureau, American Community Survey

Table A.69 shows population growth estimates for the county from 2010 to 2015 based on the based on the American Community Survey's annual population estimates.

TABLE A.69: POPULATION GROWTH FOR GEORGE COUNTY

Location	Population Estimates						% Change 2010-2015
	2010	2011	2012	2013	2014	2015	
Lucedale	2,934	2,936	2,943	2,959	2,978	2,993	2.0%
Unincorporated Area	19,127	19,425	19,636	19,798	19,982	20,111	5.1%
GEORGE COUNTY TOTAL	22,061	22,361	22,579	22,757	22,960	23,104	4.7%

Source: United States Census Bureau, American Community Survey

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains or other identified areas of high risk.

VULNERABILITY ASSESSMENT RESULTS

As noted in Section 6: Vulnerability Assessment, only hazards with a specific geographic boundary, available modeling tool, or sufficient historical data allow for further analysis. Those results, specific to George County, are presented here. All other hazards are assumed to impact the entire planning region (e.g., drought) or, due to lack of data, analysis would not lead to credible results (e.g., infectious disease). The total county exposure, and thus risk to these hazards, was presented in Table A.65.

The hazards to be further analyzed in this subsection include: flood, wildfire, earthquake, hurricane and tropical storm winds and storm surge, hazardous materials incident, dam and levee failure, and sea level rise.

The annualized loss estimate for all hazards is presented near the end of this subsection in Table A.83.

FLOOD

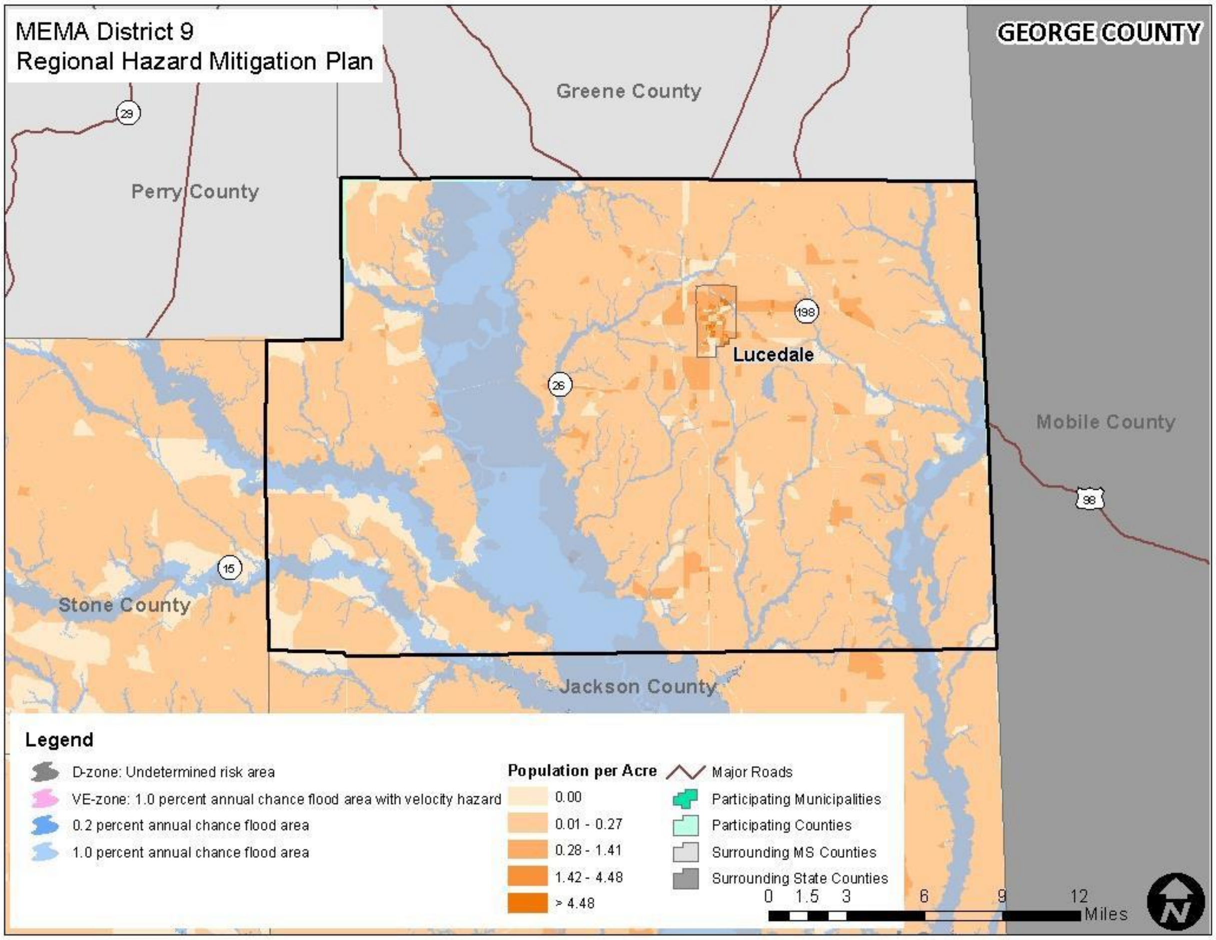
In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with improved property records for George County. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified floodplain.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Social Vulnerability

Figure A.31 is presented to gain a better understanding of at-risk population by evaluating census block level population data against mapped floodplains. There are areas of concern in several of the population centers in the county. Therefore, there is significant population vulnerability to flooding.

FIGURE A.30 : POPULATION DENSITY NEAR FLOODPLAINS IN GEORGE COUNTY



Source: Federal Emergency Management Agency DFIRM, United States Census 2020

Critical Facilities

The critical facility analysis revealed that there are no facilities located in one of the identified floodplain zones. A list of specific critical facilities and their associated risk can be found in Table A.84 at the end of this subsection.

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in George County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. Such site-specific vulnerability determinations are outside the scope of this assessment but may be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

WILDFIRE

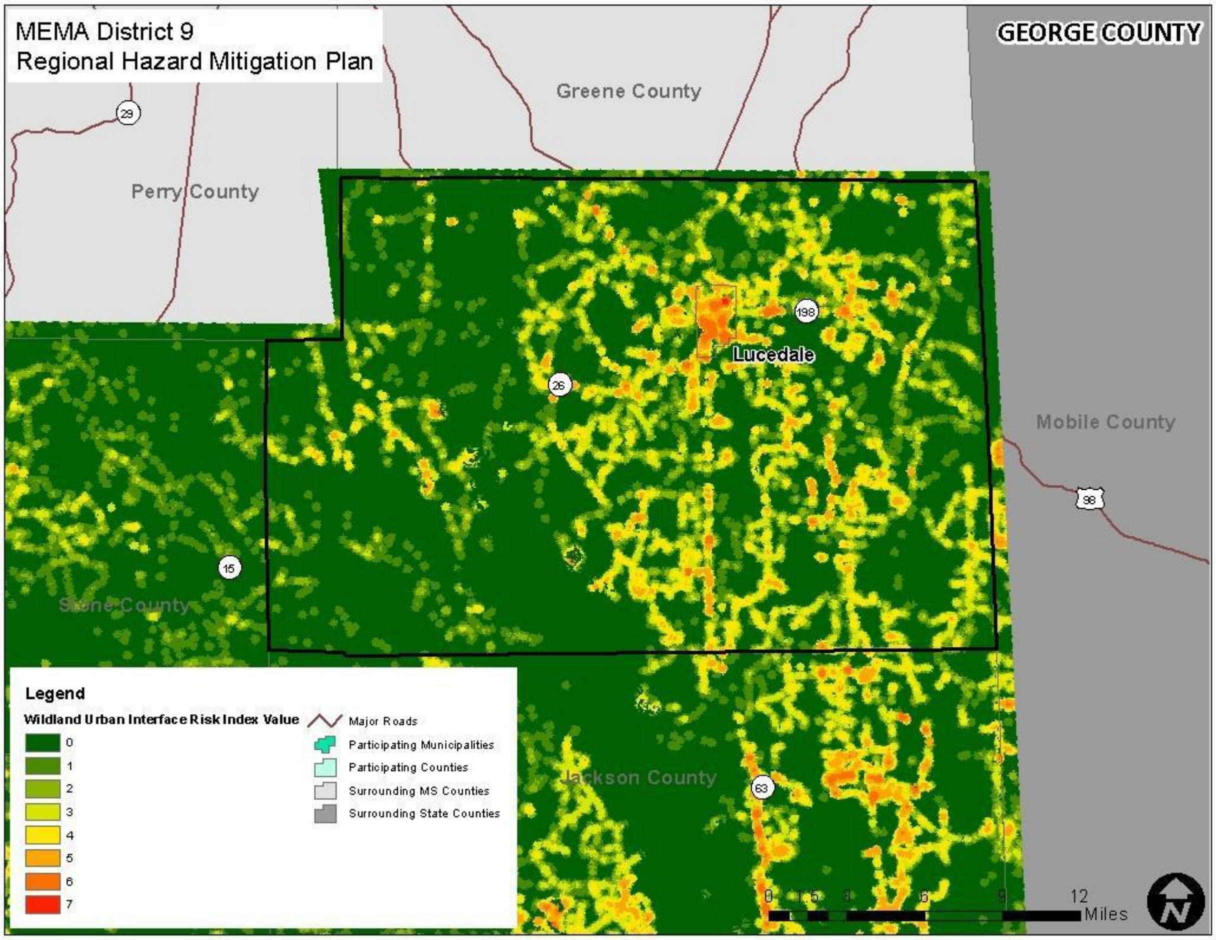
Although historical evidence indicates that George County is susceptible to wildfire events, there are few reports which include information on historic dollar losses. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered relatively low, though it should be noted that a single event could result in significant damages throughout the county.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones. For the critical facility analysis, areas of concern were intersected with critical facility locations.

Figure A.32 shows the Wildland Urban Interface Risk Index (WUIRI) data, which is a data layer that shows a rating of the potential impact of a wildfire on people and their homes. The key input, Wildland Urban Interface (WUI), reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the WUI and rural areas is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, it was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to 7 with higher values being most severe (as noted previously, this is only a measure of relative risk). Figure A.33 shows the areas of analysis where any grid cell is less than 3. Areas with a value below 3 were chosen to be displayed as areas of risk because this showed the upper echelon of the scale and the areas at highest risk.

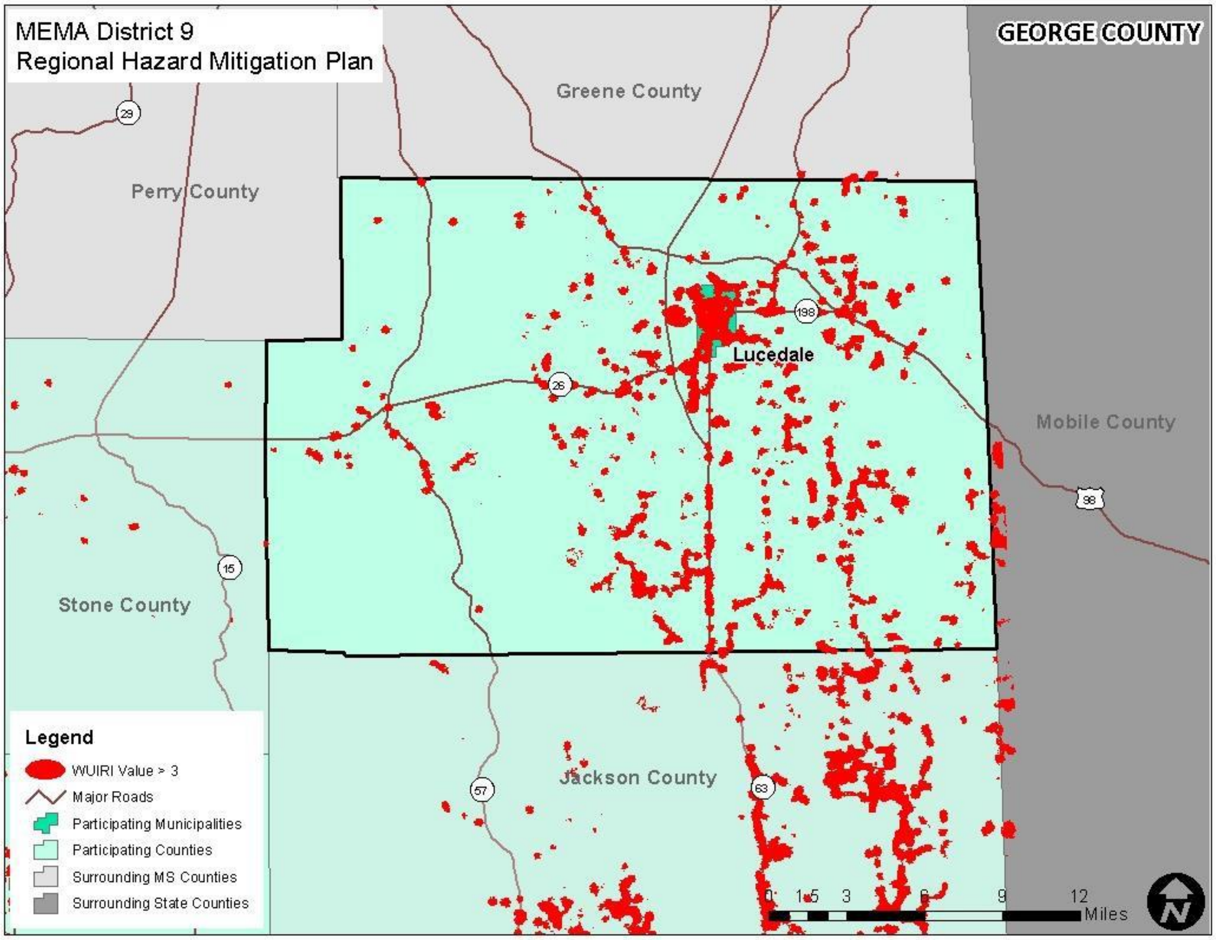
Table A.73 shows the results of the analysis.

FIGURE A.31: WUI RISK INDEX AREAS IN GEORGE COUNTY



Source: Southern Wildfire Risk Assessment Data

FIGURE A.32: WILDFIRE RISK AREAS IN GEORGE COUNTY



Source: Southern Wildfire Risk Assessment Data

TABLE A.70: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE RISK AREAS

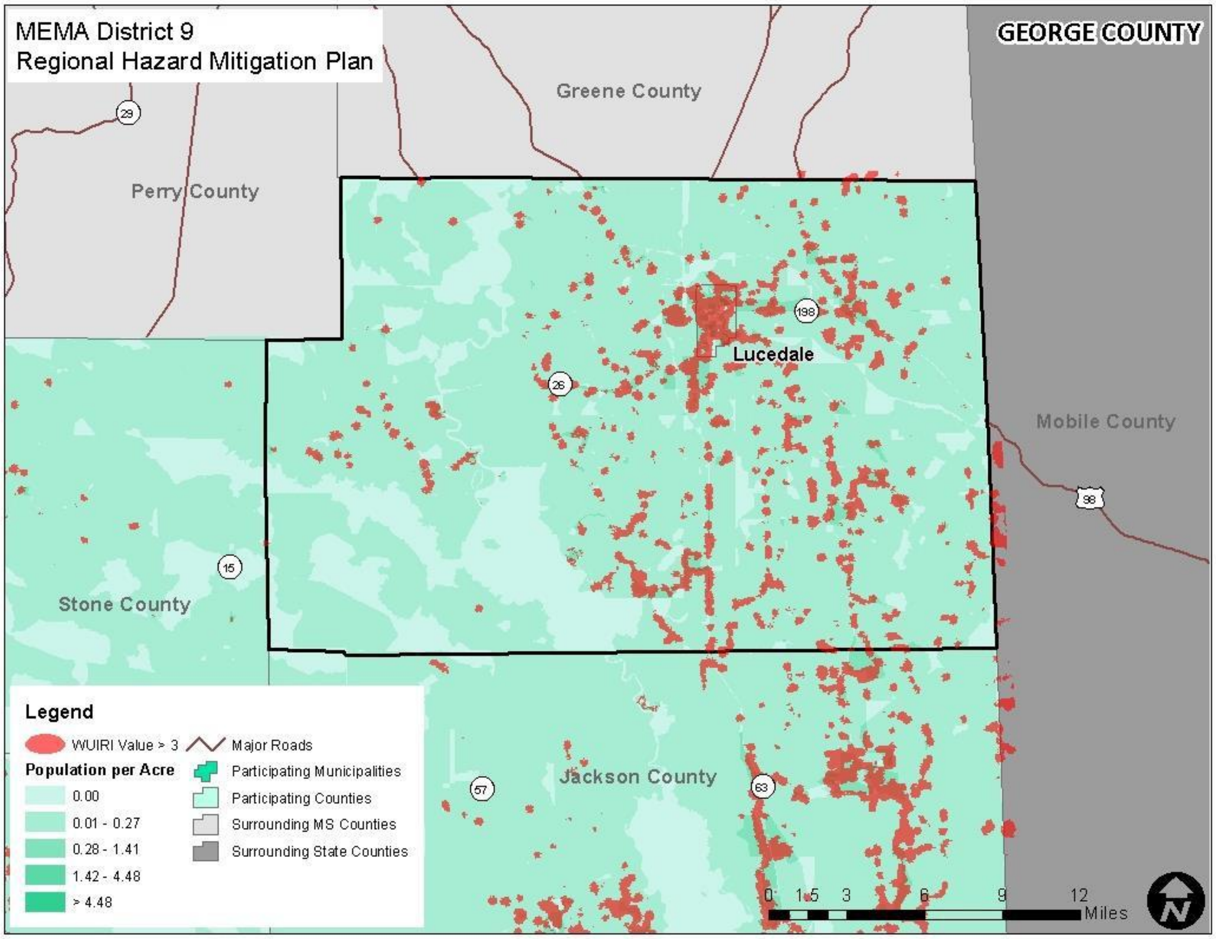
Location	Wildfire Risk	
	Approx. Number of Buildings	Approx. Improved Value
Lucedale	1,538	$335,976,000
Unincorporated Area	8,010	$1,328,263,000
GEORGE COUNTY TOTAL*	9,548	$1,664,239,000

* As noted above, building footprints and parcel data were not available for George County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.
Source: SWRA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Given some level of susceptibility across the entire county, it is assumed that the total population is at risk to the wildfire hazard. Figure A.34 shows an overlay of the wildfire risk areas identified above with the population density by census block. This shows that many of the areas of high population concentration are susceptible to wildfire because of their proximity to the wildland urban interface.

FIGURE A.33: WILDFIRE RISK AREAS IN GEORGE COUNTY



Source: Southern Wildfire Risk Assessment Data; United States Census

Critical Facilities

The critical facility analysis revealed that there are 37 critical facilities located in wildfire areas of concern, including 1 EOC, 6 fire stations, 1 medical, 1 police station and 6 schools. It should be noted that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in Table A.81 at the end of this subsection.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in George County.

<u>EARTHQUAKE</u>

As the Hazus-MH model suggests below, and historical occurrences confirm, any earthquake activity in the area is likely to inflict only minor to moderate damage to the county. Hazus-MH 3.2 estimates a total annualized loss of $8,000 which includes buildings, contents, and inventory throughout the county.

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the average annualized loss for the district. The results of the analysis are generated at the Census Tract level within Hazus-MH and then aggregated to the county level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to structure failure, building loss, contents damage, and inventory loss. They do not include losses to business interruption, lost income, or relocation. Table A.71 summarizes the findings with results rounded to the nearest thousand. Based on the probabilistic 5.0 magnitude earthquake scenario, no damages to structures was identified within MEMA District 9.

TABLE A.71: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Structural Damage	Non-Structural Damage	Contents Damage	Inventory Loss	Total Annualized Loss
George County	$0	$0	$0	$0	$0

Source: Hazus-MH

Social Vulnerability

It can be assumed that all existing and future populations are at risk to the earthquake hazard.

Critical Facilities

The Hazus-MH probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in George County. The Hazus-MH scenario indicates no damage is expected from an earthquake occurrence. While George County may not experience a large earthquake, localized damage is possible with an occurrence.

HURRICANE AND TROPICAL STORM

Historical evidence indicates that George County has very significant risk to the hurricane and tropical storm hazard. There have been 10 disaster declarations due to hurricanes or tropical storms (Hurricanes Camille, Frederic, Georges, Ivan, Dennis, Katrina, Gustav, and Isaac, as well as Tropical Storms Allison and Isidore). A large number tracks have come near or traversed through the county, as shown and discussed in Section A.2.12. Hazus-MH 3.2 estimates a total annualized loss of $6,751,000 which includes buildings, contents, and inventory throughout the county.

Hurricane Winds

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and storm surge and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore, only these two aspects of hurricane losses are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to hurricane and tropical storm wind hazard. Hazus-MH 3.2 was used to determine average annualized losses for the county as shown below in Table A.75. Only losses to buildings, inventory, and contents are included in the results.

TABLE A.72: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
George County	$4,776,000	$1,959,000	$16,000	$6,751,000

Source: Hazus-MH

Storm Surge
In addition, although it was treated as a separate hazard throughout this plan, storm surge is most often associated with hurricanes and tropical storms. Indeed, Hazus incorporates the storm surge model for estimating damage from storm surge as part of the hurricane model. The storm surge model can only be run as part of a historic hurricane model run and not as part of an annualized loss model. Unfortunately, in this model, storm surge impacts are calculated as part of the total damage from the historic event and thus could not be separated out and evaluated solely in terms of storm surge loss. As such, the estimated losses presented below are combined losses from hurricane winds and storm surge. The historic Hurricane Katrina model was utilized as this was certainly one of the most impactful storms in the region and therefore estimates the potential losses that are possible from a large hurricane event. Table A.76 presents the losses from this modeled event.

TABLE A.73: POTENTIAL LOSS ESTIMATIONS FOR LARGE HURRICANE EVENT

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
George County	$33,209,000	$10,744,000	$73,000	$44,026,000

Source: Hazus-MH

Social Vulnerability
Given equal susceptibility across the county, it is assumed that the total population, both current and future, is at risk to the hurricane and tropical storm wind hazard. In terms of social vulnerability to storm surge, coastal populations are at much higher risk than inland populations. Since George County is not located on the coast, there is lower social vulnerability to storm surge compared to the rest of the region.

Critical Facilities
Given equal vulnerability across George County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among factors. Determining individual building response to wind and storm surge is beyond the scope of this plan. However, this plan will consider mitigation action for especially vulnerable structures and/or critical facilities to mitigate against the effects of the hurricane hazard. A list of specific critical facilities can be found in Table A.84 at the end of this subsection.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in George County.

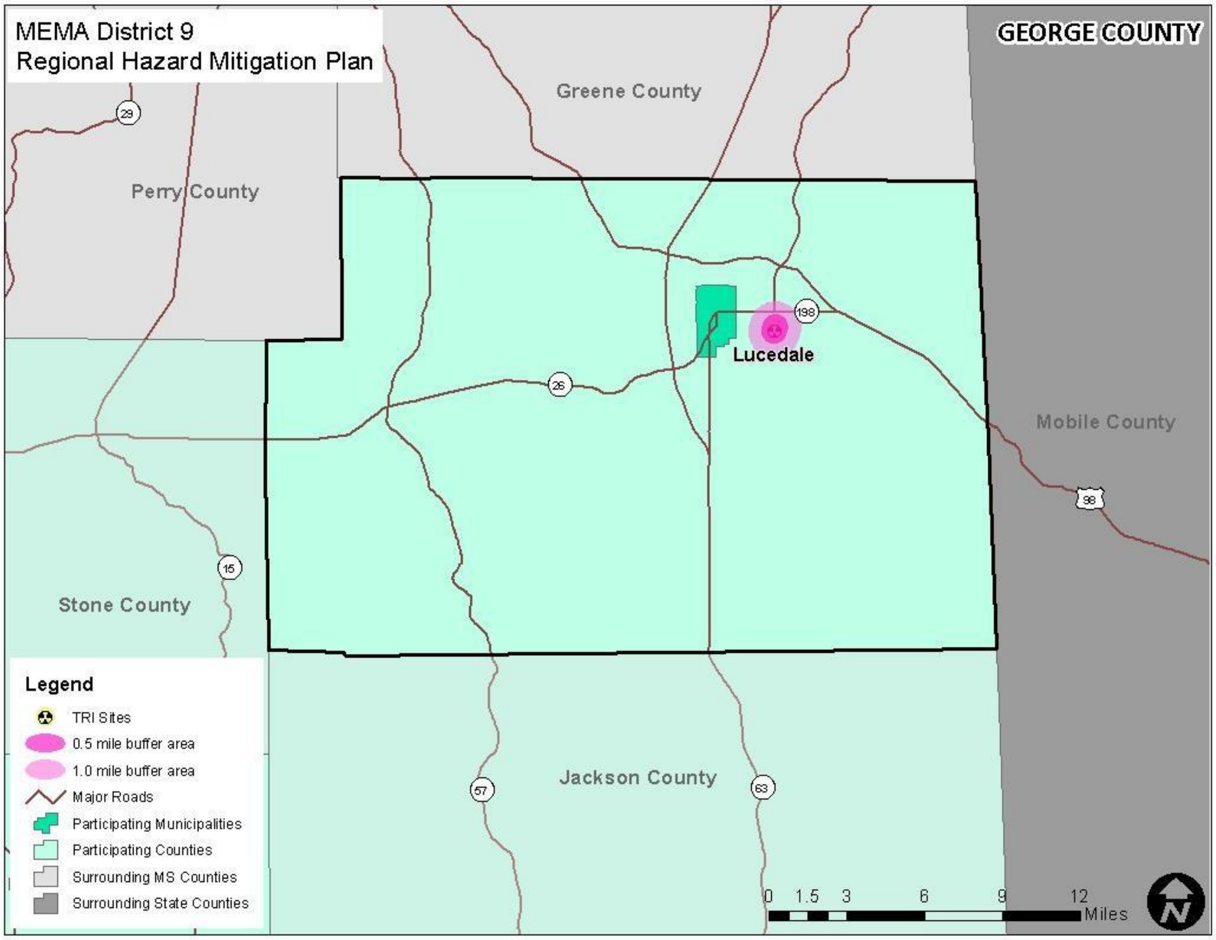
<u>HAZARDOUS MATERIALS INCIDENT</u>

Historical evidence indicates that George County is susceptible to hazardous materials events. A total of 11 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration, resulting in $101,050 in property damage. On an annualized level, these damages amount to $3,866 for the county.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities, and cause affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

0.5-mile buffers were used to identify critical asset inventory that intersects with these areas of concern. These areas are assumed to represent the different levels of effect: immediate (primary) and secondary. For the fixed site analysis, geo-referenced TRI sites in the region, along with buffers, were used for analysis as shown in Figure A.35. For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. Figure A.34 shows the areas used for mobile road toxic release buffer analysis and Figure A.34 shows the areas used for the mobile railroad toxic release buffer analysis. The results indicate the approximate number of improved properties and improved value, as shown in Table A.74 (fixed sites), Table A.75 (mobile roads), and Table A.76 (mobile railroad sites).

FIGURE A.34: TRI SITES WITH BUFFERS IN GEORGE COUNTY



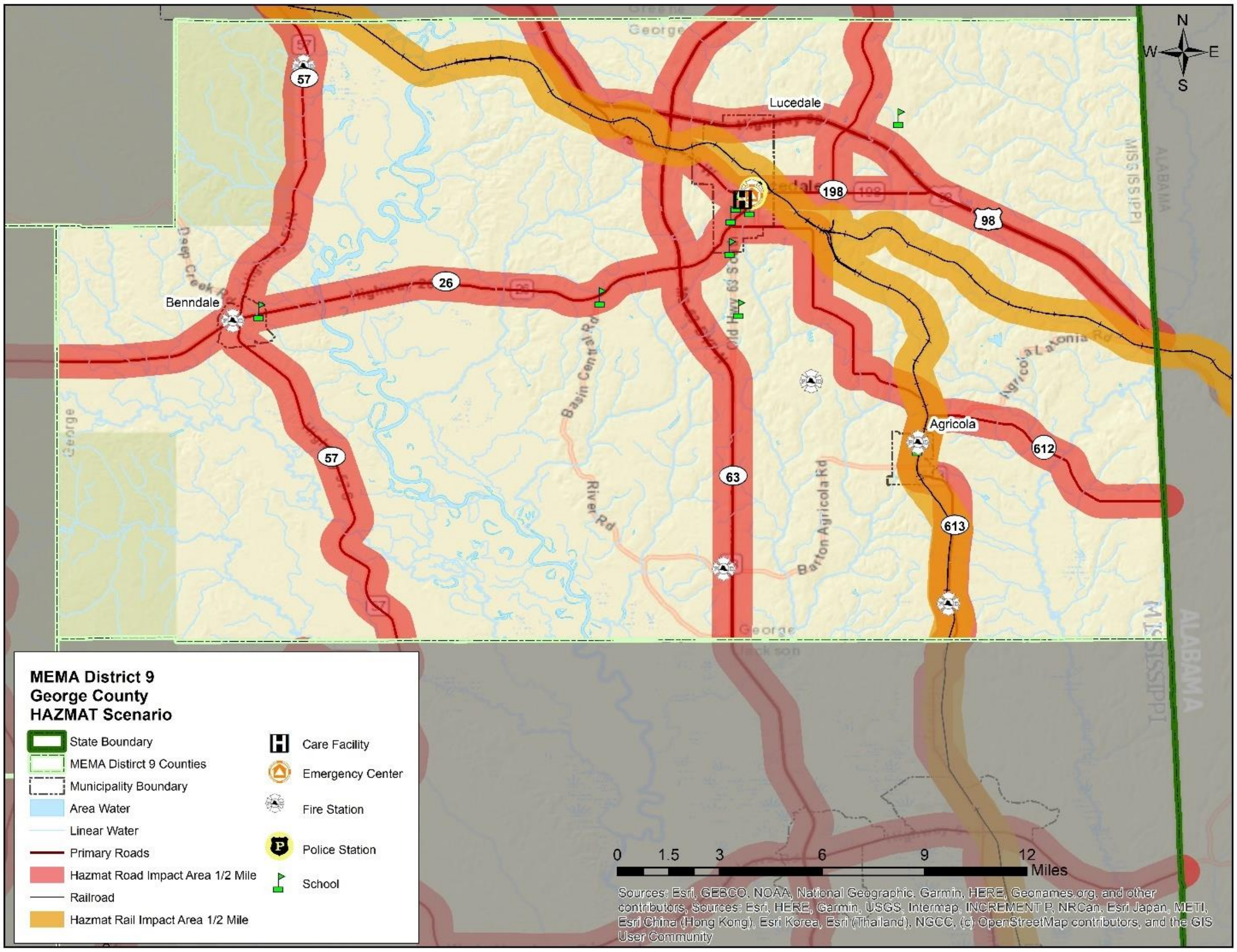
Source: Environmental Protection Agency

TABLE A.74: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Lucedale	0	$0	99	$18,341,000
Unincorporated Area	83	$22,552,000	262	$53,812,000
GEORGE COUNTY TOTAL*	83	$22,552,000	361	$72,153,000

* As noted above, building footprints and parcel data were not available for George County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.
Source: EPA, MDEQ, Hazus MH

FIGURE A.35: MOBILE (ROAD) HAZMAT BUFFERS IN GEORGE COUNTY



Source: Federal Highway Administration National Highway Planning Network

Source: U.S. Department of Transportation Federal Railroad Administration

Based on the analyses performed 1 Hospital, 6 fire stations, 1 police department, 1 sheriff's department, 1 emergency operations center, 6 schools and 1 community college fall within the .5 mile buffer zones of vulnerability for primary roads and ralways.

Social Vulnerability
Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities
Fixed Site Analysis:
The critical facility analysis for fixed TRI sites revealed that there are 2 facilities located in a fixed HAZMAT risk zone. Neither of these facilities are in the primary (0.5 mile) risk area.

Mobile Analysis:
The critical facility analysis for transportation corridors revealed that there are 41 facilities located in the primary and secondary road HAZMAT buffer areas. Of these, there were 35 critical facilities located in the primary risk zone including 1 EOC, 6 fire stations, 1 medical, 1 police station and 6 school .

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in George County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in condition that could alter the impact area (i.e., direction and speed of wind, volume of release, etc.).

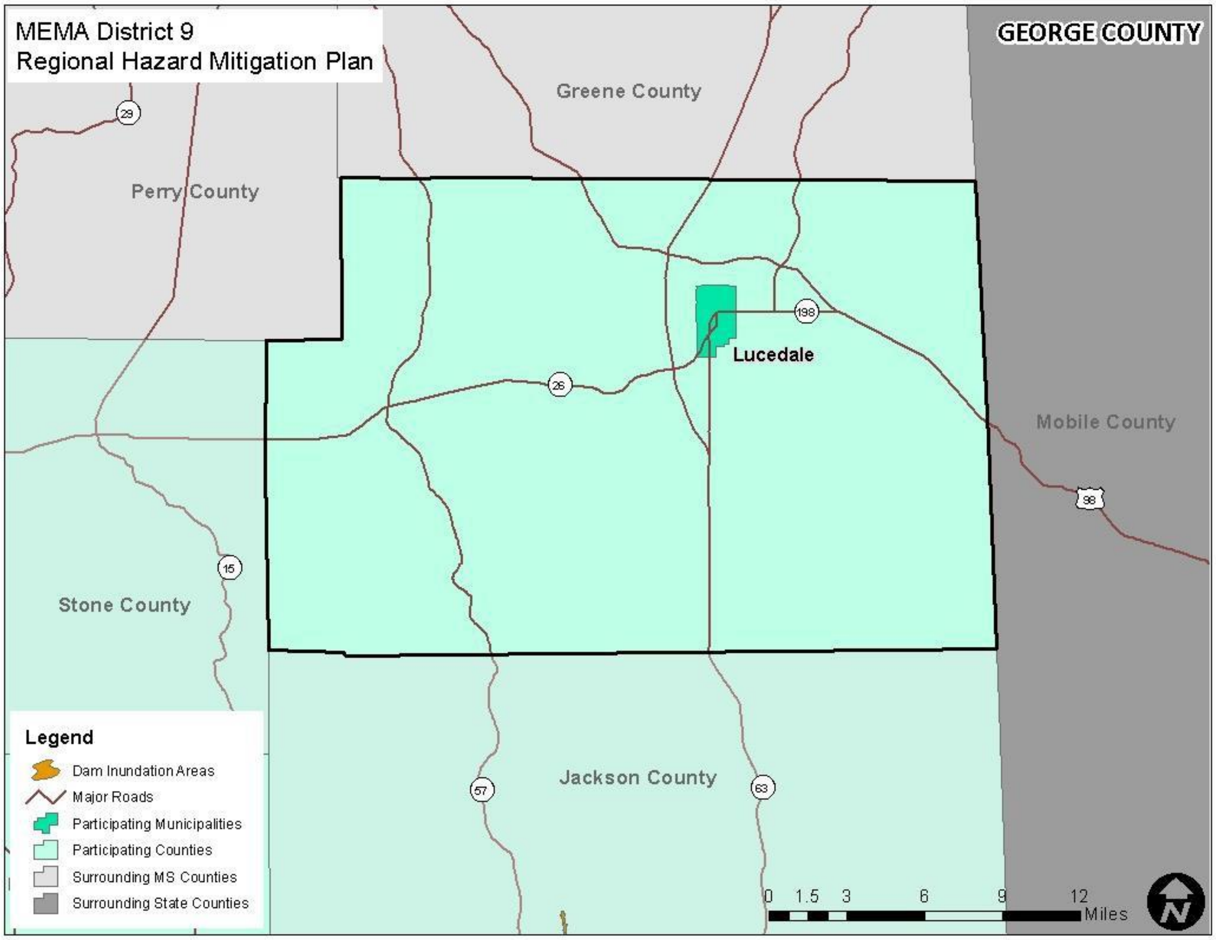
DAM/LEVEE FAILURE

In order to assess risk to a dam or levee failure, a GIS-based analysis was used to estimate exposure to one of the areas delineated by the Mississippi Department of Environmental Quality as a potential inundation area in the event of a failure. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified inundation area. As mentioned previously, this type of inundation mapping has not been completed for every dam/levee in the region, so the results of this analysis likely underestimate the overall vulnerability to a dam or levee failure. However, the analysis is still useful as a sort of baseline minimum of property that is potentially at-risk. The identified inundation areas can be found in Figure A.38.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table A.75 presents the potential at-risk property. Both the number of buildings and the approximate improved value are presented

FIGURE A.36: DAM INUNDATION AREAS IN GEORGE COUNTY



Source: Mississippi Department of Environmental Quality

TABLE A.75: ESTIMATED EXPOSURE OF IMPROVEMENTS TO THE DAM/LEVEE FAILURE HAZARD

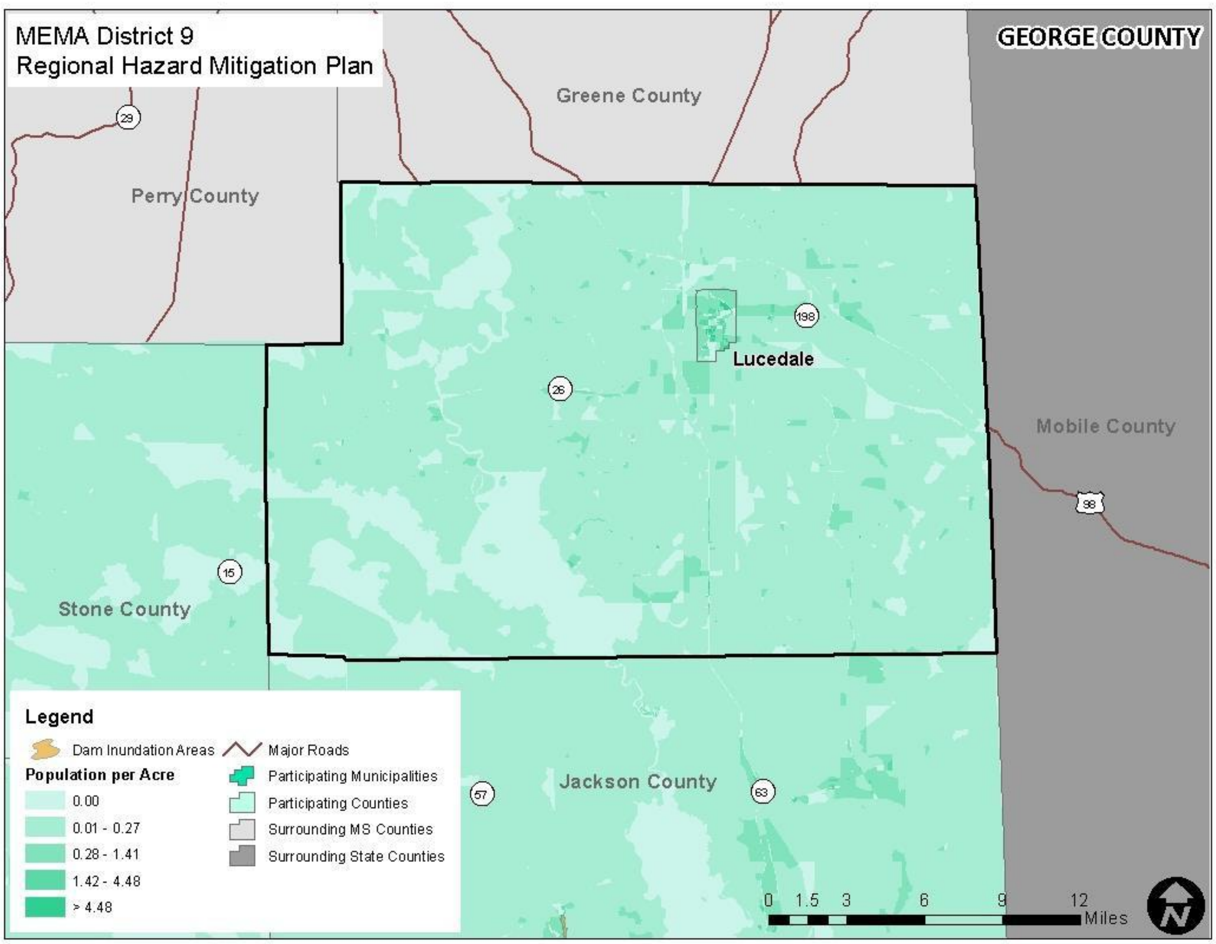
Location	Dam Inundation Area	
	Approx. Number of Buildings	Approx. Improved Value
Lucedale	0	$0
Unincorporated Area	0	$0
GEORGE COUNTY TOTAL*	0	$0

* As noted above, building footprints and parcel data were not available for George County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.
Source: MDEQ, Hazus

Social Vulnerability

Figure A.39 is presented to gain a better understanding of at-risk population by evaluating census block level population data against dam inundation areas. There are no areas of concern in the county and it should be noted that most of the population of the region is not at risk to a dam/levee failure.

FIGURE A.37: POPULATION DENSITY NEAR DAM INUNDATION AREAS IN GEORGE COUNTY



Source: MDEQ, United States Census 2010

Critical Facilities
The critical facility analysis revealed that there are no facilities located in dam inundation areas. A list of specific critical facilities and their associated risk can be found in Table A.84 at the end of this subsection.

In conclusion, a dam does not have the potential to impact existing and future buildings, facilities, and populations in George County, though this analysis is not all-encompassing in terms of risk to a dam or levee failure because inundation mapping is not available for all dams in the region.

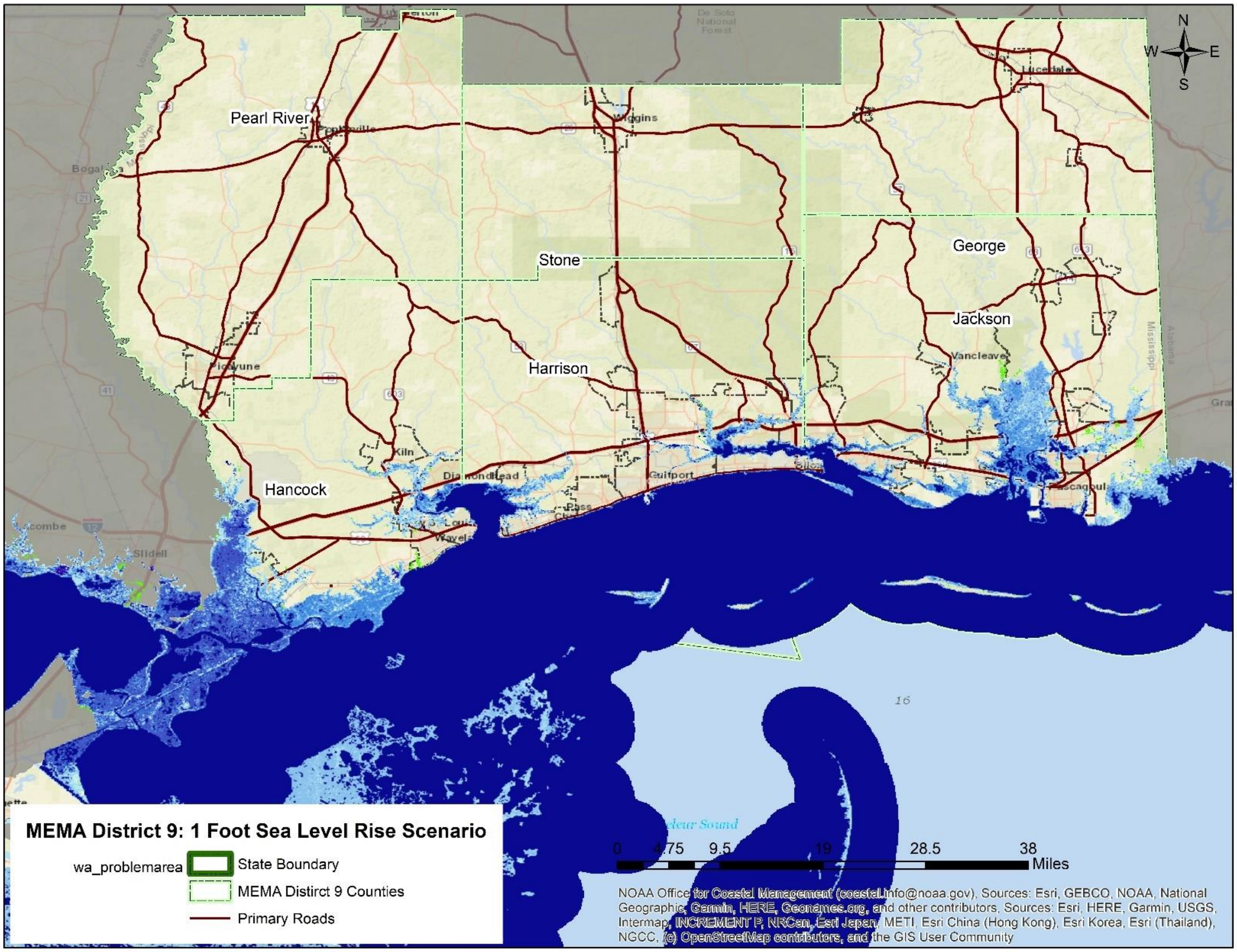
CLIMATE CHANGE/SEA LEVEL RISE

Most assessments carried out across the globe have concluded that climate change is a phenomenon that will impact our planet in the foreseeable future. Among others, the National Climate Assessment, International Panel on Climate Change, and National Oceanic and Atmospheric Administration all project that climate change will impact the United States and will have a major impact on coastal communities due to the effects of sea level rise. As such, projections concerning sea level rise are important to incorporate into planning efforts in order to identify people and property that may be impacted.

In order to assess sea level rise risk, a GIS-based analysis was used to estimate exposure to future projections of sea level rise using data produced by the National Oceanic and Atmospheric Administration in combination with improved property records for the county. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within the inundation zone that would be created in the event of 1 foot, 3 feet, and 6 feet of sea level rise. A number of different sea level rise scenarios were available via NOAA (from 1 foot to 6 feet, at 1 foot intervals), however these scenarios were selected to demonstrate a range of potential sea level rise scenarios from low to moderate to high projections. These scenarios can be found in Figure A.40, Figure A.41, and Figure A.42.

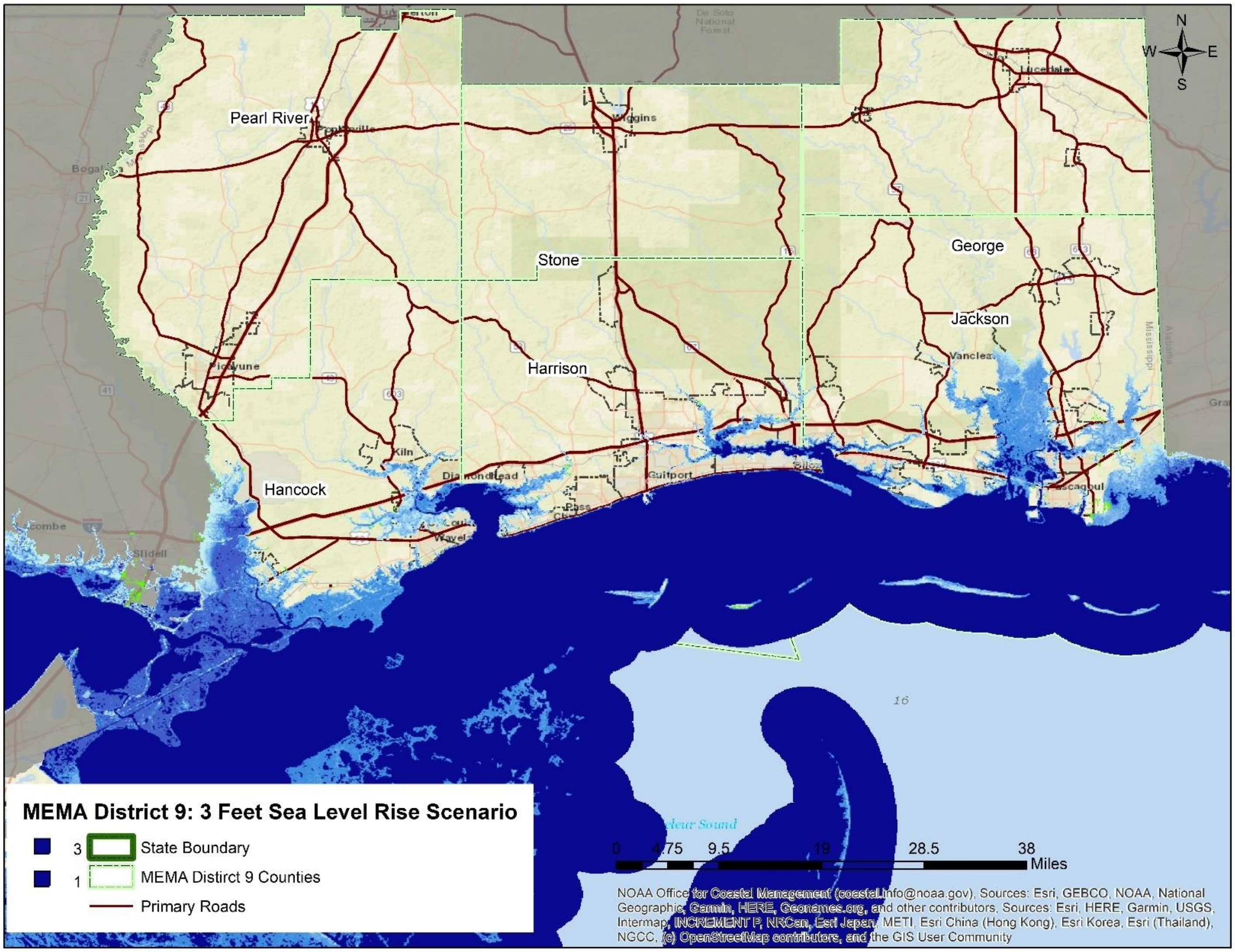
Table A.81 presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

FIGURE A.38: 1 FOOT SEA LEVEL RISE SCENARIO IN GEORGE COUNTY



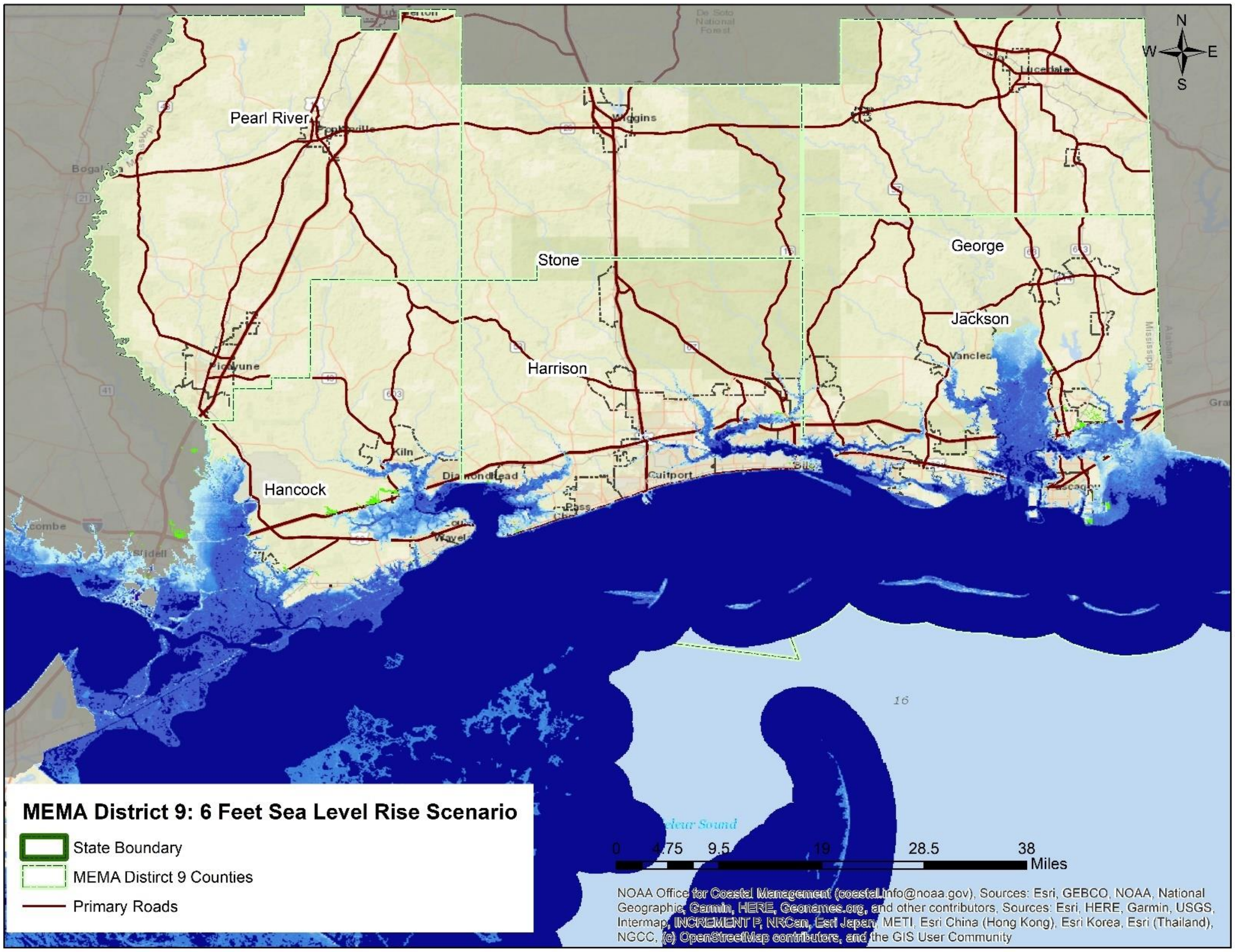
Source: NOAA

FIGURE A.39: 3 FEET SEA LEVEL RISE SCENARIO IN GEORGE COUNTY



Source: NOAA

FIGURE A.40: 6 FEET SEA LEVEL RISE SCENARIO IN GEORGE COUNTY



Source: NOAA

TABLE A.76: ESTIMATED EXPOSURE OF PARCELS TO THE SEA LEVEL RISE HAZARD

Location	1.0 foot		3.0 feet		6.0 feet	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Lucedale	0	0	0	0	0	0
Unincorporated Area	0	0	0	0	0	0
GEORGE COUNTY TOTAL*	0	0	0	$0	0	$0

As noted in the above map figures no structures fall within the 1, 3 or 6 feet inundation areas within George County.

Social Vulnerability

Critical Facilities

The critical facility analysis revealed that there are no facilities located in the 3 feet of sea level rise scenario inundation area. As mentioned above, this scenario was selected as it is a mid-range projection for sea level rise based on a number of studies. A list of specific critical facilities and their associated risk can be found in Table A.84 at the end of this subsection.

CONCLUSIONS ON HAZARD VULNERABILITY

Table A.77 presents an overall summary of the community's vulnerability for each jurisdiction. This summary provides key problem statements and identifies the community's greatest vulnerabilities that will be addressed in the mitigation strategy.

TABLE A.77: SUMMARY OF VULNERABILITY FOR GEORGE COUNTY

	Key Problem Statements
George County	George County and Lucedale have a large amount of timber, open, and agriculture land, creating an enhanced risk to wildfires across the county. The county is also more vulnerable to drought which can damage crop yields or reduce stock and crop production in theagricultural sector, resulting in economic loss.

Table A.78 presents a summary of annualized loss for each hazard in George County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the county.

It should also be noted that many of these estimates are based on incomplete data and likely underestimate the historic dollar damage sustained in each county. Especially for hazards such as extreme cold, extreme heat, hail, lightning, and winter weather, it is very likely that more damage occurred historically than has been identified.

TABLE A.77: ANNUALIZED LOSS FOR GEORGE COUNTY

Hazard	George County
Flood-related Hazards	
Dam and Levee Failure	NA
Erosion	NA
Flood	$97,859
Storm Surge	$0
Fire-related Hazards	
Drought	NA
Lightning	$7.722
Wildfire	NA
Geologic Hazards	
Earthquake†	$0
Wind-related Hazards	

Extreme Cold	$0
Extreme Heat/Heat Wave	$79,506
Hailstorm	$22,902
Hurricane and Tropical Storm	$6,751,00
Severe Thunderstorm/High Wind	$18,092
Tornado	$88,811
Winter Weather	$0
Hazard	**George County**
Other Hazards	
Climate Change/Sea Level Rise	NA
Hazardous Materials Incident/Train Derailment	$3,866
Infectious Disease	NA

†Historic dollar damage was not available for this hazard, but since estimated annualized losses from Hazus were available, those numbers were used in this table.
*In this table, the term "Not Available" is used to indicate that no records of dollar losses for the particular hazard were recorded. This could be the case either because there were no events that caused dollar damage or because documentation of that particular type of event is not well kept.

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to impacts from atmospheric hazards such as drought and hailstorm. Some buildings may be more vulnerable to some of these hazards based on locations, construction, and building type. In addition, all populations are vulnerable to hazards like infectious disease which could presumably impact any segment of the population without regard to geographic location. Table A.84 shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "X").

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GEORGE COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of George County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: Capability Assessment.

Planning and Regulatory Capability

Table A.78 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for George County. An X indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. A dagger (†) indicates that the given item is administered for that municipality by the county. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the MEMA District 9 Regional Hazard Mitigation Plan.

TABLE A.78: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Threat and Hazard Identification and Risk Assessment (THIRA)	Comprehensive Land Use Plan	Floodplain Management Plan/Flood Mitigation Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Emergency Management Accreditation Program (EMAP Accreditation)	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment/ Reconstruction Plan/ Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System (CRS
GEORGE COUNTY	X		X						X						X		X	X	X				X	X	
Lucedale	X		X						†						†		X	X	X			X	X	X	

A more detailed discussion on the county's planning and regulatory capabilities follows.

EMERGENCY MANAGEMENT

Hazard Mitigation Plan
George County has previously adopted a hazard mitigation plan. The City of Lucedale has also previously adopted a municipal-level hazard mitigation plan.

Emergency Operations Plan
George County maintains an emergency operations plan through its Emergency Management Agency. The City of Lucedale has formally adopted this plan.

GENERAL PLANNING

Comprehensive Land Use Plan
George County has adopted a county comprehensive plan. The City of Lucedale has also adopted a municipal comprehensive plan.

Zoning Ordinance
George County has adopted a zoning ordinance as part of its county comprehensive plan. The City of Lucedale has also adopted a zoning ordinance.

Subdivision Ordinance
George County has adopted a subdivision ordinance. The City of Lucedale has also adopted subdivision regulations as part of its municipal comprehensive plan.

Building Codes, Permitting, and Inspections
George County has not adopted a building code. However, the City of Lucedale has adopted a building code through its code enforcement ordinance.

FLOODPLAIN MANAGEMENT

Table A.79 provides NFIP policy and claim information for each participating jurisdiction in George County.

TABLE A.79: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
GEORGE COUNTY†	08/16/88	09/19/12	112	$14,459,000	42	$385,792
Lucedale	04/15/86	09/19/12	10	$2,430,500	1	$11,000

†Includes unincorporated areas of county only
Source: NFIP Community Status information as of 1/10/2017; NFIP claims and policy information as of 10/31/2016
During the 2022 HMP update process updated NFIP/Repetitive and Severe Repetitive Loss updated data was unavailable through FEMA requests. The Natural Resource Defense Council (NRDC) provided unofficial updated information considered as the best available data for the HMP update process.

George County	**Total # of NFIP Claims**	**Total NFIP Payments**	**Total # of SRLs**	**Total SRL Claim Payments**
	76	**$432,809**	**0**	**0**

Source: https://www.nrdc.org/resources/losing-ground-flood-visualization-tool

CRS Participation: According to the FEMA Community Rating System (CRS) Eligible/Participating Communities database George County and participating jurisdictions do not currently participate in the CRS.

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance.

George County and the City of Lucedale both participate in the NFIP and have adopted flood damage prevention ordinances.

Implement the substantial improvement/substantial damage provisions:
Damage Estimates are a part of the National Flood Insurance Program (NFIP). If a community participates in the NFIP, part of the responsibility of the local participating community is to perform damage estimates. These estimates are performed using a FEMA Substantial Damage Estimate software program. This program is used by the Mississippi Emergency Management Agency's (MEMA) Office of Mitigation Floodplain Management (FPM) Bureau to assist local communities in determining damage estimates as it relates to the NFIP. The FPM Bureau is tasked with assisting local communities with the training and deployment of the SDE program. Local building officials/Stormwater management and floodplain managers for each participating jurisdiction are responsible for ensuring that the substantial improvement/substantial damage provisions are implemented following a flood related event within their respective jurisdiction. The local officials will ensure that all NFIP criteria/requirements are implemented and met following a flood event, local officials will work with FEMA to ensure proper documentation/designations are made and properly recorded for structures deemed substantially damaged during an event.

ADMINISTRATIVE AND TECHNICAL CAPABILITY
Table A.80 provides a summary of the capability assessment results for George County with regard to relevant staff and personnel resources. An X indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill. A dagger (†) indicates a county-level staff member(s) provides the specified knowledge or skill to that municipality.

TABLE A.80: RELEVANT STAFF/PERSONNEL RESOURCES

Staff/Personnel Resource	Planners with knowledge of land development/land management	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human- caused hazards	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
GEORGE COUNTY		X		X	X		X	X		
Lucedale		X	X	†	X		†	X		

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

FISCAL CAPABILITY

Table A.81 provides a summary of the results for George County with regard to relevant fiscal resources. An X indicates that the given fiscal resource has previously been used to implement hazard mitigation actions. A dagger (†) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

TABLE A.81: RELEVANT FISCAL RESOURCES

Fiscal Tool/Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: HMGP and other federal, state, and private grants/resources
GEORGE COUNTY		†							†	†
Lucedale									†	X

POLITICAL CAPABILITY

During the months immediately following a disaster, local public opinion in George County is more likely to shift in support of hazard mitigation efforts.

Table A.82 provides a summary of the results for George County with regard to political capability. An X indicates the expected degree of political support by local elected officials in terms of adopting/funding information.

TABLE A.82: LOCAL POLITICAL SUPPORT

Political Support	Limited	Moderate	High
GEORGE COUNTY		X	
Lucedale		X	

SECTION 12 GEORGE COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for George County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Council and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: Mitigation Strategy and Section 9: Mitigation Action Plan.

MITIGATION GOALS

George County developed nine mitigation goals in coordination with the other participating MEMA District 9 Region jurisdictions. The regional mitigation goals are presented in Table A.83.

TABLE A.83: MEMA DISTRICT 9 REGIONAL MITIGATION GOALS

	Goal
Goal #1	Minimize risk and vulnerability of the community to hazards. Objective 1: Improve understanding of hazard risks through monitoring and assessment projects.

Goal #2	Minimize loss of life, injury, and damages to property, the economy, and the environment. *Objective 1:* Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment. *Objective 2:* Improve hazard assessment information to make recommendations for encouraging higher standards for safer development in areas vulnerable to natural and technological hazards. *Objective 3*: Implement sustainable activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resilient to natural and technological hazards.
Goal #3	Minimize loss to critical facilities and infrastructure, utilities, and services. *Objective 1:* Prioritize mitigation projects for critical facilities, services, and infrastructure.
Goal #4	Improve, expand, and enhance public education, awareness, and preparedness. *Objective 1:* Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.
Goal #5	Build and enhance local mitigation capabilities to improve the region's ability to prepare for, respond to, and recover. *Objective 1:* Strengthen communication and coordinate participation among and within public agencies, community members, non-profit organizations, business, and industry to gain a vested interest in implementation.
Goal #6	Enter into partnerships with neighboring jurisdictions, federal and state agencies, and others to share information and develop a more hazard resistant community. *Objective 1:* Encourage leadership within the public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.
Goal #7	Enhance response procedures and emergency management capabilities. *Objective 1*: Coordinate and integrate natural and technological hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
Goal #8	Reduce economic losses, minimize social disruptions, and maintain quality of life. *Objective 1*: Reduce losses and repetitive damages for hazard events while promoting insurance coverage for catastrophic hazards.
Goal #9	Protect the environment and natural resources. *Objective 1:* Preserve, rehabilitate, re-establish, and enhance natural systems to serve natural hazard mitigation functions.

MITIGATION ACTION PLAN

The mitigation actions proposed by George County and the City of Lucedale are listed in the following individual Mitigation Action Plans.

George County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Ensure strict enforcement of subdivision order.	All	High	George County	Local	2028	Ongoing
P-2	Ensure strict enforcement of regulations against structures in the floodplain.	Flooding	High	Floodplain Administrator; George County	Local	2028	Ongoing
P-3	Ensure continuity of services through an enhanced government services continuity plan.	All	Low to Moderate	George County	Local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Enhance stormwater management activities.	Hurricane and Tropical Storm, Flooding	High	George County Supervisors and Road Crews	Local	2028	Ongoing
Property Protection							
PP-1	Promote the building of "safe rooms" in new construction and when remodeling existing structures.	Severe Thunderstorm, Tornado, Hurricane and Tropical Storm	Moderate to High	George County	Local, MEMA, FEMA	2028	Ongoing as funding becomes available
PP-2	Ensure continuity of services by retrofitting public buildings.	All	High	George County	Local, MEMA, FEMA	2028	Ongoing
PP-3	Ensure that new public buildings are designed and built to hurricane resistant building codes.	Hurricane and Tropical Storm, Tornado, Severe Thunderstorm / High Winds	High	George County	Local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Emergency Services							
ES-1	Ensure that communication systems are adequate during disasters.	All	High	George County Emergency Management; George County	Local	2028	Ongoing
ES-2	Monitor the current status of generators for maintenance of critical facilities	All	High	George County	Local	2028	Ongoing
ES-3	Ensure the adequacy of emergency shelters.	All	High	George County Emergency Management Agency; George County	Local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-4	Enhance emergency response capabilities.	All	Moderate	George County	Local	2028	Ongoing
Public Education and Awareness							
PEA-1	Expand public awareness through education and outreach materials to citizens and visitors.	All	High	George County Emergency Management Agency	Local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Develop and/or expand outreach strategies for vulnerable populations.	All	Moderate to High	George County; George County Emergency Management Agency; George County Sheriff's Department; George County VFDs	Local	2028	Ongoing
PEA-3	Host a hurricane expo for outreach and education.	Hurricane and Tropical Storm	High	George County Emergency Management Agency; George County	Local	2028	Ongoing pending funding sources
PEA-4	Provide and/or expand outreach information on hazard-resistant structures.	All	Moderate to High	George County Emergency Management Agency; George County	Local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Enhance disaster preparedness of local government.	Flooding, Severe Thunderstorm, Hurricane and Tropical Storm	Moderate to High	George County	Local	2028	Ongoing

City of Lucedale Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Maintain elevation certificates for all post-FIRM structures.	Flooding, Hurricane and Tropical Storm	High	City Building Department	Local	2028	Ongoing
P-2	Ensure continuity of city services through an enhanced government services continuity plan.	All	Low to Moderate	City of Lucedale	Local	2028	Ongoing depending on funding sources
P-3	Ensure strict enforcement of regulations against structures in the floodplain.	Flooding, Hurricane and Tropical Storm	High	City Planning Commission	Local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Enhance stormwater management activities.	Hurricane and Tropical Storm, Flooding	High	City Public Works Department	Local	2028	Ongoing
Property Protection							
PP-1	Promote the building of “safe rooms” in new construction and when remodeling existing structures.	Hurricane and Tropical Storm, Tornado, Severe Thunderstorm	Moderate to High	City Building Department	Local, MEMA, FEMA	2028	Ongoing contingent upon the availability of funding.
PP-2	Ensure continuity of city services by retrofitting public buildings.	All	High	City of Lucedale	Local, MEMA, FEMA	2028	Ongoing contingent upon the availability of funding.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-3	Ensure that new city buildings are designed and built to hurricane resistant building codes.	Hurricane and Tropical Storm, Tornado	High	City of Lucedale; City Building Department	Local	2028	Ongoing
Natural Resource Protection							
NRP-1	Ensure that environmental resources are protected and preserved through open spaces and green spaces.	All	Moderate	City Building Department and Planning Commission	Local	2028	Ongoing
NRP-2	Ensure that environmental resources are protect and preserved through conservation easements in natural wetlands and riparian areas.	Hurricane and Tropical Storm, Flooding	Moderate	Land Trust for the Mississippi Coastal Plain, City of Lucedale, George County	Local	2028	Ongoing
Structural Projects							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Ensure that communication systems are adequate during disasters.	All	High	City of Lucedale; George County Emergency Management	Local	2028	Ongoing
ES-2	Assess the current status of generators for maintenance of critical facilities.	All	High	City of Lucedale	Local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-3	Enhance emergency response capabilities.	All	Low to Moderate	City Police Department; City Fire Department	Local	2028	Ongoing
Public Education and Awareness							
PEA-1	Enhance the city's elevation awareness program.	Flooding, Hurricane and Tropical Storm	Moderate	City Building and Public Works Departments	Local	2028	Ongoing
PEA-2	Expand public awareness through education and outreach materials to citizens and visitors.	All	High	City of Lucedale	Local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-3	Encourage families to develop family disaster plans for all hazards approach.	All	Moderate to High	City First Responders (Police, Fire, etc.)	Local	2028	Ongoing
PEA-4	Develop and/or expand outreach strategies for vulnerable populations.	All	Moderate to High	City of Lucedale staff and officials; Lucedale Police Department; Lucedale Fire Department	Local	2028	Ongoing
PEA-5	Provide and/or expand outreach information on hazard-resistant structures.	Al	High	Lucedale Building Department	Local	2028	Ongoing
PEA-6	Enhance disaster preparedness of local government.	All	Moderate to High	City of Lucedale	Local	2028	Ongoing

2023 New Mitigation Actions:

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
	Hardening of fire stations throughput the county. Retrofitting bay doors for wind proofing. Harden roofs with upgraded steel. Movella, Agricola, Howell, Central, Rocky Creek, Basin, Barton, Baxley, Salem, Benndale, Boone, Shipmon, Twin Creek and Ward VFD.	Severe Thunderstorm /Wind, Hurricane/Tropical Storm, Tornado, Hailstorm	High	OEM, Fire	FEMA and other grant funding	2028	New

ANNEX B

Annex B: HANCOCK COUNTY

This annex includes jurisdiction-specific information for Hancock County and its participating municipalities. It consists of the following five subsections:

B.1 Hancock County Community Profile
B.2 Hancock County Risk Assessment
B.3 Hancock County Vulnerability Assessment
B.4 Hancock County Capability Assessment
B.5 Hancock County Mitigation Strategy

HANCOCK COUNTY COMMUNITY PROFILE

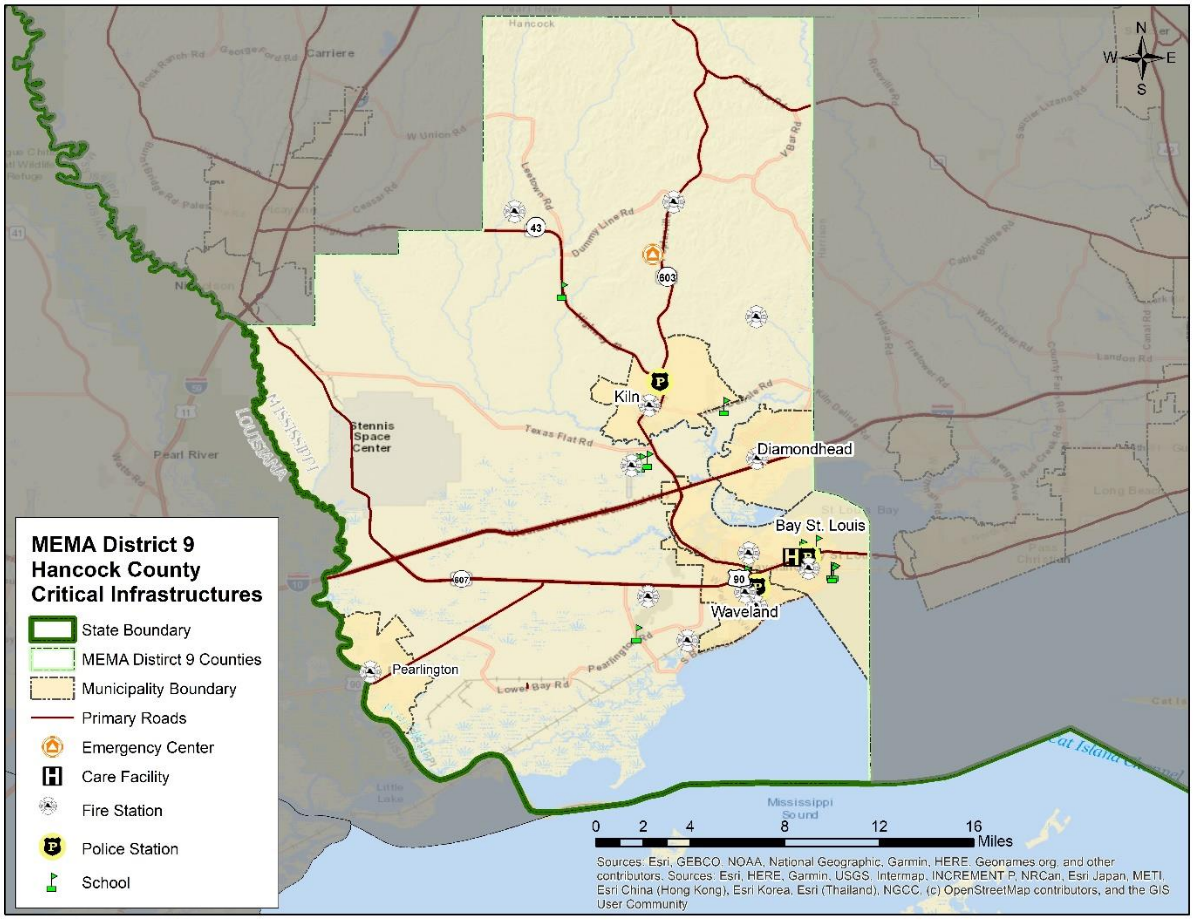
Geography And The Environment

Hancock County is located on the Mississippi coast. It comprises three cities, Bay St. Louis, Diamondhead, and Waveland, as well as many small unincorporated communities. An orientation map is provided as Figure B.1.

Hancock County is situated in the East Gulf Coastal Plain. It is made up of the gently rolling Pine Belt, also known as the "Piney Woods," and the coastal area called the Coastal Meadows or Terrace. The region has generally low topographic elevations and extensive tracts of marshy land. There are many rivers, creeks, bayous, and other natural drainage networks in the region which empty into the Gulf of Mexico. The total area of the county is 553 square miles, 79 square miles of which is water area.

Hancock County enjoys four distinct seasons but the climate in the region is generally hot and humid compared to the rest of the United States given its latitude and location along the Gulf Coast. Precipitation is generally highest in winter months when the temperatures are moderately lower, but the likelihood of precipitation remains relatively constant throughout the year. Snowfall is rare but does occur. Summers in the region can become fairly hot with average highs in the nineties and lows in the seventies. The region is also often susceptible to turbulent weather when warm, wet air from the Gulf of Mexico is pushed up into the region to mix with cooler air coming down from across the continent which can result in severe weather conditions. This is particularly true in the spring when seasons are changing, and diverse weather patterns interact. The region is also subject to hurricanes and tropical storms from June to October.

FIGURE B.1: HANCOCK COUNTY ORIENTATION MAP



Population And Demographics

Population counts from the U.S. Census Bureau for 1990, 2000,2010, and 2020 for the county and participating jurisdictions are presented in Table B.1.

TABLE B.1: POPULATION COUNTS FOR HANCOCK COUNTY

Jurisdiction	2000 Census Population	2010 Census Population	2020 Census Population	% Change 2010-2020
Hancock County	42,967	43,929	46,053	4.8%
Bay St. Louis	8,209	9,260	9,284	0.2%
Diamondhead CDP†	5,912	8,425	9,529	13.1%
Waveland	6,674	6,435	7,210	12%

†Diamondhead was not incorporated until 2012, therefore population counts for the city were not available in 1990, 2000, or 2010. Instead, population counts for the Diamondhead Census Designated Place (CDP) were provided for reference prior to the 2020 Census.

Source: United States Census Bureau, , 2000, 2010, 2020 Census,

TABLE B.2: DEMOGRAPHICS OF HANCOCK COUNTY

Jurisdiction	White, Percent (2020)	Black or African American, Percent (2020)	American Indian or Alaska Native, Percent (2020)	Asian, Percent (2020)	Native Hawaiian or Other Pacific Islander, Percent (2020)	Two or More Races, percent (2020)	Persons of Hispanic Origin, Percent (2020)*
Hancock County	87.2%	8.7%	0.7%	1.0%	0.1%	2.4%	3.9%
Bay St. Louis	73.3%	18.4%	0.3%	1.1%	0.0%	3.4%	6.0%
Diamondhead CDP†	91.3%	1.3%	0.0%	0%	0.0%	7.2%	6.0%
Waveland	83.1%	12.3%	0.8%	0%	0.0%	2.4%	1.9%

*Hispanics may be of any race, so also are included in applicable race categories
†Diamondhead was not incorporated until 2012, therefore demographics of the city were not available in 2010. Instead, demographics for the Diamondhead Census Designated Place (CDP) were provided for reference
Source: United States Census Bureau, 2020 Population Estimates/2017-2021 ACS

Housing

. Housing information for the county and three municipalities is presented in Table B.3.

TABLE B.3: HOUSING CHARACTERISTICS OF HANCOCK COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Housing Units (2020)	Median Home Value (2017-2020)
Hancock County	21,072	21,840	24,076	$168,500
Bay St. Louis	3,817	5,241	X	$195,900
Diamondhead CDP†	3,084	4,308	X	$188,600
Waveland	3,442	3,286	X	$164,200

†Diamondhead was not incorporated until 2012, therefore housing counts for the city were not available in 2000 or 2010. Instead, housing counts for the Diamondhead Census Designated Place (CDP) were provided for reference. However, the median home value presented is for the City of Diamondhead.
Source: United States Census Bureau, 2000,2010, 2020 Census, 2017-2021 American Community Survey 5-Year Estimates

Infrastructure

TRANSPORTATION

In Hancock County, Interstate 10 and U.S. Highway 90 run roughly east to west allowing transportation in the southern half of the county. Mississippi Highway 43 runs and Highway 603 run north-south through Hancock County.

The Stennis International Airport and the Diamondhead Airport are a general aviation and public-use airport, respectively, which are located in Hancock County. The Gulfport-Biloxi International Airport, located in Harrison County, also serves the county. This airport is served by three major airlines with direct flights to Atlanta, Charlotte, Dallas/Ft. Worth, and Houston as well as connections to hundreds of locations in the U.S. and worldwide.

In terms of other transportation services, Port Bienville operates within the county, connecting it to national and global markets. One Class-I Major and one Class-III Local railways also serve the county.

UTILITIES

Electrical power in Hancock County is mainly provided by electric power associations. Mississippi Power Company also provides power to some parts of the county.

There are two private and municipal natural gas suppliers that serve Hancock County. These include CenterPoint Energy Resources and the City of Waveland.

Water and sewer service is provided by a number of different sources including one of the participating cities and the county, but unincorporated areas often rely on septic systems and wells in Hancock County.

COMMUNITY FACILITIES

There are a number of buildings and community facilities located throughout Hancock County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 4 communications facilities, 1 emergency operations center (EOC), 8 fire stations, 3 medical facilities, 6 police stations, 3 power/gas facilities, 3 private/non-profit facilities, 22 public facilities, 18 schools, 1 shelter, 8 special populations facilities, 12 transportation facilities, and 16 water/wastewater facilities located within the county.

There is one hospital located in Hancock County. It is the Hancock Medical Center in the City of Bay St. Louis. There are also additional medical care facilities located in the county as outlined in the vulnerability assessment (Section 6.4.1).

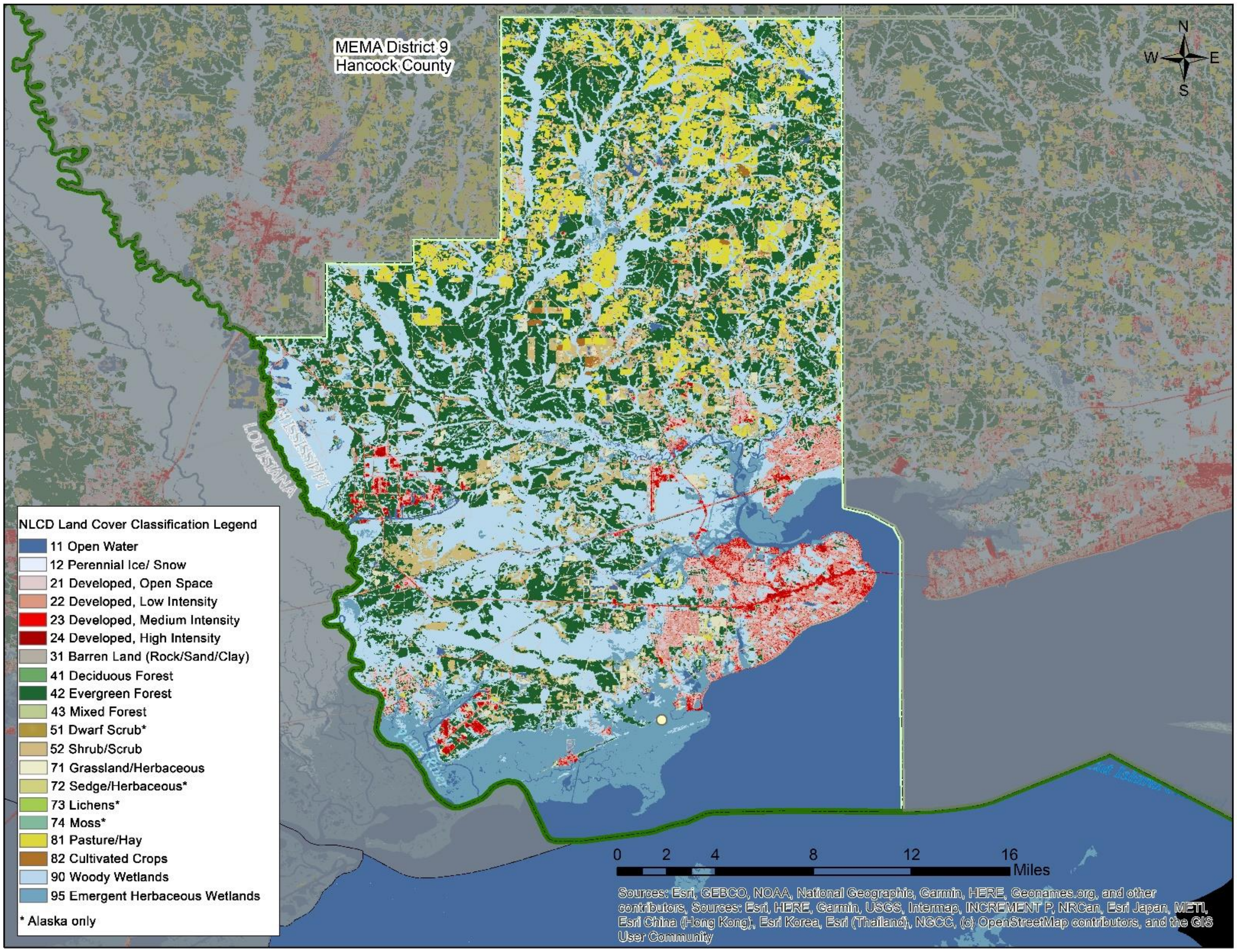
Hancock County contains numerous local, state, and national parks and recreation areas, including the Mississippi Gulf Coast National Heritage Area and Buccaneer State Park. Golf courses and resorts, recreational and sports fishing, gamming and casinos, and sand beaches are abundant in the county.

Land Use

Many areas of Hancock County are undeveloped or sparsely developed. There are several incorporated municipalities located along the coast. Coastal land use patterns radiate from city centers and commercial land uses and are located in central business districts and highway strips, with surrounding housing that becomes progressively large in lot size and floor area with distance from the central business districts. Residential and non-residential densities are generally low, and concentrated mix of uses are infrequent, creating an auto-oriented land use pattern along the coast. Upland land use patterns differ markedly from the coastal plain. There are only a few municipalities and unincorporated rural centers. There is a mix of protected lands, such as the DeSoto National Forest. Private lands are used for exurban housing, agriculture, and forestry. Consistent with its rural character, densities are very low and uses are not mixed, making motor vehicles the only viable mode for virtually all travel.

Local land use and associated regulations are further discussed in Section 7: Capability Assessment.

Figure B.2: Land Cover Classification



Employment And Industry

According to the 2019 American Community Survey (ACS), Hancock County had an average annual employment of 21,495 workers and an average unemployment rate of 4.5 percent (compared to 4.2 percent for the state In 2019, the average annual median household income in Hancock County was $48,119 compared to $45,081 in the state of Mississippi.

SECTION 13 HANCOCK COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: Hazard Identification as they pertain to Hancock County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: Hazard Profiles.

National Risk Index Scores:

The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter

Weather. Because not all hazards apply to the County, only those with a defined risk to the County are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability and Community Resilience, to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions but cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision-makers as they develop risk reduction strategies.

Social Vulnerability:
Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Per the FEMA National Risk Index, Hancock County has a Social Vulnerability Rating of **"Relatively Moderate"** and a Social Vulnerability Score of **"55.3"** (FEMA, 2023).

The "Social Vulnerability Score" and "Rating" represent the relative level of a community's social vulnerability compared to all other communities at the same level. A community's Social Vulnerability Score is also proportional to a community's risk. A higher Social Vulnerability Score results in a higher Risk Index Score (FEMA, 2023).

Social vulnerability is also one of five components included in the formulation of the "National Risk Index Score" in addition to community resilience, estimated annual loss (EAL) based on exposure, annualized frequency, and historic Loss Ratio (HLR) factors (FEMA, 2023).

Table B.4:. Social Vulnerability FEMA NRI Score

HANCOCK COUNTY, MS FEMA NRI SOCIAL VULNERABILITY SCORE	
Social Vulnerability Score	Social Vulnerability Rating
55.3	Relatively Moderate
Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).	
Source: hazards.fema.gov/nri/social-vulnerability	

Community Resilience:
Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Table B.5:. Community Resilience FEMA NRI Score

HANCOCK COUNTY, MS FEMA NRI COMMUNITY RESILIENCE SCORE	
Community Resilience Score	Community Resilience Rating
60.3	Relatively High
Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).	
Source: hazards.fema.gov/nri/community-resilience	

Expected Annual Loss:

Table B.6: Expected Annual Loss FEMA NRI Score (All Natural Hazards)

EXPECTED ANNUAL LOSS FOR HANCOCK COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS SCORE	
Expected Annual Loss Score	Expected Annual Loss Rating
88.9	Relatively Moderate

Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio).
Source: hazards.fema.gov/nri/expected-annual-loss

FEMA National Risk Index Score:

Table B.7:. Overall FEMA NRI Score

FEMA OVERALL NRI SCORE FOR HANCOCK COUNTY,MS FEMA OVERALL NRI SCORE	
FEMA Overall NRI Score	FEMA Overall NRI Rating
88.07	Relatively Moderate
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience. (Expected Annual Loss X Social Vulnerability / Community Resilience = Risk Index).	
Source: hazards.fema.gov/nri/determining-risk	

Hancock County Overall Risk Scores:

The following tables represent the new overall risk scores for Hancock County based on the described methodology above. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores. FEMA NRI Scores were used as appropriate and applicable to inform the analysis.

Table B.8:. 2023 Hazard Risk Scores Hancock County

Hazard Event	Probability	Consequence				Total Risk Score (Probability x Consequence)
	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Factors	Sum of Weighted Impact Factors	Consequence Score	
Dam and Levee Failure	1	1	4	15	20	13
Erosion	3	12	10	23	45	69
Flood	3	12	12	32	56	84
Storm Surge	3	12	15	32	59	88
Drought	2	8	11	18	37	41
Lightning	3	10	9	22	41	64
Wildfire	3	12	6	24	42	65
Earthquake	1	0	4	12	16	11
Extreme Cold	1	10	7	19	36	22
Extreme Heat/Heat Wave	3	12	8	27	47	72
Hailstorm	2	7	6	13	26	30
Hurricane Tropical Storm	3	12	17	39	68	99
Severe Thunderstorm/High Wind	3	10	16	32	58	86
Tornado	3	11	15	34	60	89
Winter Weather	2	6	7	26	39	43
Climate Change/Sea Level Rise	3	11	6	22	39	61
HAZMAT/Train Derailment	2	7	6	17	30	34

Infectious Disease	1	8	12	27	47	28

For full rankings and methodologies please click the below link:

HancockCounty_RankingSpreadsheet.xlsx

Table B.9:. Hazard Risk Scores Legend

Probability Factor		Sum of Weighted Extent Factors		Sum of Weighted Vulnerability Factors		Sum of Weighted Impact Factors		Consequence Score		Total Risk Score	
1	Low (L)	0–3	Low (L)	0–6	Low (L)	0–12	Low (L)	0–25	Low (L)	0–24	Low (L)
2	Medium (M)	4–7	Medium (M)	7–12	Medium (M)	13–26	Medium (M)	26–50	Medium (M)	25–59	Medium (M)
3	High (H)	8–12	High (H)	13–18	High (H)	27–39	High (H)	51–75	High (H)	60–100	High (H)

** The **Legend** – specifically the assignment of low, medium, and high—provides an additional means to qualitatively assess the probability factor, sum of weighted factors, and the total risk scores for each hazard.*

*The **Consequence Score** represents the sum of the Extent, Vulnerability, and Impact Factors.*

*The **Total Risk Score** is a measure of Probability and Consequence.*

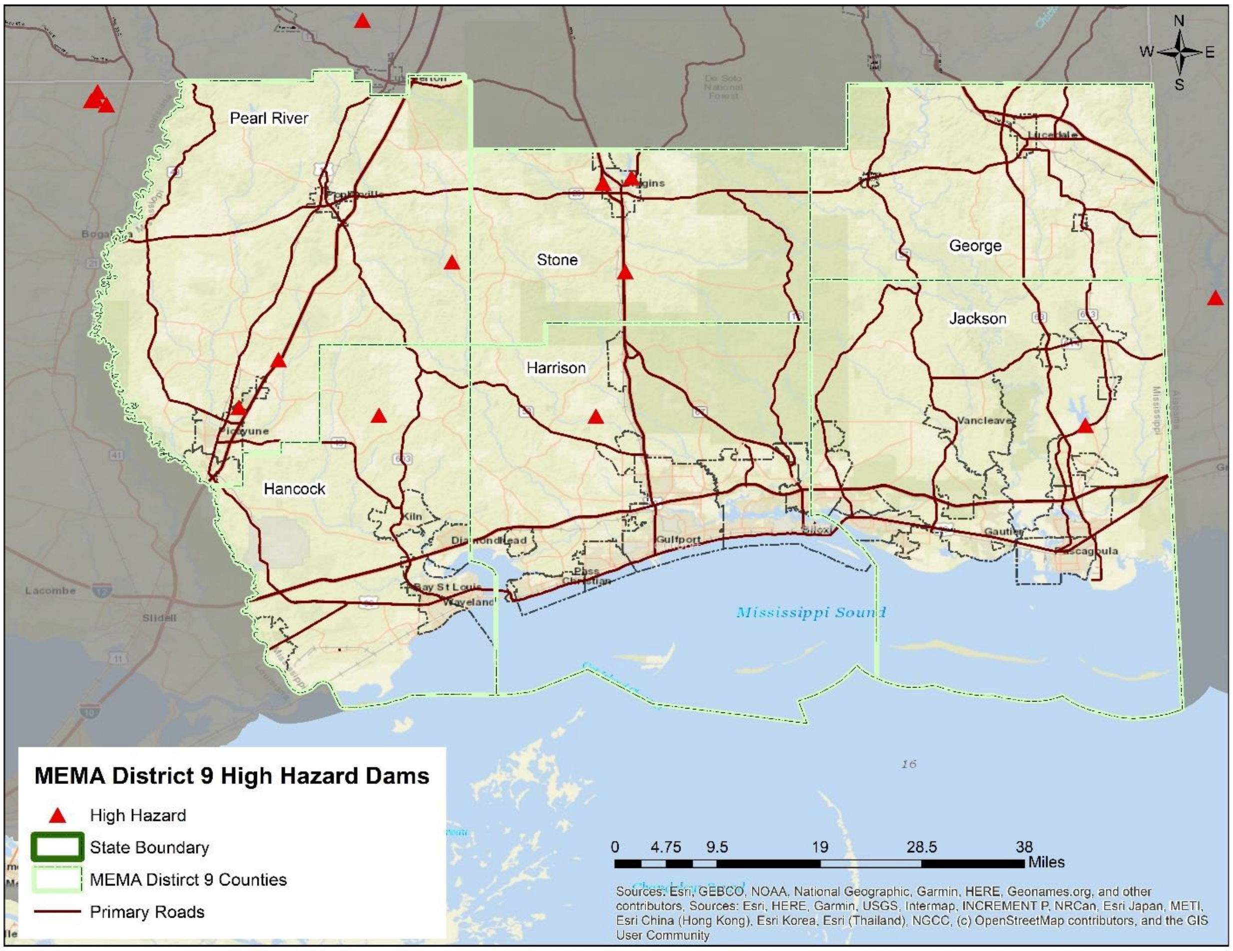
FLOOD-RELATED HAZARDS

Dam And Levee Failure

LOCATION AND SPATIAL EXTENT

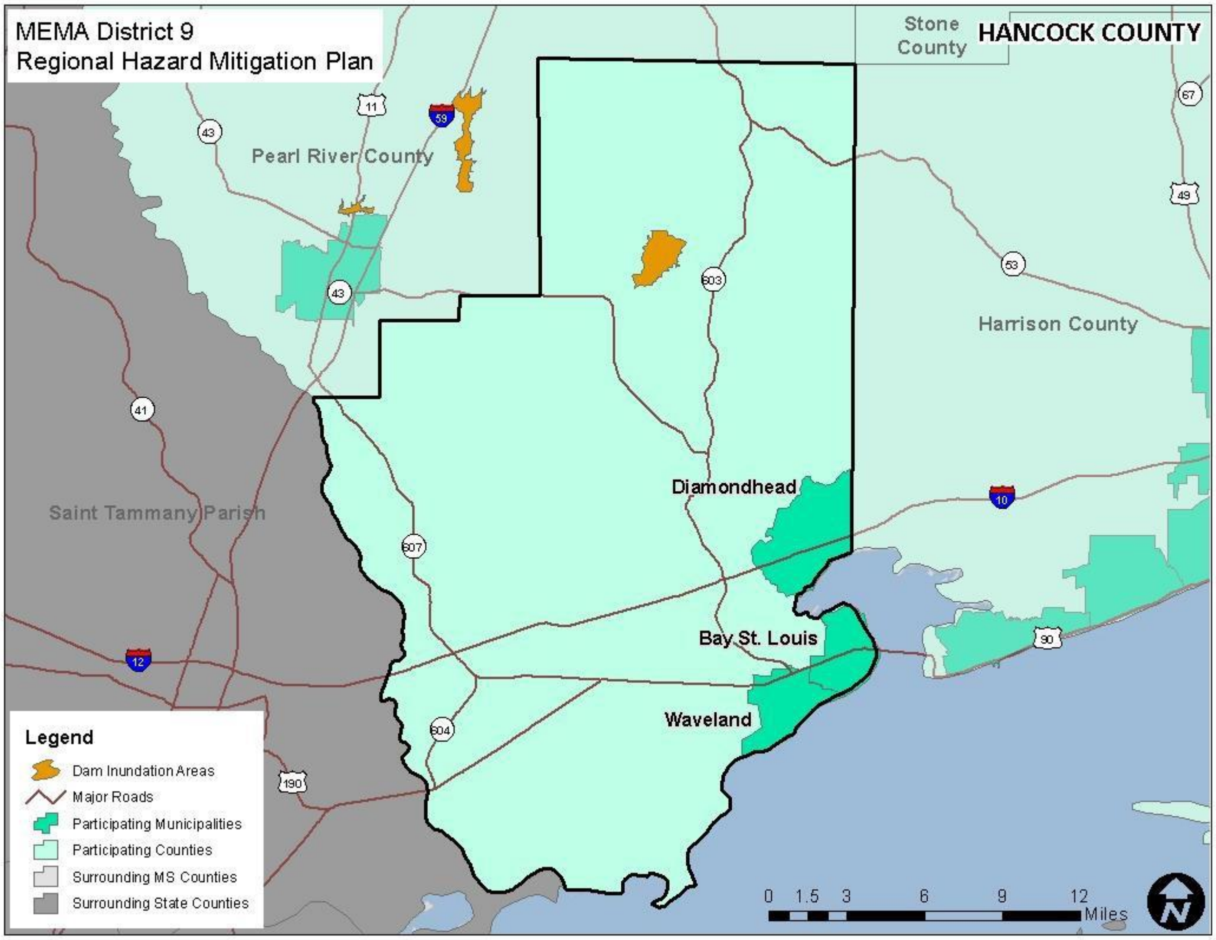
According to the Mississippi Department of Environmental Quality, there is one high hazard dam in Hancock County. Figure B.3 and Figure B.4 show the location of this high hazard dam as well as mapped dam inundation areas, and Table B.10 lists it by name.

FIGURE B.3: HANCOCK COUNTY HIGH HAZARD DAM LOCATIONS



Source: Mississippi Department of Environmental Quality

FIGURE B.4: HANCOCK COUNTY DAM INUNDATION AREAS



Source: Mississippi Department of Environmental Quality

TABLE B.10: HANCOCK COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential
Hancock County	
WHITE CYPRESS LAKE DAM	High

Source: Mississippi Department of Environmental Quality

HISTORICAL OCCURRENCES

According to the Mississippi State Hazard Mitigation Plan, there has been one dam failure reported in Hancock County. Although no damage was reported with this event, several breach scenarios in the region could be catastrophic.

Table B.11 below provides a brief description of the one reported dam failure.

TABLE B.11: HANCOCK COUNTY DAM FAILURES (1982-2022)

Date	County	Structure Name	Cause of Failure
April 1983	Hancock	Boy Scout Camp	Breached

Source: Mississippi State Hazard Mitigation Plan

PROBABILITY OF FUTURE OCCURRENCES

Given the current dam inventory and historic data, a dam breach is possible (between 1 and 10 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

The FEMA NRI does not assess high-hazard dam failure events

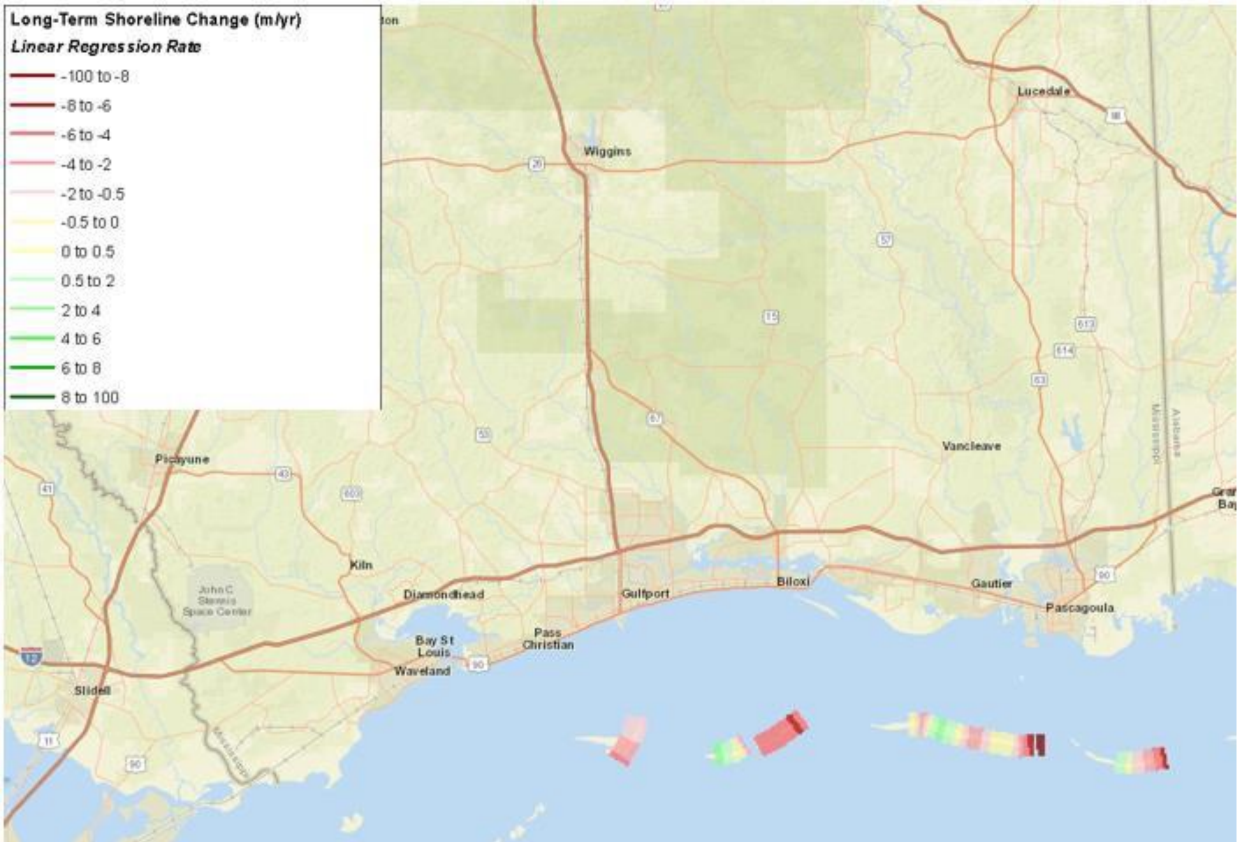
Erosion

LOCATION AND SPATIAL EXTENT

For the most part, major erosion in Hancock County is typically caused by coastal tides, ocean currents, and storm events. Although the county also experiences riverine erosion in many of its inland areas, these are of somewhat less concern than coastal erosion areas which historically have had larger impacts. Unlike inland areas, where the soil has greater organic matter content, coastal soils are mainly composed of fine grained particles such as sand. This makes coastal soils much more susceptible to erosion. Although some areas of the Hancock County coast are protected and natural erosion processes are allowed to take place for the most part, many areas near where development has occurred are especially susceptible.

At this time, there is limited data available on localized areas of erosion. Most of the information collected by the United States Geological Survey (USGS) is focused on the barrier islands that are just off the coast of the mainland. The long-term shoreline change for the barrier islands as calculated by the USGS can be found in Figure B.5 It should be noted that many areas of the coast are protected through the use of structural techniques. Also, a great deal of renourishment activities are carried out along the mainland coastal communities.

FIGURE B.5: LONG-TERM SHORELINE CHANGE (M/YR) IN THE MEMA DISTRICT 9 REGION



Source: United States Geological Survey

HISTORICAL OCCURRENCES

Several sources were vetted to identify areas of erosion in Hancock County. This includes searching local newspapers, interviewing local officials, and reviewing previous hazard mitigation plans. Because dramatic, short-term erosion tends to take place after major storm events such as hurricanes, flooding, or storm surge, the erosion events often correspond directly with those events. Conversely, with long- term erosion, it is difficult to identify a specific historic occurrence because these events are by nature occurring at all times over a long period at a very gradual rate. Therefore, long-term historic erosion events cannot be confined to a specific timeframe or occurrence.

PROBABILITY OF FUTURE OCCURRENCES

Erosion remains a natural, dynamic, and continuous process for Hancock County, and it will continue to occur. The annual probability level assigned for erosion is likely (between 10 and 100 percent annually).

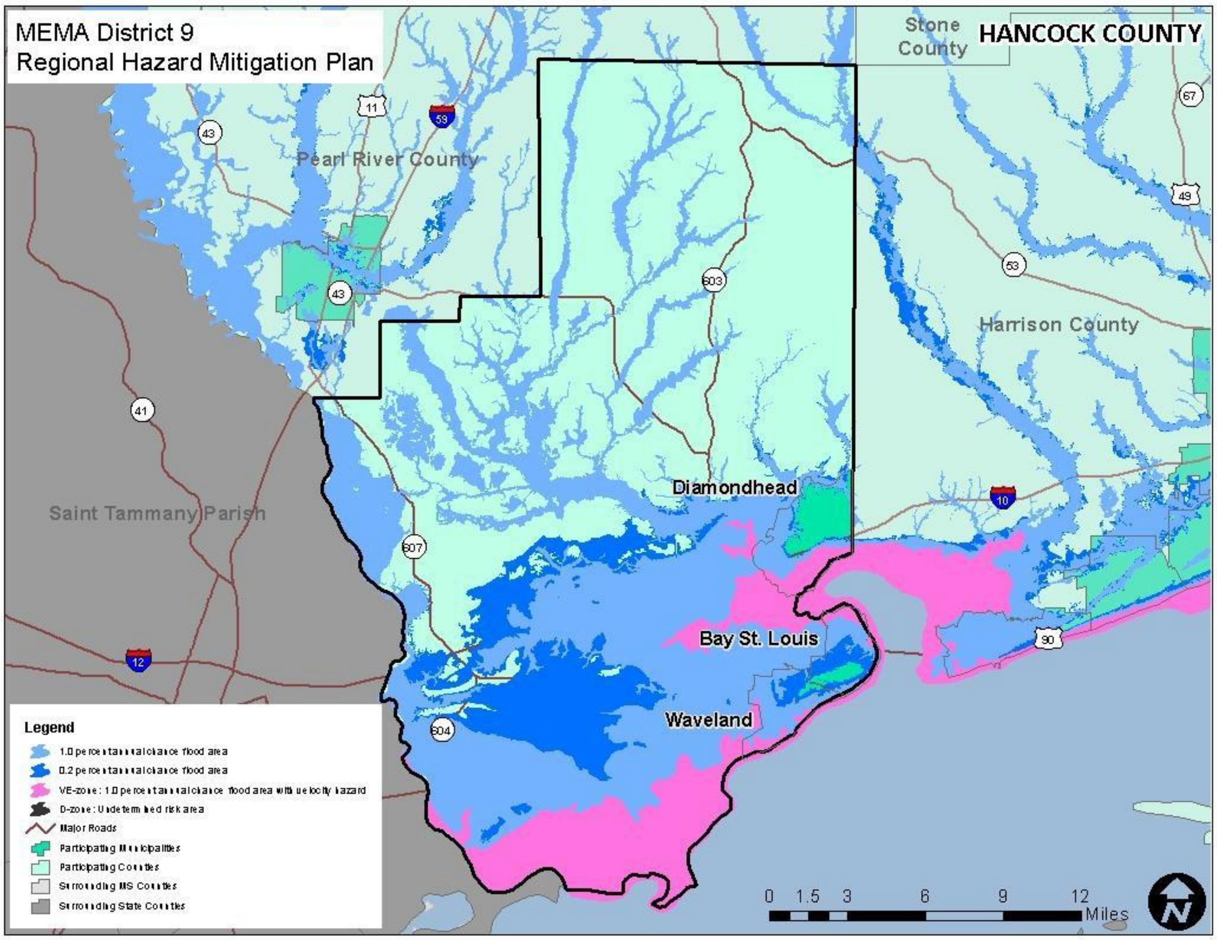
FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

The FEMA NRI does not assess erosion events.

LOCATION AND SPATIAL EXTENT

There are areas in Hancock County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM). This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevations), Zone VE (1-percent annual chance floodplain with additional hazards due to storm-induced velocity wave action), Zone X500 (0.2-percent annual chance floodplain), and Zone D (undetermined risk area). Figure B.6 illustrates the location and extent of currently mapped special flood hazard areas for the county based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

FIGURE B.6: SPECIAL FLOOD HAZARD AREAS IN HANCOCK COUNTY



Source: Federal Emergency Management Agency

Figures B.7 and B.8 display Flood Hazard Layer information both including and excluding facilities.

Figure B.7: National Flood Hazard Layer (No Facilities)

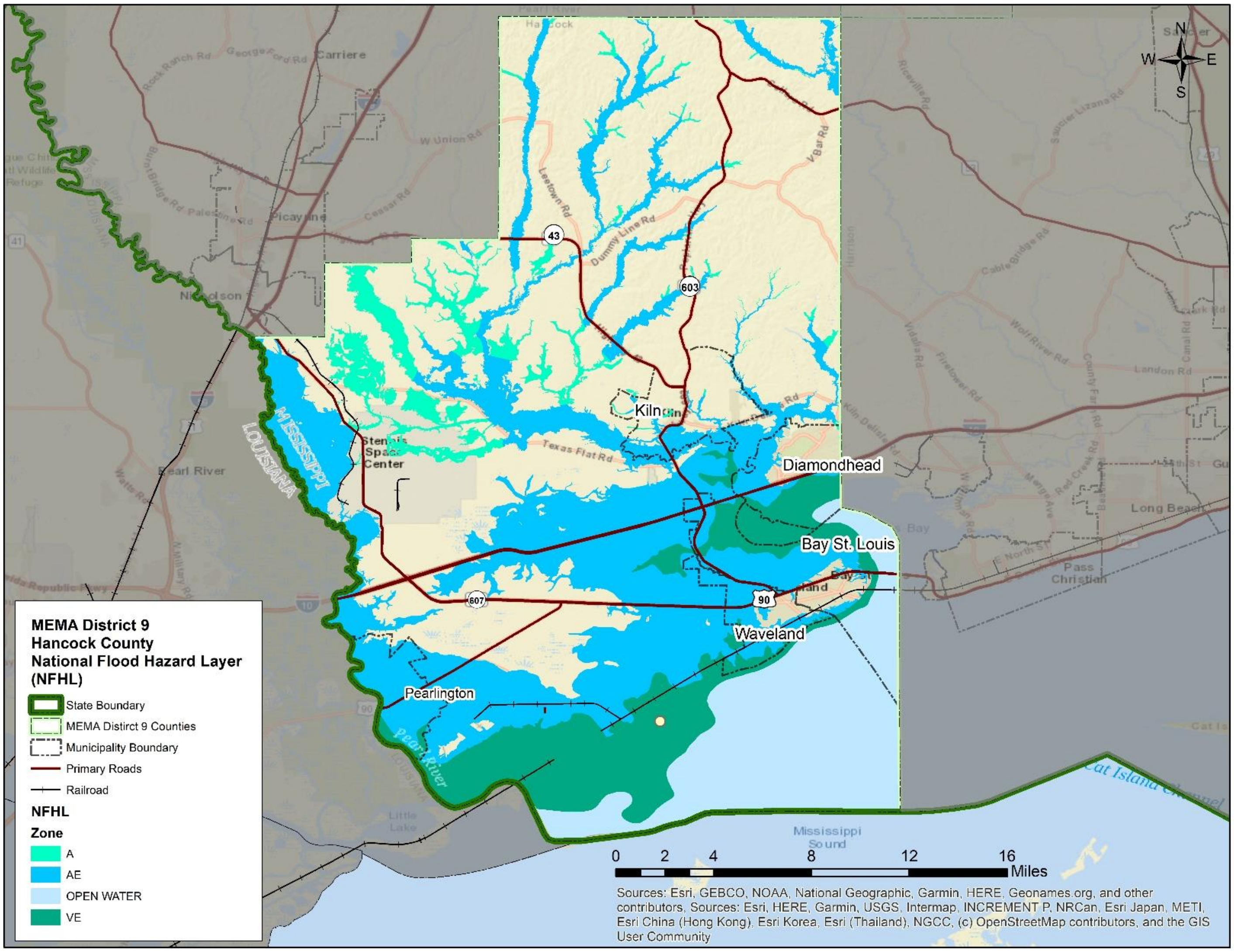
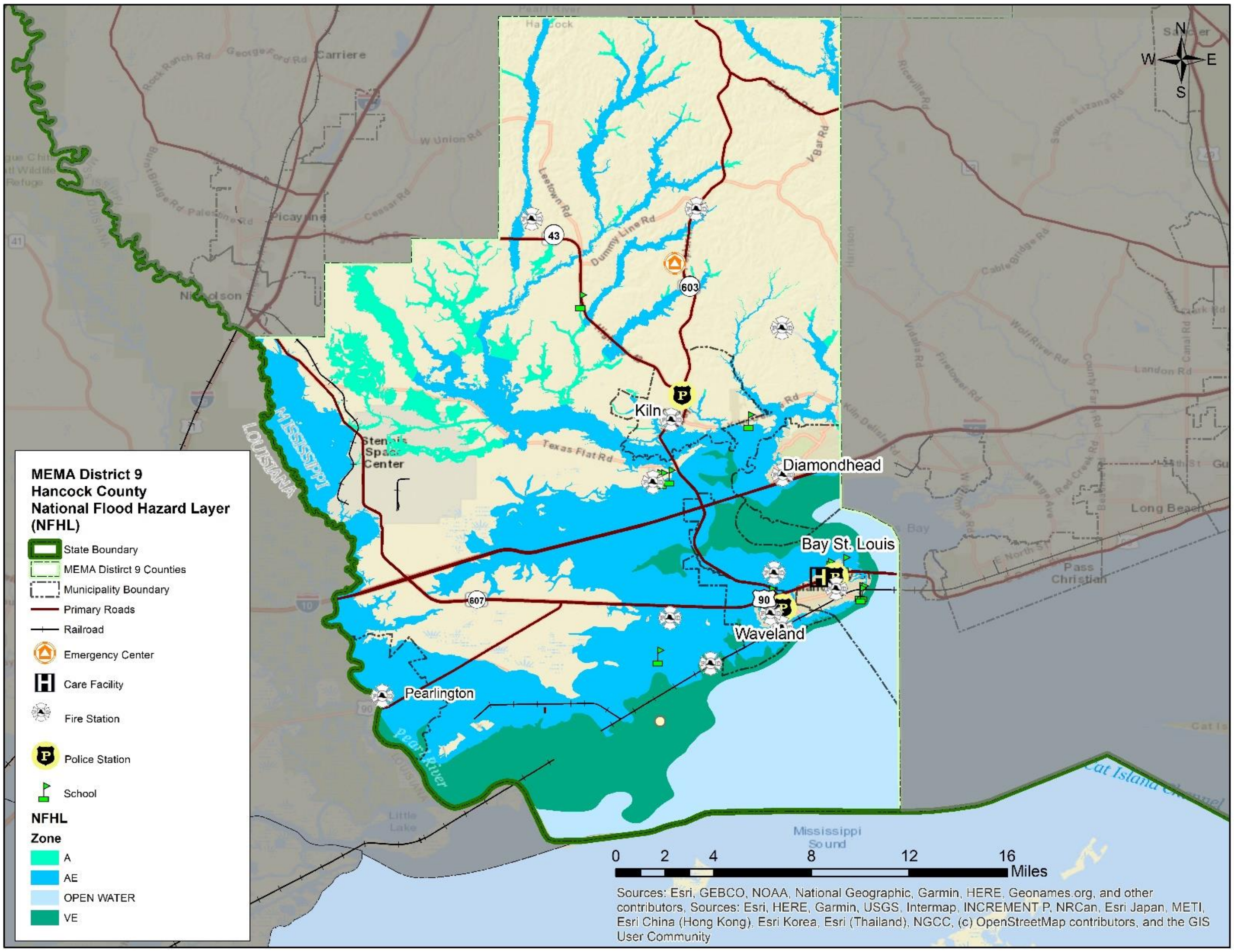


Figure B.8: National Flood Hazard Layer (Facilities)


MEMA District 9
Hancock County
National Flood Hazard Layer (NFHL)
State Boundary
MEMA District 9 Counties
Municipality Boundary
Primary Roads
Railroad
Emergency Center
Care Facility
Fire Station
Police Station
School
NFHL
Zone
A
AE
OPEN WATER
VE
Kiln
Diamondhead
Bay St. Louis
Waveland
Pearlington
Stennis Space Center
Carriere
Picayune
Nicholson
Long Beach
Pass Christian
MISSISSIPPI
LOUISIANA
Pearl River
Mississippi Sound
Cat Island Channel
0 2 4 8 12 16 Miles
Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

HAZUS 100-year Flood Analysis

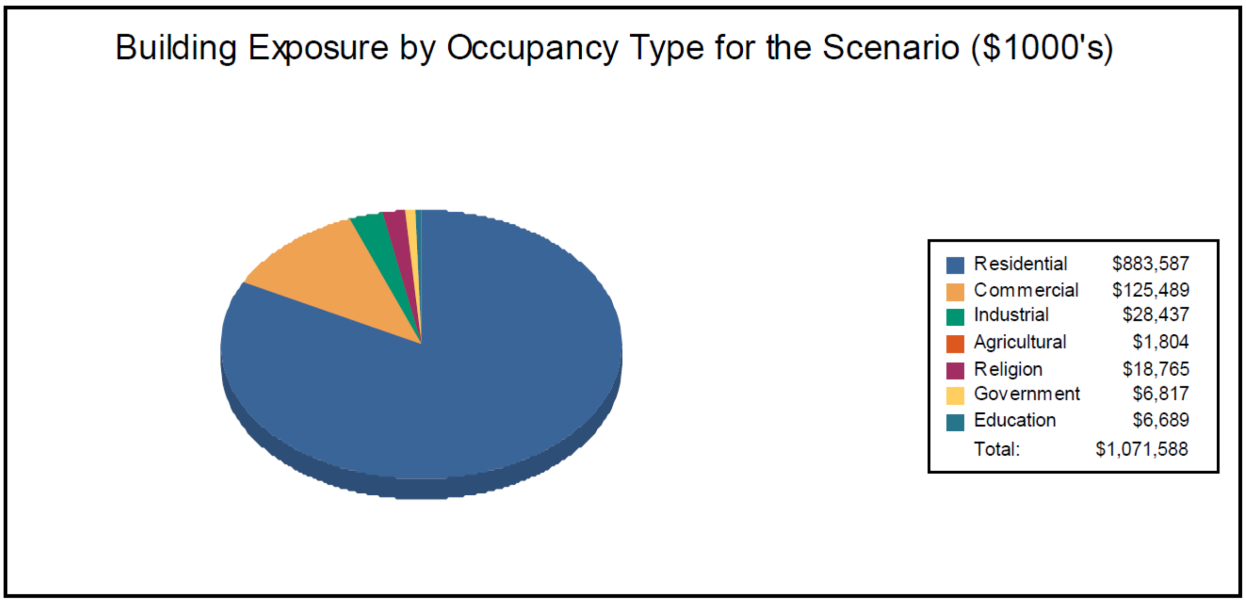
Hazus estimates that there are 20,833 buildings in the region which have an aggregate total replacement value of 4,047 million dollars.

Table B.12: 100-year Flooding Building Exposure by Occupancy Type for the Scenario

Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	883,587	82.5%
Commercial	125,489	11.7%
Industrial	28,437	2.7%
Agricultural	1,804	0.2%
Religion	18,765	1.8%
Government	6,817	0.6%
Education	6,689	0.6%
Total	**1,071,588**	**100%**

Pie Chart 1: 100-year Flooding Building Exposure by Occupancy Type for the Scenario



HAZUS General Building Stock

Hazus estimates that about 245 buildings will be at least moderately damaged. This is over 35% of the total number of buildings in the scenario. There are an estimated 58 buildings that will be destroyed.

Figure B.9: HAZUS 100-year Flood Scenario

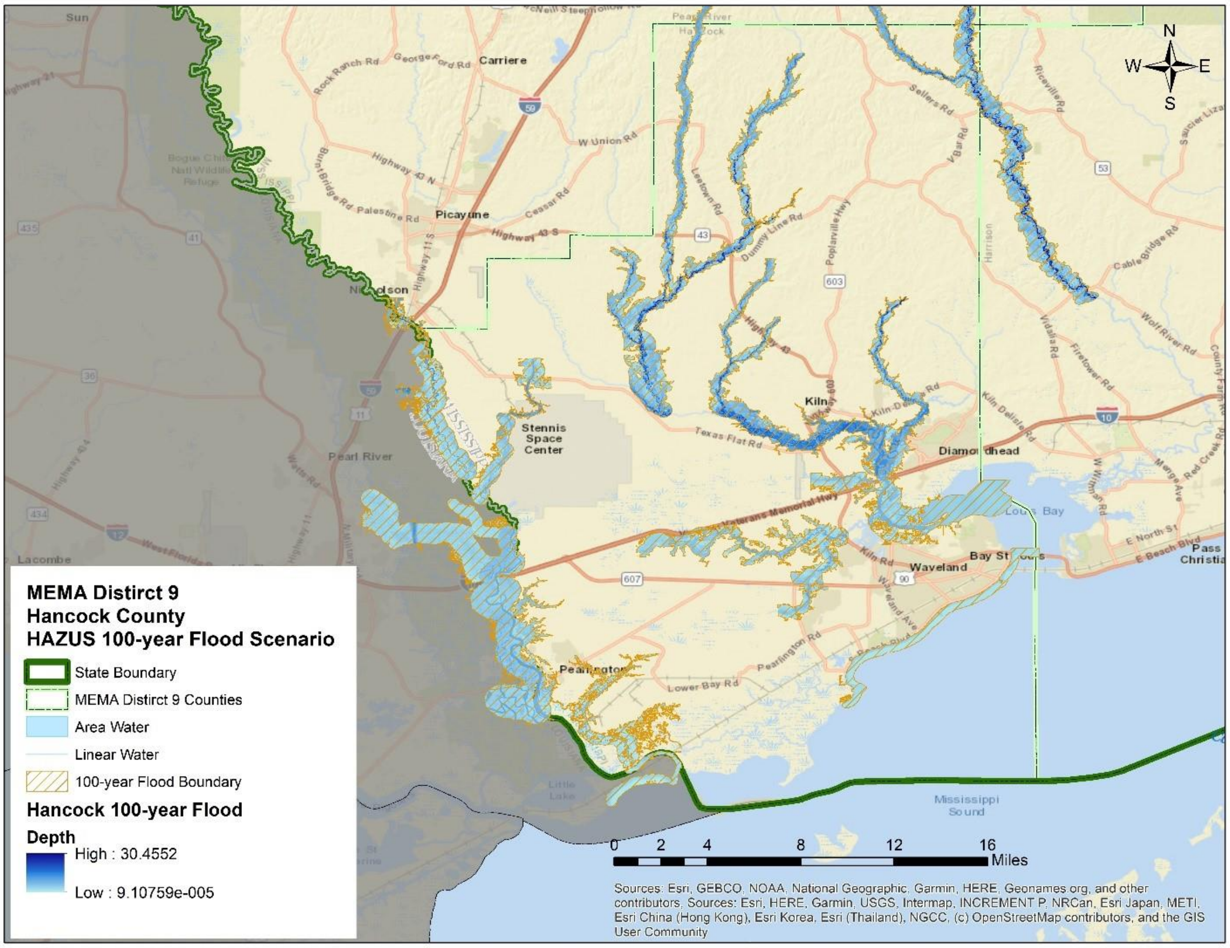
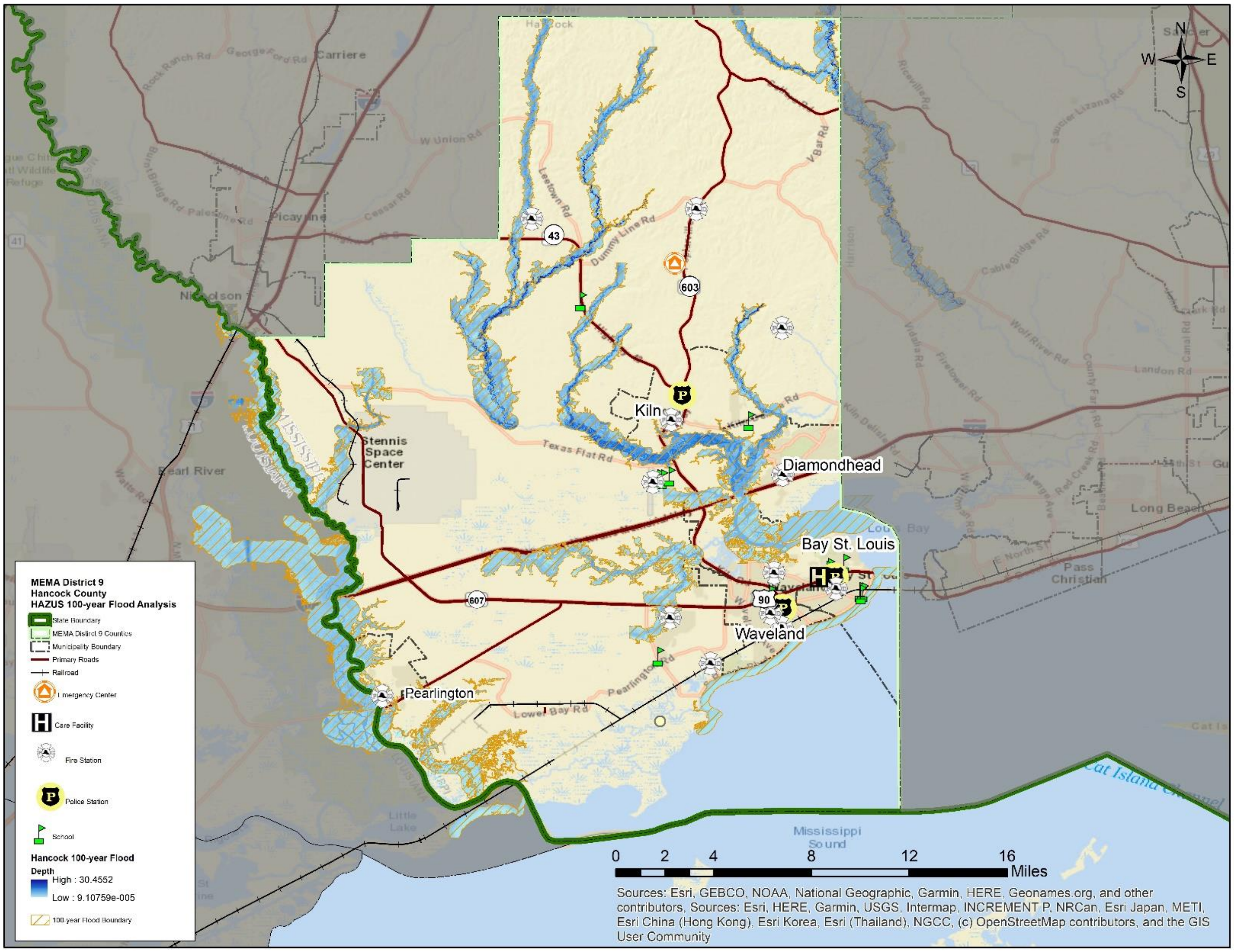


Figure B.10: HAZUS 100-year Flood Analysis (Facilities)



HAZUS Economic Loss

The total economic loss estimated for the flood is 102.63 million dollars, which represents 9.58 % of the total replacement value of the scenario buildings.

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 56.07 million dollars. 45% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 58.78% of the total loss.

HISTORICAL OCCURRENCES

Floods were at least partially responsible for four disaster declarations in Hancock County in 1974, 1979, 1991, and 1995. Information from the National Climatic Data Center was used to ascertain additional historical flood events. The National Climatic Data Center reported a total of 29 events in Hancock County since 1997. These events accounted for over $1.1 million in property damage in the county. Based on recorded historic occurrences Hancock County has experienced rainfall events ranging up to 6-10'' in a single event causing a wide range of flood depths throughout the county ranging from a few inches of flood waters to several feet based on the location and duration of each event, the amounts vary. A summary of these events is presented in Table B.13. Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in Table B.14.

TABLE B.13: SUMMARY OF FLOOD OCCURRENCES IN HANCOCK COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2022)	Annualized Property Losses
Bay St. Louis	4	0/0	$0	$0
Diamondhead	1	0/0	$0	$0
Waveland	4	0/0	$150,064	$6,003
Unincorporated Area	24	0/0	$1,096,514	$43,861
HANCOCK COUNTY TOTAL	33	0/0	$1,246,578	$49,864

Source: National Climatic Data Center

TABLE B.14: HISTORICAL FLOOD EVENTS IN HANCOCK COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Bay St. Louis				
BAY ST LOUIS	12/21/2006	Heavy Rain	0/0	$0
BAY ST LOUIS	10/22/2007	Flash Flood	0/0	$0
BAY ST LOUIS	3/28/2009	Flash Flood	0/0	$0
BAY ST LOUIS	4/14/2018	Flash Flood	0/0	$0
Diamondhead				
DIAMONDHEAD ARPT	3/21/2012	Flash Flood	0/0	$0
Waveland				
WAVELAND	5/19/1997	Flash Flood	0/0	$150,064
WAVELAND	12/12/2009	Flash Flood	0/0	$0
WAVELAND	3/9/2011	Flash Flood	0/0	$0
WAVELAND	4/14/2015	Flash Flood	0/0	$0
Unincorporated Area				
COUNTYWIDE	1/7/1998	Flash Flood	0/0	$14,776
COUNTYWIDE	3/7/1998	Flash Flood	0/0	$0
COUNTYWIDE	6/11/2001	Flood	0/0	$0
COUNTYWIDE	9/26/2002	Flash Flood	0/0	$0
COUNTYWIDE	6/30/2003	Flash Flood	0/0	$654,492
HANCOCK (ZONE)	7/1/2003	Flood	0/0	$327,246

Location	Date	Type	Deaths/Injuries	Property Damage*
COUNTYWIDE	7/5/2003	Heavy Rain	0/0	$0
SOUTH PORTION	5/29/2005	Flash Flood	0/0	$0
HANCOCK (ZONE)	10/16/2006	Coastal Flood	0/0	$0
HANCOCK (ZONE)	4/10/2008	Coastal Flood	0/0	$0
HANCOCK (ZONE)	3/27/2009	Coastal Flood	0/0	$0
HANCOCK (ZONE)	12/1/2009	Coastal Flood	0/0	$0
HANCOCK (ZONE)	2/4/2010	Coastal Flood	0/0	$0
HANCOCK (ZONE)	5/1/2010	Coastal Flood	0/0	$0
HANCOCK (ZONE)	5/2/2010	Coastal Flood	0/0	$0
HANCOCK (ZONE)	6/30/2010	Coastal Flood	0/0	$0
KILN	6/30/2010	Flash Flood	0/0	$0
KILN	4/14/2014	Flash Flood	0/0	$0
KILN	5/16/2015	Flash Flood	0/0	$0
HANCOCK (ZONE)	6/15/2015	Coastal Flood	0/0	$0
HANCOCK (ZONE)	10/25/2015	Coastal Flood	0/0	$0
LAKESHORE	7/16/2018	Flash Flood	0/0	$0
CRANE CREEK	5/12/2019	Flood	0/0	$100,000
KILN	4/15/2021	Flash Flood	0/0	$0

*Property damage is reported in 2022 dollars; all damage may not have been reported.
Source: National Climatic Data Center

HISTORICAL SUMMARY OF INSURED FLOOD LOSSES

According to FEMA flood insurance policy records as of October 2016, there have been 8,558 flood losses reported in Hancock County through the National Flood Insurance Program (NFIP) since 1978, totaling over $737.4 million in claims payments. A summary of these figures for the county is provided in TableB.15. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Hancock County were either uninsured, denied claims payment, or not reported.

TABLE B.15: SUMMARY OF INSURED FLOOD LOSSES IN HANCOCK COUNTY

Location	Number of Policies	Flood Losses	Claims Payments
Bay St. Louis	2,240	1,244	$148,880,718
Diamondhead	14	0	$0
Waveland	1,795	1,385	$183,867,798
Unincorporated Area	4,265	5,929	$404,676,960
HANCOCK COUNTY TOTAL	8,314	8,558	$737,425,476

Source: National Flood Insurance Program

REPETITIVE LOSS PROPERTIES

According to the Mississippi Emergency Management Agency, there are 1,060 non-mitigated repetitive loss properties located in Hancock County, which accounted for 2,689 losses and over $121.6 million in claims payments under the NFIP. The average claim amount for these properties is $43,094. Of the 1,060 properties, 982 are single family, 9 are 2-4 family, 10 are assumed condominium, 6 are other residential, and 30 are non-residential. Without mitigation, these properties will likely continue to experience flood losses. Table B.16 presents detailed information on repetitive loss properties and NFIP claims and policies for Hancock County.

During the 2022 HMP update process updated NFIP/Repetitive Loss data was requested; however, no new data was made available. The 2016 data is considered the best available data for the plan update. With a lack of data provided via FEMA the National Resource Defense Council (NRDC) was utilized to provide unofficial NFIP/RL data. Based on data available via the (NRDC), Hancock County has experienced a total of 9,666 NFIP claims totaling $718,949,437 in payments. The total number of SRL properties is 138 totaling 24,840,002 claim payments.
[Losing Ground: Severe Repetitive Flooding in the United States (nrdc.org)]

TABLE B.16: REPETITIVE LOSS PROPERTIES IN HANCOCK COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Bay St. Louis	408	389 single family; 4 2-4 family; 4 assumed condo; 1 other residential; 10 other non-residential	1,106	$40,169,698	$12,303,491	$52,473,189	$47,444
Diamondhead	23	23 single family	--	--	--	--	--
Waveland	74	69 single family; 1 2-4 family; 4 other residential	223	$6,295,197	$1,973,246	$8,268,443	$37,078
Unincorporated Area	555	524 single family; 4 2-4 family; 6 assumed condo; 1 other residential; 20 other non-residential	1,360	$47,689,291	$13,184,868	$60,874,158	$44,760
HANCOCK COUNTY TOTAL	1,060		2,689	$94,154,186	$27,461,605	$121,615,790	$43,094

*The information provided by Diamondhead did not include number of losses or total payments information for the city. Therefore, the number of losses and total payments for the city are not included in the regional total.
Source: Federal Emergency Management Agency, National Flood Insurance Program

PROBABILITY OF FUTURE OCCURRENCES

Flood events will remain a threat in Hancock County, and the probability of future occurrences will remain highly likely (100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figure above, which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain). Further, as described in other hazard profiles, it is highly likely that Hancock County will continue to experience inland flooding associated with large tropical storms and hurricanes.

It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county. For example, the southern half of the county has more floodplain and thus a higher risk of flood than the rest of the county. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

It should also be noted that anticipated sea level rise will increase the probability and intensity of future tidal flooding events in years to come. Rising sea level over time will shorten the return period (increasing the frequency) of significant flood events. This hazard is discussed elsewhere in this section.

FEMA NRI Expected Annual Loss Estimates

Table B.17: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR FLOODING EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.8 events/year	0.17	$1,924,306	$124,006	$1,374	$2,049,686	84.3	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table B.18: Hancock County Hazard Specific Risk Index Table

HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX - FLOODING	
Risk Index Score	Risk Index Rating
83.3/100	Relatively Moderate

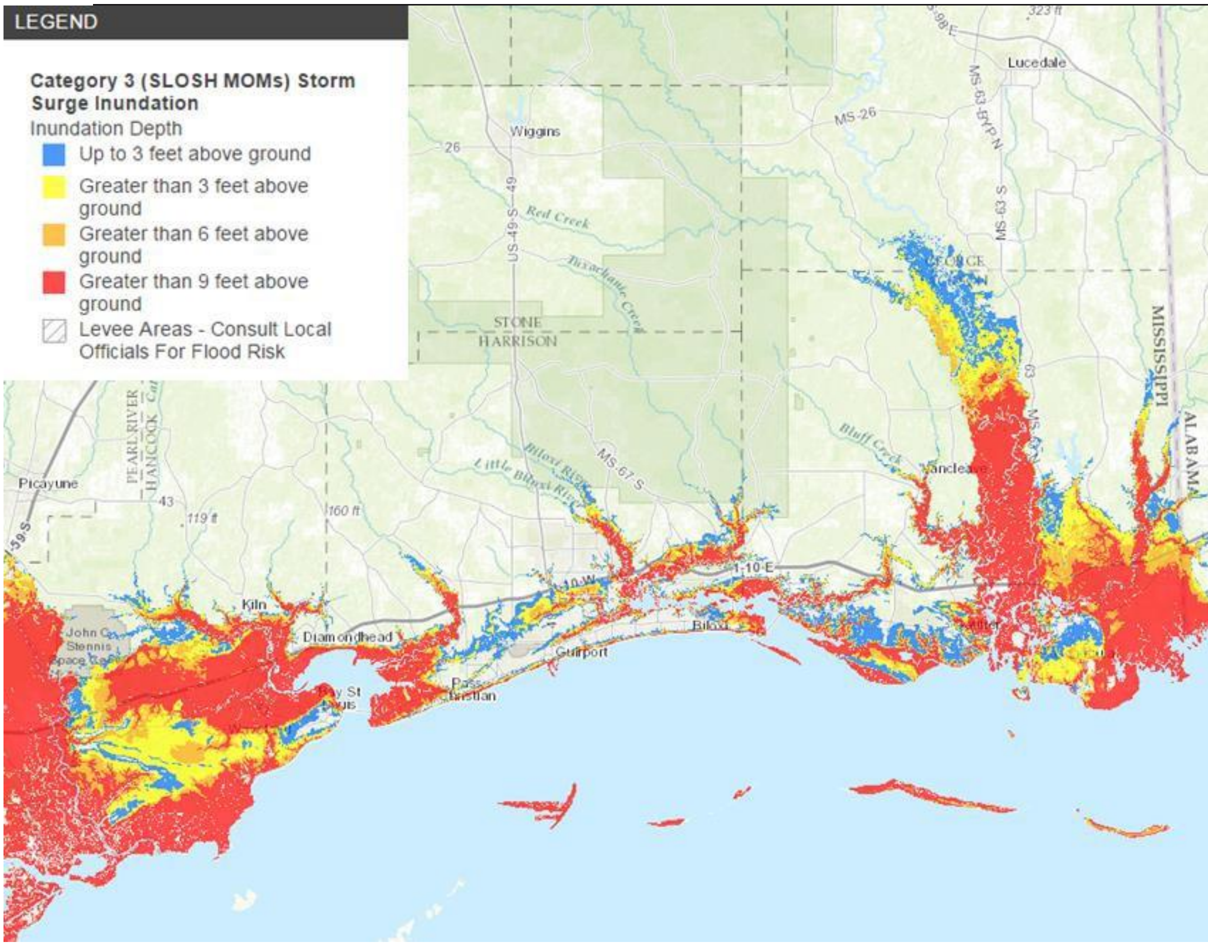
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*
Source: FEMA National Risk Index (2023)

Storm Surge

LOCATION AND SPATIAL EXTENT

There are many areas in Hancock County that are subject to potential storm surge inundation as modeled and mapped by the National Oceanic and Atmospheric Administration (NOAA). Figure B.11 illustrates hurricane storm surge inundation zones based on a Category 3 storm. The illustration is derived from geo- referenced SLOSH (Sea, Lake, and Overland Surge from Hurricanes) data produced by the USACE in coordination with NOAA. SLOSH is a modeling tool used to estimate storm surge for coastal areas resulting from historical, hypothetical, or predicted hurricanes taking into account maximum expected levels for pressure, size, forward speed, track, and winds. Therefore, the SLOSH data is best used for defining the potential maximum surge associated with various storm intensities for any particular location. As shown in the figure, the entire coast of Hancock County is at high risk to storm surge inundation. Inland areas may also experience substantial flooding during a storm event.

FIGURE B.11: STORM SURGE RISK AREAS IN THE MEMA DISTRICT 9 REGION



Source: NOAA

HISTORICAL OCCURRENCES

According to the National Climatic Data Center, 11 storm surge events have been reported for Hancock County since 1998. These events accounted for almost $4.2 billion (2016 dollars) in property damage. A summary of these events is presented in Table B.19. Detailed information on the recorded storm surge events can be found in Table B.20.

TABLE B.19: SUMMARY OF STORM SURGE EVENTS IN HANCOCK COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Bay St. Louis	0	0/0	$0	$0
Diamondhead	0	0/0	$0	$0
Waveland	0	0/0	$0	$0
Unincorporated Area	25	0/0	$4,184,523,545	$174,355,148
HANCOCK COUNTY TOTAL	25	0/0	$4,184,523,545	$174,355,148

Source: National Climatic Data Center

TABLE B.20: HISTORICAL STORM SURGE EVENTS IN HANCOCK COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Bay St. Louis				
None reported	--	--	--	--

Diamondhead				
None reported	--	--	--	--
Waveland				
None reported	--	--	--	--
Unincorporated Area				
LAKESHORE	2/15/1998	2-4 feet above normal	0/0	$738,813
PEARLINGTON	10/13/2001	--	0/0	$0
HANCOCK (ZONE)	6/30/2003	3-5 feet above normal	0/0	$654,492
HANCOCK (ZONE)	9/15/2004	3-5 feet above normal	0/0	$510,012
HANCOCK (ZONE)	10/9/2004	2-4 feet above normal	0/0	$19,125
HANCOCK (ZONE)	7/5/2005	3-5 feet above normal	0/0	$616,623
HANCOCK (ZONE)	8/29/2005	19-25 feet	0/0	$4,168,372,453
HANCOCK (ZONE)	9/1/2008	8-11 feet	0/0	$1,398,337
HANCOCK (ZONE)	9/11/2008	4-6 feet above normal	0/0	$0
HANCOCK (ZONE)	9/2/2011	2-4 feet above normal	0/0	$10,707
HANCOCK (ZONE)	8/28/2012	10 feet	0/0	$2,202,981
HANCOCK (ZONE)	6/15/2015	-	0/0	$0
HANCOCK (ZONE)	10/25/2015	2-4 feet above normal	0/0	$0
HANCOCK (ZONE)	4/30/2017	2 feet above normal	0/0	$0
HANCOCK (ZONE)	6/20/2017	4 feet above normal	0/0	$0
HANCOCK (ZONE)	10/07/2017	2-5 feet above normal	0/0	$0
HANCOCK (ZONE)	10/08/2018	3 feet above normal	0/0	
HANCOCK (ZONE)	7/11/2019	3-5 feet above normal	0/0	
HANCOCK (ZONE)	9/15/2020	3-5 feet above normal	0/0	
HANCOCK (ZONE)	9/21/2020	3-5 feet above normal	0/0	
HANCOCK (ZONE)	10/10/2020	3-5 feet above normal	0/0	
HANCOCK (ZONE)	10/28/2020	8-9 feet above normal	0/0	$10,000,000
HANCOCK (ZONE)	5/19/2021	-	0/0	
HANCOCK (ZONE)	6/19/2021	2-4 feet above normal	0/0	
HANCOCK (ZONE)	8/28/2021	7 feet above normal	0/0	

*Property damage is reported in 2022 dollars; all damage may not have been reported.
Source: National Climatic Data Center

PROBABILITY OF FUTURE OCCURRENCES

It is highly likely (100 percent annual probability) that Hancock County will continue to experience storm surge associated with large tropical storms, hurricanes, and squalls combined with high tides. As noted in the preceding section (under Flood), anticipated sea level rise will increase the probability and intensity of future storm surge events in years to come. This rise in sea level will not only increase the probability and intensity of tidal flooding events, but will also contribute to the loss of coastal wetlands and erosion of sand beaches that act as protective buffers against storm surge events.

FEMA NRI Expected Annual Loss Estimates

Table B.21: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR COASTAL FLOODING/STORM SURGE							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
6.1 Events/Year	0.01	$62,543	$2,681,468	n/a	$2,744,011	87.7	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table B.22: Hancock County Hazard Specific Risk Index Table

HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – COASTAL FLOODING/STORM SURGE	
Risk Index Score	Risk Index Rating
86.7/100	Relatively Moderate
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

FIRE-RELATED HAZARDS

Drought

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that Hancock County would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment but may exacerbate wildfire conditions.

HISTORICAL OCCURRENCES

According to the U.S. Drought Monitor, Hancock County had drought levels of Severe or worse in 6 of the last 22 years (January 2000-October 2022). Table B.23 shows the most severe drought classification for each year, according to U.S. Drought Monitor classifications. It should be noted that the U.S. Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

TABLE B.23: HISTORICAL DROUGHT OCCURRENCES IN HANCOCK COUNTY

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

	Hancock County
2000	EXCEPTIONAL
2001	MODERATE
2002	SEVERE
2003	ABNORMAL
2004	ABNORMAL
2005	ABNORMAL
2006	EXTREME
2007	MODERATE
2008	ABNORMAL
2009	MODERATE
2010	MODERATE
2011	EXCEPTIONAL
2012	EXTREME
2013	ABNORMAL
2014	SEVERE
2015	MODERATE
2016	ABNORMAL
2017	NONE
2018	NONE
2019	NONE
2020	NONE
2021	NONE
2022	NONE

Source: United States Drought Monitor

No anecdotal information was available from the National Climatic Data Center on droughts in Hancock County.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that Hancock County has a probability level of likely (between 10 and 100 percent annual probability) for future drought events. However, the extent (or magnitude) of drought and the amount of geographic area covered by drought, varies with each year. Historic information indicates that there is a much lower probability for extreme, long-lasting drought conditions.

FEMA NRI Expected Annual Loss Estimates

Table B.24: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR DROUGHT EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
15.1 events/year	n/a	n/a	n/a	$16,216	$16,216	47.1	Very low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table B.25: Hancock County Hazard Specific Risk Index Table

HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – DROUGHT	
Risk Index Score	Risk Index Rating
43.6/100	Very Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Lightning

LOCATION AND SPATIAL EXTENT

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Hancock County is uniformly exposed to lightning.

HISTORICAL OCCURRENCES

According to the National Climatic Data Center, there have been eight recorded lightning events in Hancock County since 1996. These events resulted in almost $403,000 in damages. Furthermore, lightning has caused two fatalities in the county. A summary of these events is presented in Table B.26. Detailed information on historical lightning events can be found in Table B.27.

It is certain that more than eight events have impacted the county. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE B.26: SUMMARY OF LIGHTNING OCCURRENCES IN HANCOCK COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2022)	Annualized Property Losses
Bay St. Louis	2	0/0	$7,093	$273
Diamondhead	2	0/0	$163,623	$6,293
Waveland	2	0/0	$231,796	$8,915
Unincorporated Area	2	2/0	$0	$0
HANCOCK COUNTY TOTAL	8	2/0	$402,512	$15,481

Source: National Climatic Data Center

TABLE B.27: HISTORICAL LIGHTNING OCCURRENCES IN HANCOCK COUNTY

Location	Date	Deaths/ Injuries	Property Damage*	Details
Bay St. Louis				
BAY ST LOUIS	6/26/1997	0/0	$4,202	Lightning struck the Sheriff's Office communication center causing extensive damage to equipment.
				Lightning strikes caused fires at a house and
Diamondhead				
				structure.
DIAMONDHEAD ARPT	7/17/2003	0/0	$163,623	Lightning caused a fire that destroyed a house.
DIAMONDHEAD ARPT	5/29/2005	0/0	$0	A lightning strike caused a fire in some trees which spread to a house in the Glen Eagle subdivision of
Location	Date	Deaths/ Injuries	Property Damage*	Details

				Diamondhead. The house was nearly destroyed by the fire.
Waveland				
WAVELAND	1/18/1996	0/0	$1,535	Lightning struck a transformer and interrupted electric service to several customers.
WAVELAND	9/16/1996	0/0	$230,261	Lightning caused a fire that damaged a restaurant and several motel suites.
Unincorporated Area				
LAKESHORE	8/8/1998	1/0	$0	Lightning killed a man as he attempted to run for cover from the thunderstorm.
LAKESHORE	8/15/2005	1/0	$0	Lightning struck and killed a 26 year old man while he was working outside.

Source: National Climatic Data Center

PROBABILITY OF FUTURE OCCURRENCES

Although there was not a high number of historical lightning events reported in Hancock County via NCDC data, it is a regular occurrence accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN), Hancock County is located in an area of the country that experienced an average of 4 to 12 lightning flashes per square kilometer per year between 2005 and 2014. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table B.28: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR LIGHTNING EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
154 events/year	0.05	$633,762	$32,042	n/a	$665,804	91.9	Relatively High

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table B.29: Hancock County Hazard Specific Risk Index Table

HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – LIGHTNING	
Risk Index Score	Risk Index Rating
90.7/100	Relatively High
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Wildfire

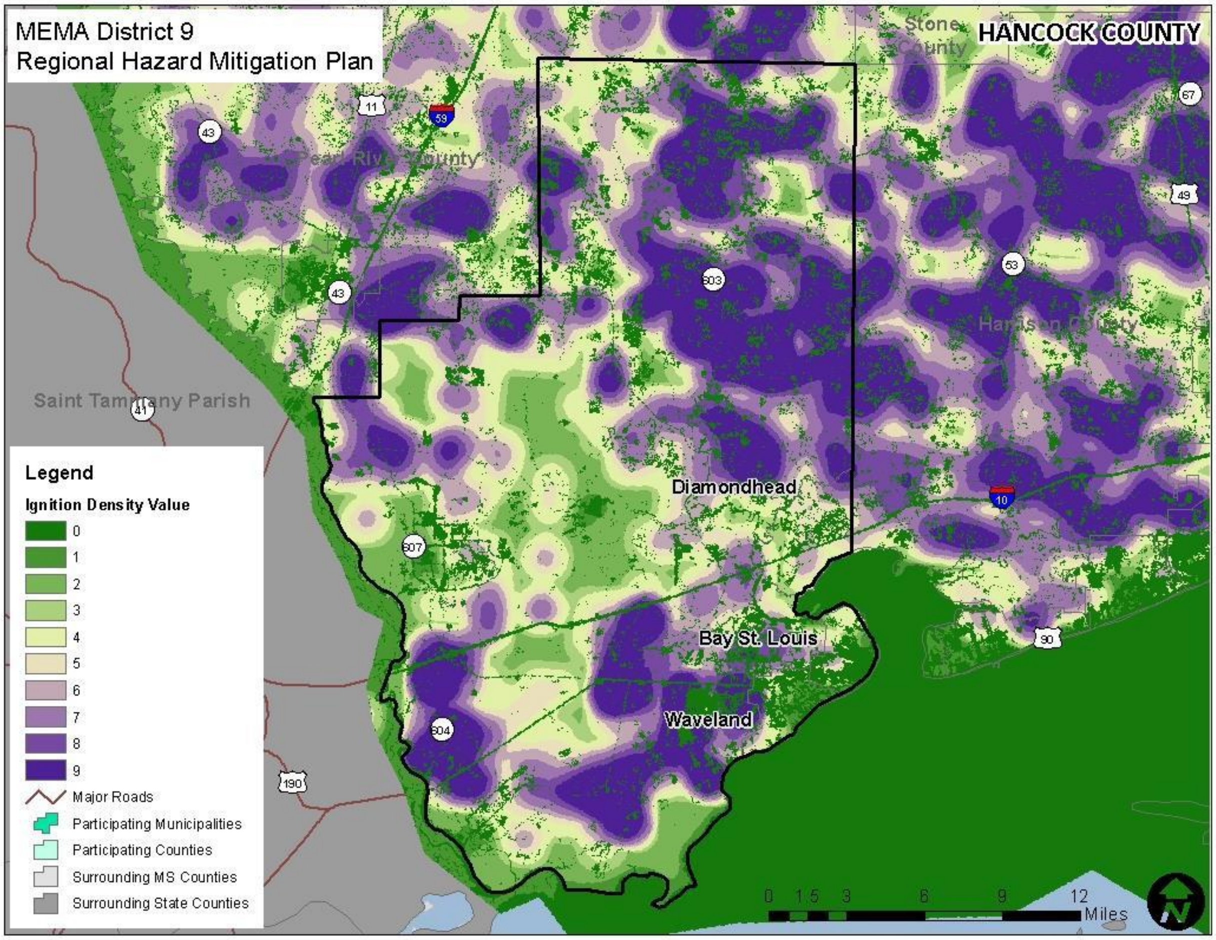
LOCATION AND SPATIAL EXTENT

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban- wildland interface are particularly susceptible to fire hazard as populations about formerly undeveloped areas. The Wildfire Ignition Density data shown in the figure below give an indication of historic location.

HISTORICAL OCCURRENCES

Figure B.12 shows the Wildfire Ignition Density in Hancock County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.

FIGURE B.12: WILDFIRE IGNITION DENSITY IN HANCOCK COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the Mississippi Forestry Commission from 2007 to 2022, Hancock County experiences an average of 92 wildfires annually which burn a combined 2,107 acres, on average per year. The data indicates that most of these fires are small, averaging 23 acres per fire. Table B.30 provides a summary of wildfire occurrences in Hancock County and Table B.31 lists the number of reported wildfire occurrences in the county between the years 2007 and 2016.

TABLE B.30: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2007 -2022)*

	Hancock County
Average Number of Fires per year	68.8
Average Number of Acres Burned per year	1,732.1
Average Number of Acres Burned per fire	28

*These values reflect averages since 2007.
Source: Mississippi Forestry Commission

TABLE B.31: HISTORICAL WILDFIRE OCCURRENCES IN HANCOCK COUNTY

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Hancock County																
Number of Fires	139	106	181	74	156	63	62	46	38	51	23	17	31	35	29	49
Number of Acres Burned	3,242	1,803	3,416	1,001	3,921	1,154	980	925	1,906	2,726	333	241	777	3,519	128	1,641

Source: Mississippi Forestry Commission

PROBABILITY OF FUTURE OCCURRENCES

Wildfire events will be an ongoing occurrence in Hancock County. Figure B138 shows that there is some probability a wildfire will occur throughout the county. However, the likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Hancock County for future wildfire events is highly likely (100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table B.32: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WILDIFRE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.409% chance/year	0.01	$145,690	$1,796,525	$52	$1,942, 267	91.8	Relatively Moderate

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

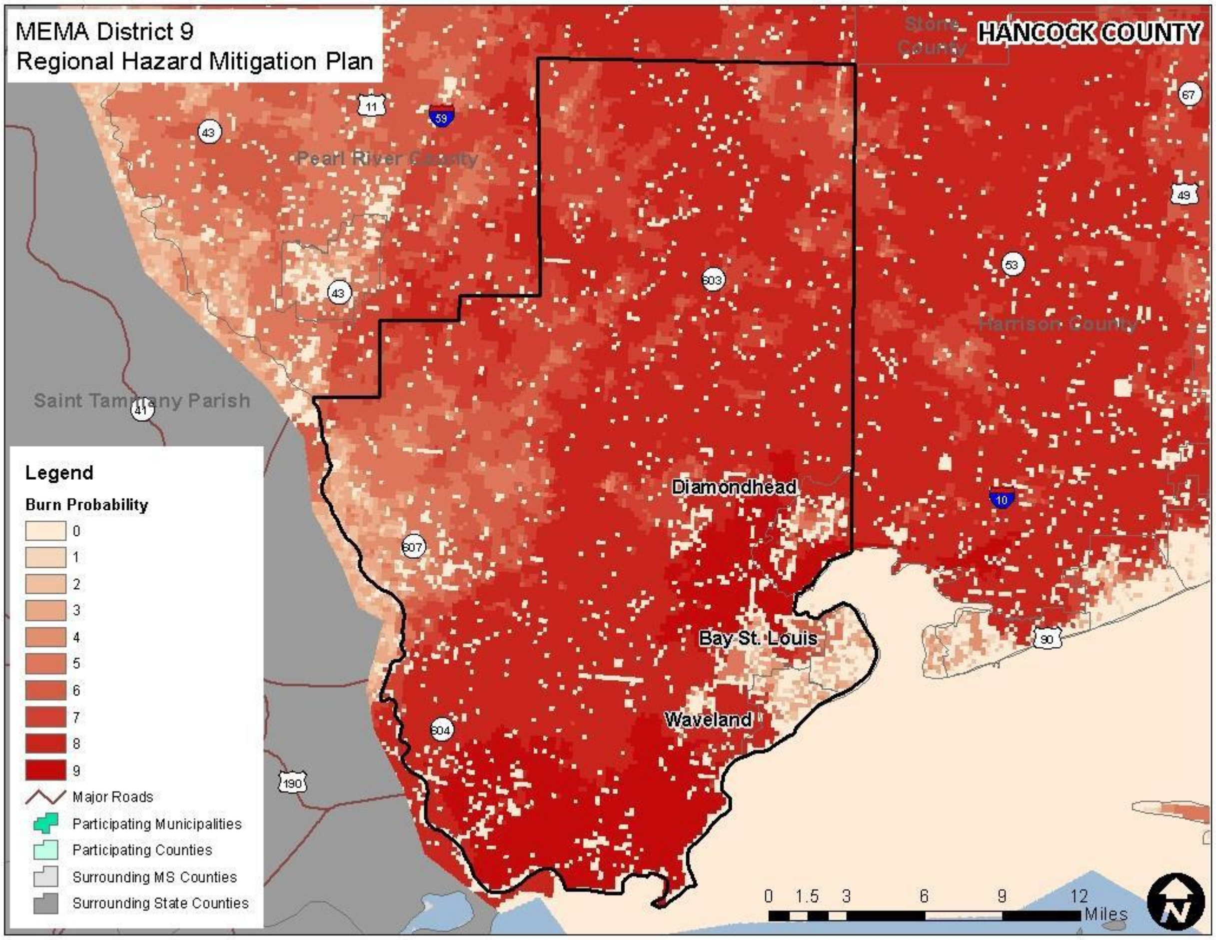
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table B.33: Hancock County Hazard Specific Risk Index Table

HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WILDFIRE	
Risk Index Score	Risk Index Rating
90.7/100	Relatively Moderate
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

FIGURE B.13: BURN PROBABILITY IN HANCOCK COUNTY



Source: Southern Wildfire Risk Assessment

Figure B.14: Wildfire Hazard Potential

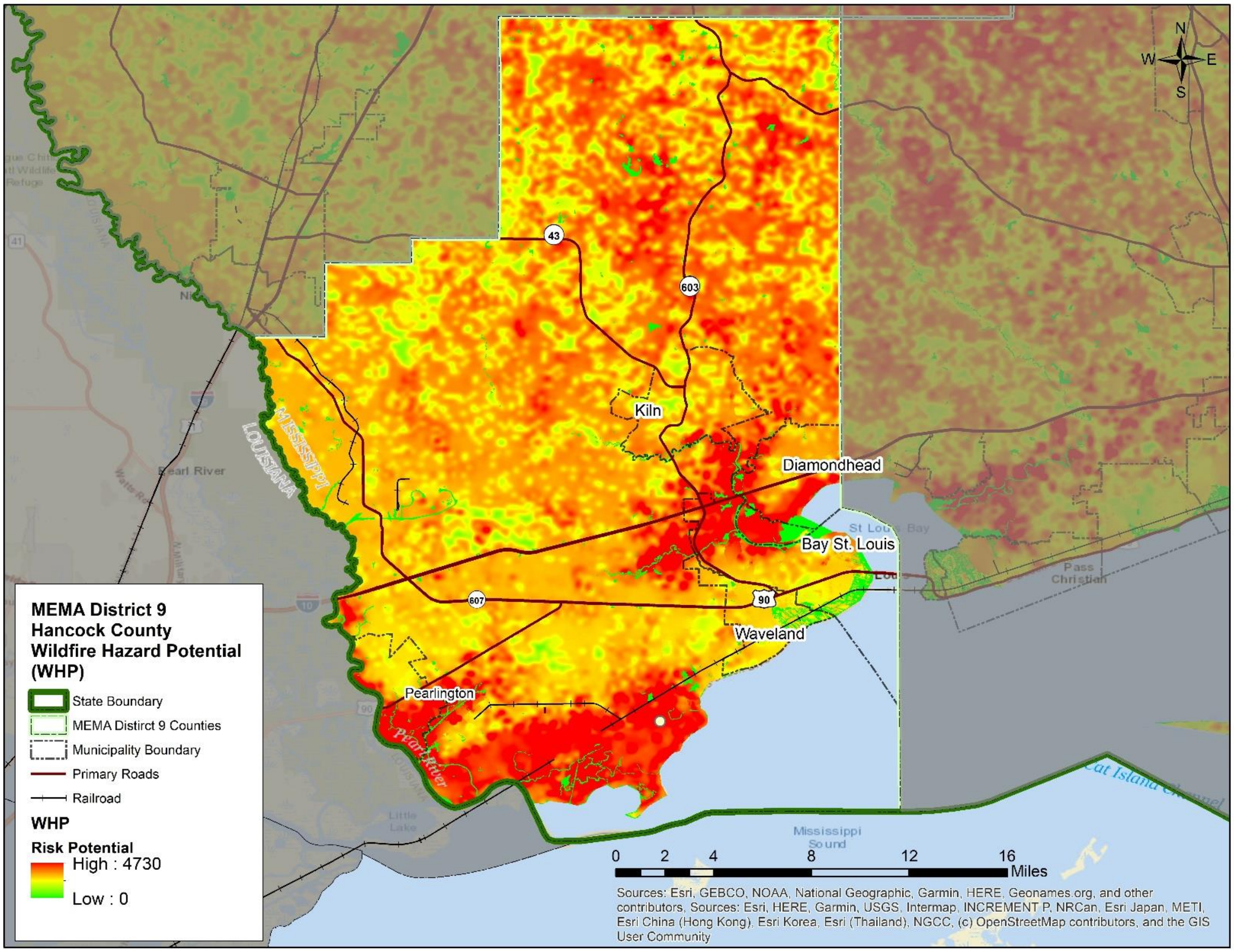
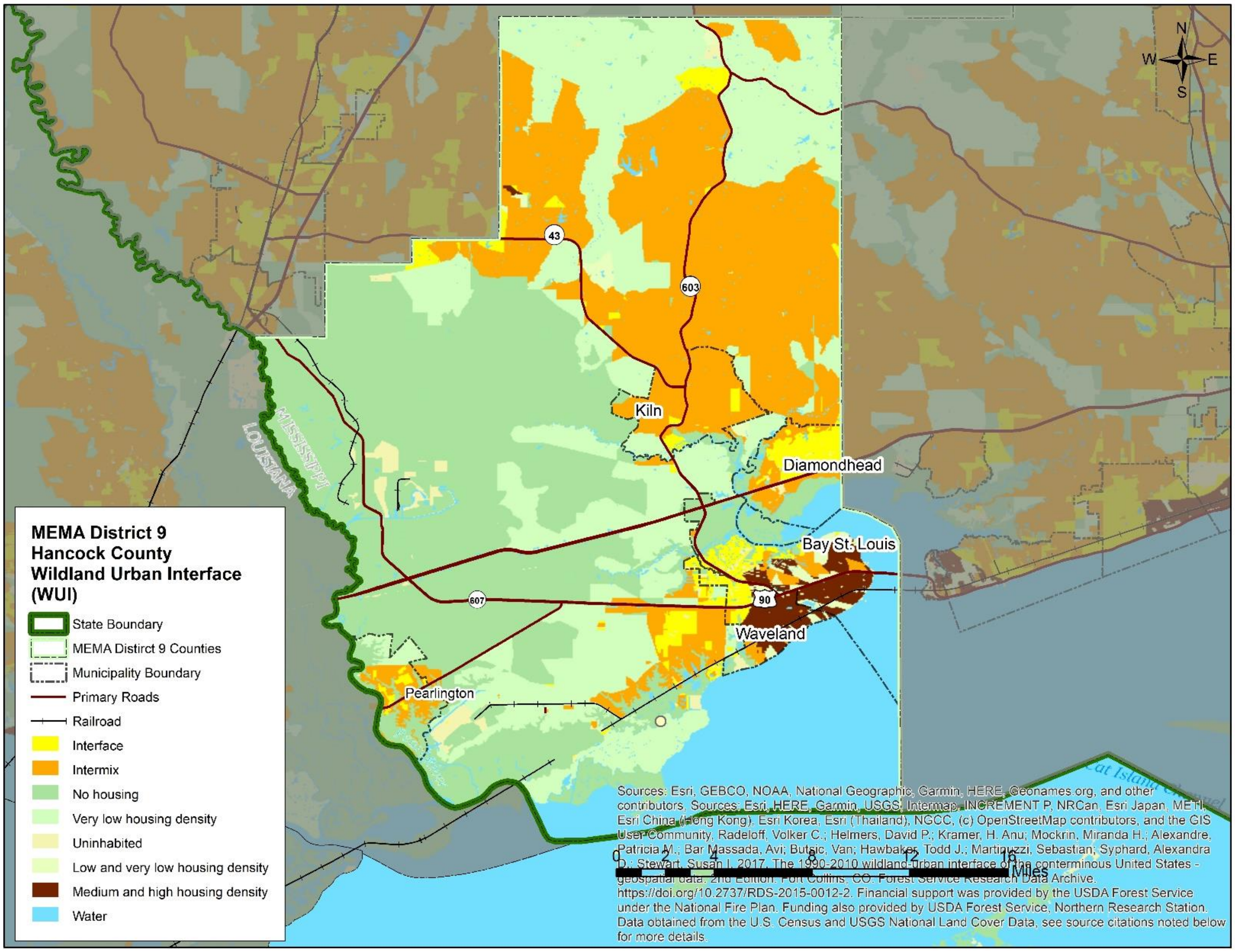


Figure B.15: Wildland Urban Interface



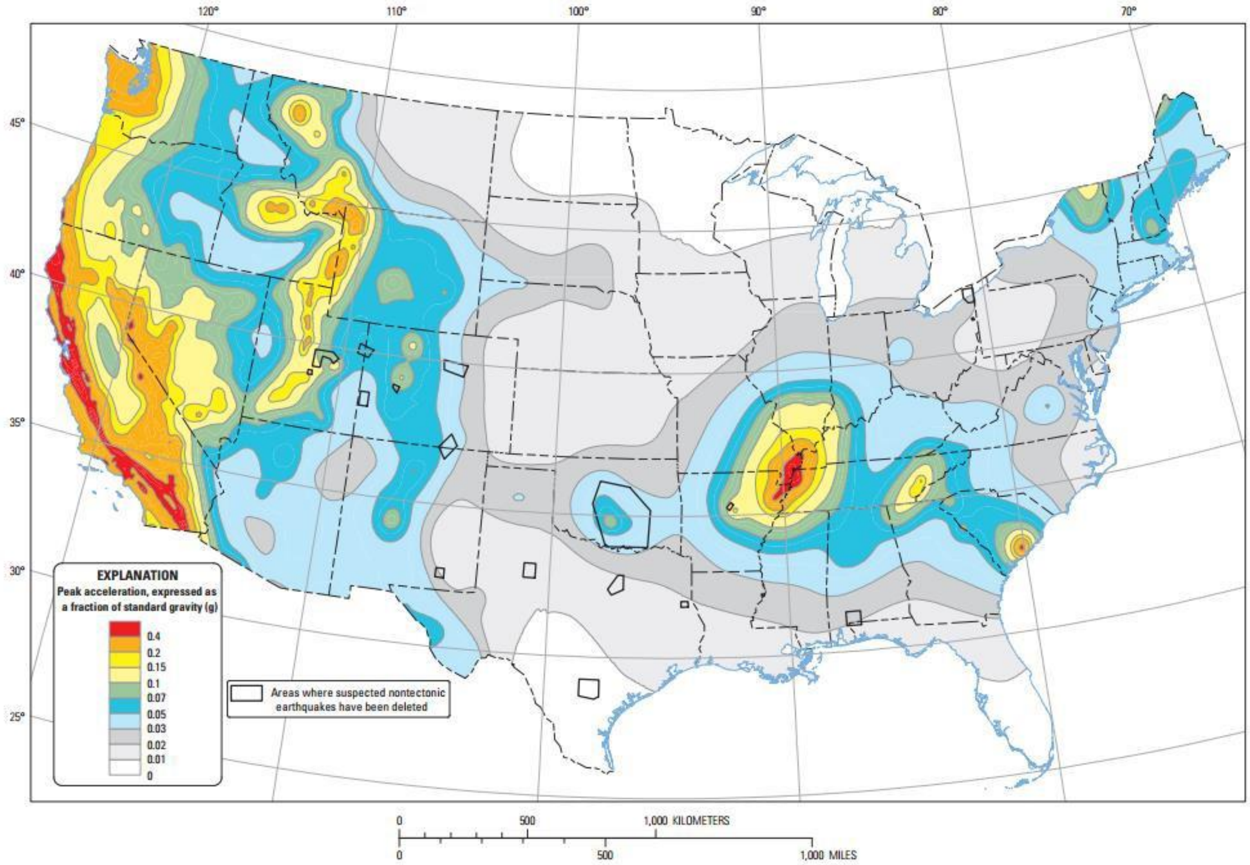
GEOLOGIC HAZARDS

EARTHQUAKE

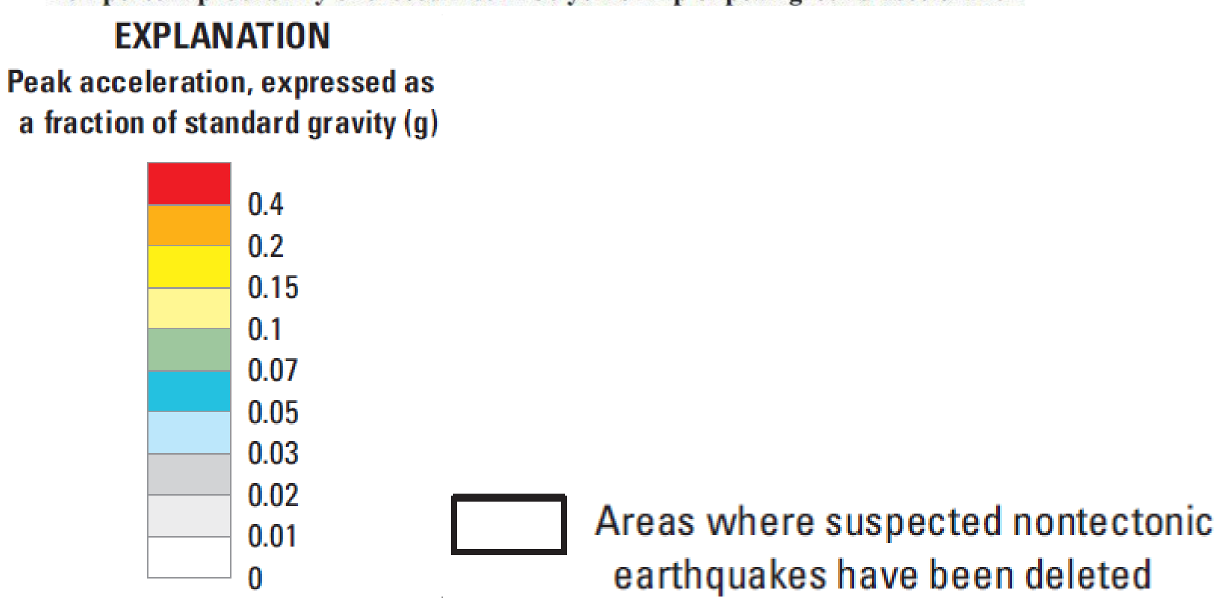
LOCATION AND SPATIAL EXTENT

Figure B.16 shows the intensity level associated with Hancock County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Hancock County lies within an approximate zone of level “1” to “2” ground acceleration. This indicates that the county exists within an area of low seismic risk.

FIGURE B.16: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



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



Source: United States Geological Survey, 2014

The primary source of potential damage to Hancock County from an earthquake is the New Madrid Seismic Zone (NMSZ). Historically, a series of earthquakes in 1811 and 1812 demonstrated that this fault zone can produce high magnitude seismic events, sometimes on the scale of a 7.5-8.0 on the Richter scale. The biggest challenge with earthquakes that occur in this area of seismic activity is predicting the recurrence of earthquakes emanating from this zone. Although the magnitude of earthquakes from the NMSZ can be large, they occur very irregularly and fairly infrequently. This makes it extremely difficult to project when they will occur.

It should also be noted that the State of Mississippi Hazard Mitigation Plan identifies certain areas of concern for liquefaction and lists the counties and corresponding zones within those counties that have the highest liquefaction potential. Hancock County does not have any identified liquefaction potential risk.

HISTORICAL OCCURRENCES

At least three earthquakes are known to have affected Hancock County since 1955. Table B.34 provides a summary of earthquake events reported by the National Centers for Environmental Information (formerly National Geophysical Data Center) between 1638 and 1985, and Figure B.17 presents a map showing earthquakes whose epicenters have occurred near the county between 1985 and 2022(no earthquakes occurred within the county boundaries during this period). A detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known) can be found in Table B.35.

TABLE B.34: SUMMARY OF SEISMIC ACTIVITY IN HANCOCK COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Bay St. Louis	2	III	< 4.8
Diamondhead	0	--	--
Waveland	0	--	--
Unincorporated Area	1	IV	< 4.8
HANCOCK COUNTY TOTAL	3	IV	< 4.8

Source: National Geophysical Data Center

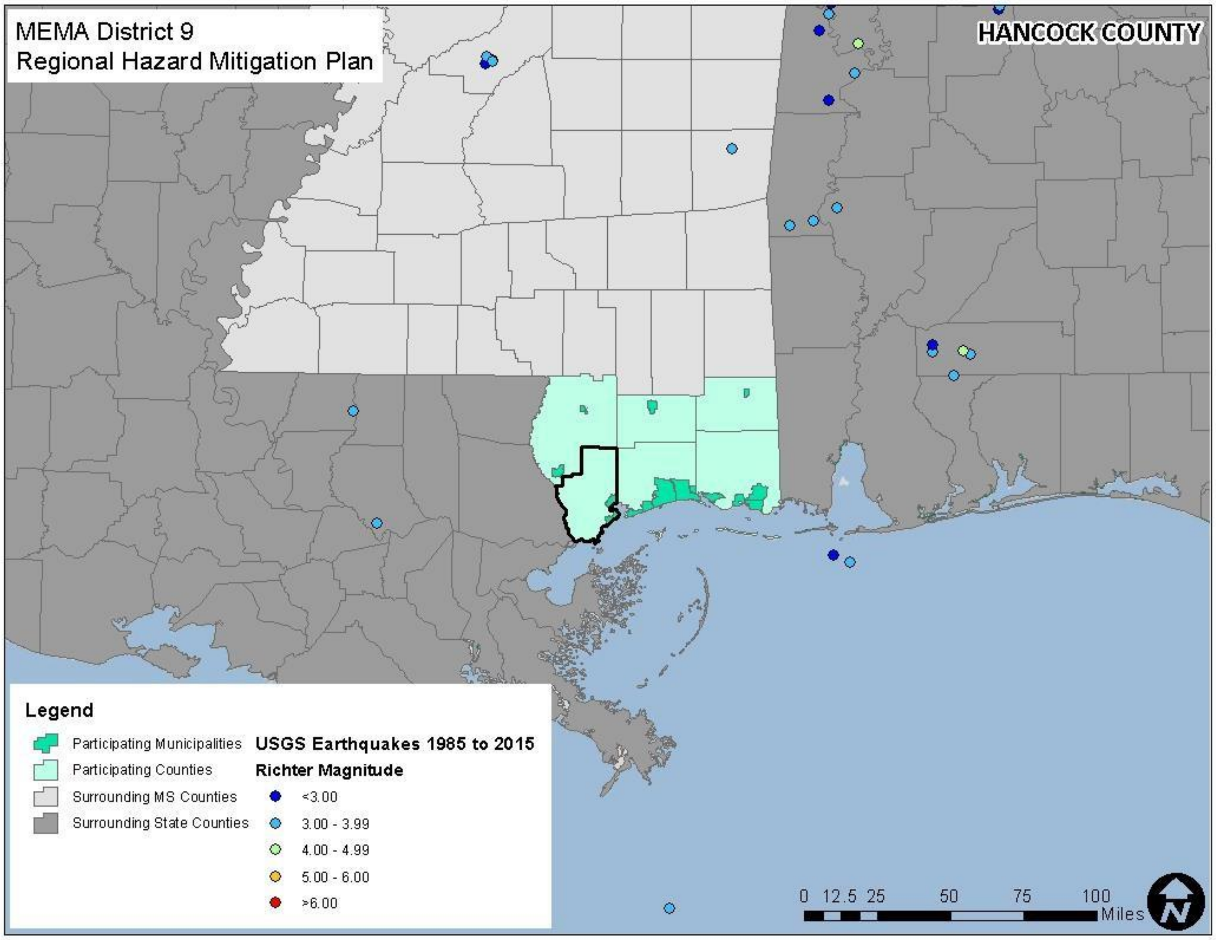
TABLE B.35: SIGNIFICANT SEISMIC EVENTS IN HANCOCK COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Bay St. Louis				
BAY ST. LOUIS	2/1/1955	24.0 km	Unknown	III
BAY ST. LOUIS	9/9/1975	39.0 km	Unknown	II
Diamondhead				
None reported	--	--	--	--
Waveland				
None reported	--	--	--	--

Location	Date	Epicentral Distance	Magnitude	MMI
Unincorporated Area				
PEARLINGTON	9/9/1975	57.0 km	Unknown	IV

Source: National Geophysical Data Center

FIGURE B.17: HISTORIC EARTHQUAKES WITH EPICENTERS NEAR HANCOCK COUNTY (1985-2022)



Source: United States Geological Survey

PROBABILITY OF FUTURE OCCURRENCES

The probability of significant, damaging earthquake events affecting Hancock County is unlikely. However, it is possible that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated to be between 1 and 10 percent (possible).

FEMA NRI Expected Annual Loss Estimates

Table B.36: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS

FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR EARTHQUAKE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.041% chance/year	0.00	$15,147	$63,299	n/a	$78,445	41.2	Very Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table B.37: Hancock County Hazard Specific Risk Index Table

HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – EARTHQUAKE	
Risk Index Score	Risk Index Rating
40.0/100	Very Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

WIND-RELATED HAZARDS

EXTREME COLD

Extreme cold typically impacts a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme cold conditions.

HISTORICAL OCCURRENCES

Data from the National Climatic Data Center was used to determine historical extreme cold events in Hancock County. Two events were reported:

February 2, 1996 – Cold/Wind Chill – An arctic airmass overspread much of south Mississippi bringing the longest extended period of cold weather since 1989. In Amite County, 4SW Gillsburg, a 67 year old man died from hypothermia on the 4th after the fire in a wood burning heater went out. Considerable property damage resulted from broken pipes due to the extended period of subfreezing temperatures. In Jackson County, Moss Point and Gautier had broken pipes in 100 and 147 houses, respectively.

December 18, 1996 – Cold/Wind Chill – An arctic airmass overspread south Mississippi resulting in three consecutive nights with subfreezing minimum temperatures. Temperatures lowered into the mid-teens over the southwest section of the state and near 20 degrees along the Gulf Coast.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of Hancock County has a probability level of possible (between 1 and 10 percent annual probability) for future extreme cold events to impact the county.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

The FEMA NRI doesn't expect any losses from Severe Cold/was not rated.

EXTREME HEAT

Heat waves typically impact a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme heat conditions.

HISTORICAL OCCURRENCES

The National Climatic Data Center was used to determine historical heat wave occurrences in the county. No events specific to Hancock County were reported, however, several events were reported elsewhere in the region. Similar events and impacts can be expected in Hancock County.

July 2000 – July was a hot and dry month in Southeast Mississippi. In Beaumont the temperature was 100 degrees or higher eleven days during the month with the hottest being 105 degrees. In Richton the temperature was 100 degrees or higher three days during the month with the hottest being 102 degrees. In Waynesboro the temperature was 100 degrees or higher four days during the month with the hottest being 103 degrees. In Wiggins the temperature was 100 degrees or higher nine days during the month with 105 degrees being the hottest. In addition to being hot is was also a dry month across the area. Most stations ended up with below normal rainfall totals for the month. In Jackson County, a 68 year old man died from heat exhaustion while sitting in his pickup truck in a parking lot with the windows rolled up, and 10 days later, a 58 year old male was found dead from heat exhaustion while sitting in his truck in the driveway of his home with the windows rolled up.

August 2007 – Heat advisories were issued for a combination of high temperatures and high humidities. Heat index vales were between 110 and 115 degrees. Several public buildings and churches allowed people to come in and cool off during the heat of the day.

July 2010 – Several days of temperatures near 100 degrees contributed to two deaths from heat stroke in the Gulfport area. The Harrison County Coroner stated that two deaths in a mobile home on Smith Road near Canal Road were caused by heat stroke. High temperatures at Gulfport Airport, approximately 3 miles away, were between 98 and 102 degrees from July 29 through August 2. Bodies were discovered on August 4, but deaths occurred several days prior to that. Date of deaths was estimated.

August 2010 – Hot and humid conditions produced heat index values between 110 and 115 degrees over coastal Mississippi. A 48 year old construction worker collapsed and died while working on a highway construction project. Jackson County coroner classified the fatality as heat related with the cause of death as hyperthermia.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of Hancock County has a probability level of highly likely (100 percent annual probability) for future heat wave events.

FEMA NRI Expected Annual Loss Estimates

Table B.38: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HEAT WAVE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1.5 events/year	0.02	$287,093	$42	$44	$287,178	73.7	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table B.39: Hancock County Hazard Specific Risk Index Table

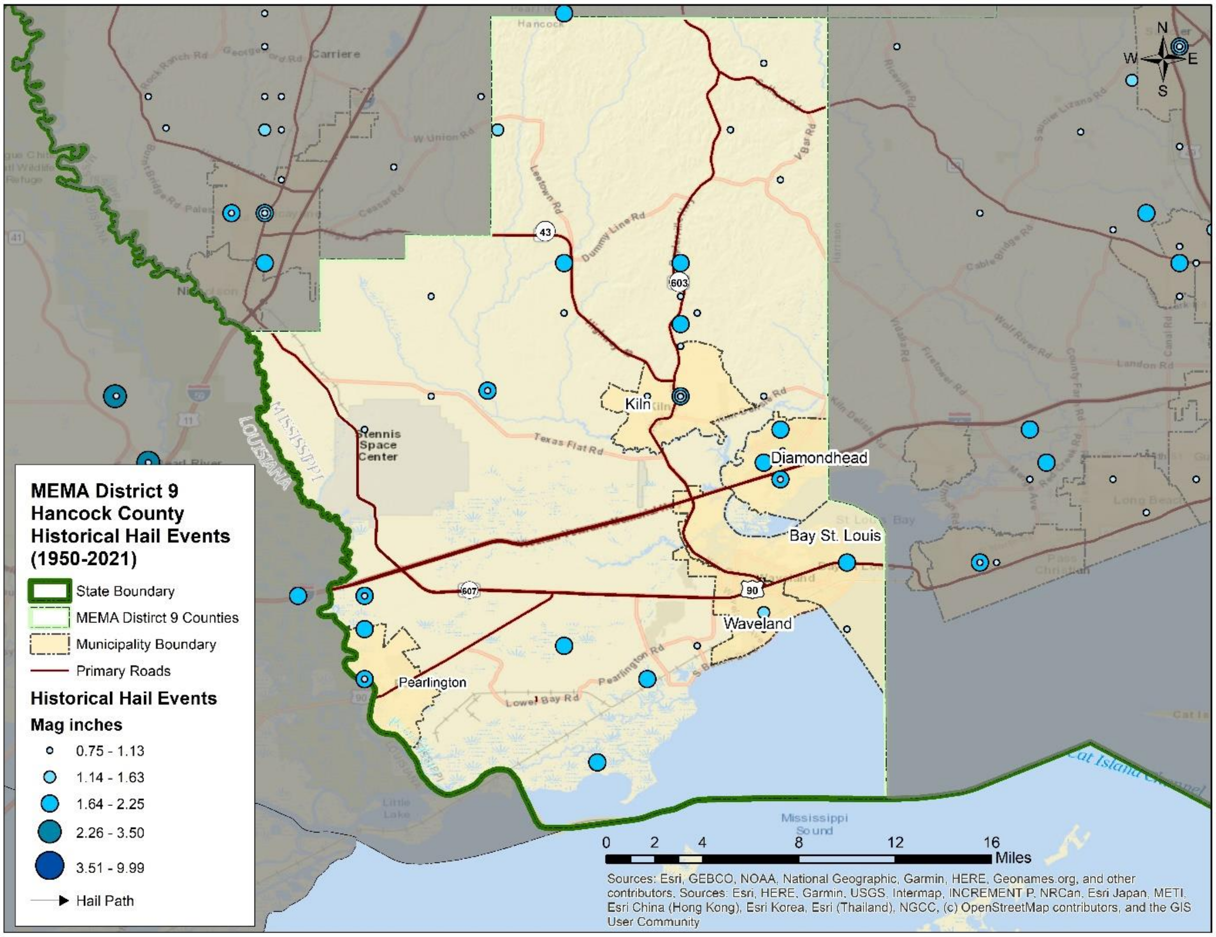
HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HEAT WAVE	
Risk Index Score	**Risk Index Rating**
71.1/100	Relatively Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

HAILSTORM

LOCATION AND SPATIAL EXTENT

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that Hancock County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms. With that in mind, Figure B.18 shows the location of hail events that have impacted the county between 1955 and 2015.

FIGURE B.18: HAILSTORM TRACKS IN HANCOCK COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

According to the National Climatic Data Center, 55 recorded hailstorm events have affected Hancock County since 1971. In all, hail occurrences did not result in any property damages. Hail ranged in diameter from 0.75 inches to 1.75 inches. Table B.40 provides a summary of the hail events in Hancock County. Detailed information about each event that occurred in the county is provided in Table B.41.

It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Climatic Data Center. Therefore, it is likely that damages are greater than the reported value.

TABLE B.40: SUMMARY OF HAIL OCCURRENCES IN HANCOCK COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2022)	Annualized Property Losses
Bay St. Louis	2	0/0	$0	$0
Diamondhead	9	0/0	$0	$0
Waveland	6	0/0	$0	$0
Unincorporated Area	39	0/0	$0	$0
HANCOCK COUNTY TOTAL	56	0/0	$0	$0

Source: National Climatic Data Center

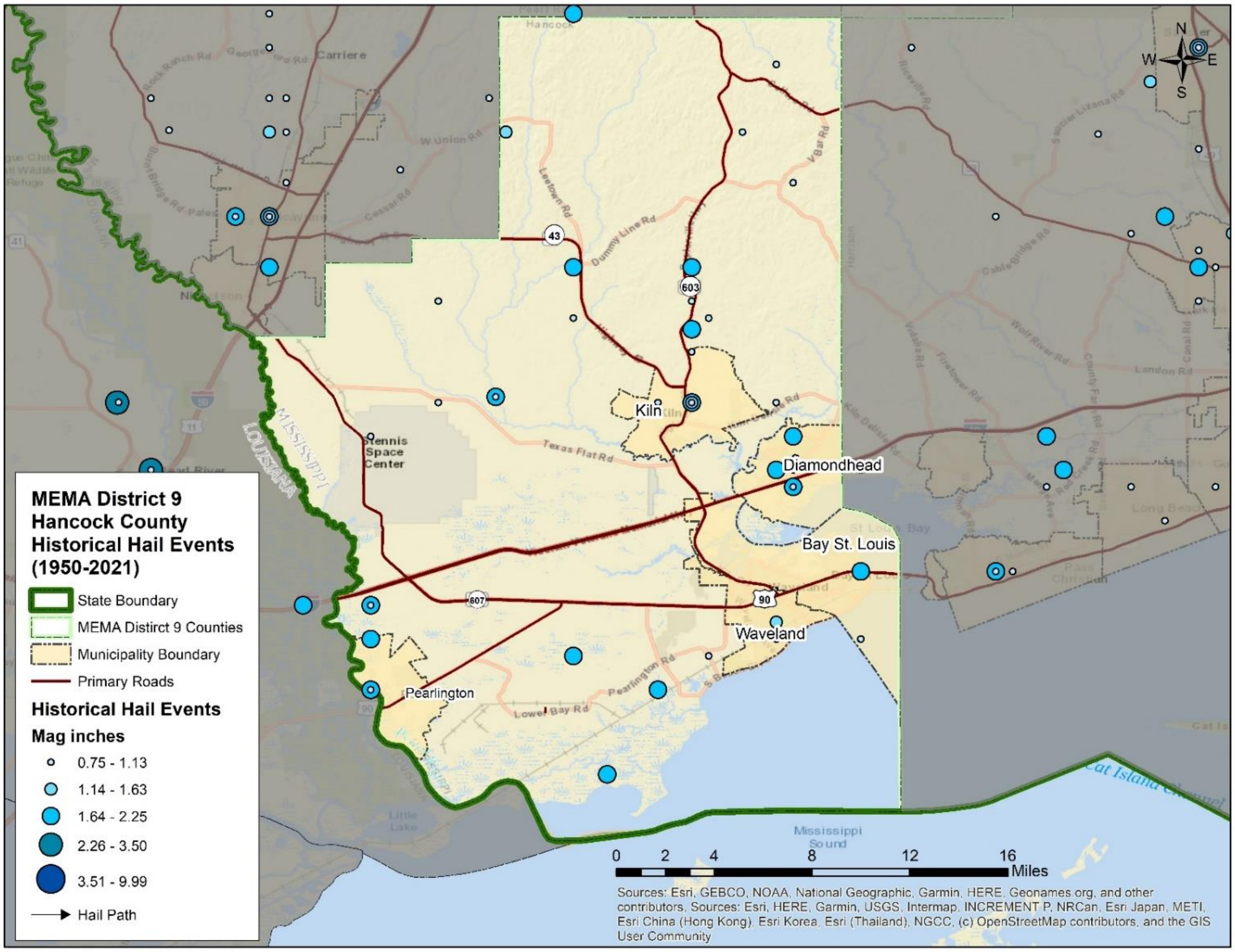
TABLE B.41: HISTORICAL HAIL OCCURRENCES IN HANCOCK COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Bay St. Louis				
BAY ST LOUIS	3/7/1998	1.75 in.	0/0	$0
BAY ST LOUIS	7/2/2009	1.75 in.	0/0	$0
Diamondhead				
DIAMONDHEAD	6/19/1997	1.75 in.	0/0	$0
DIAMONDHEAD ARPT	3/12/2001	0.75 in.	0/0	$0
DIAMONDHEAD ARPT	7/29/2003	1.00 in.	0/0	$0
DIAMONDHEAD ARPT	7/26/2009	1.75 in.	0/0	$0
DIAMONDHEAD ARPT	5/25/2010	1.75 in.	0/0	$0
DIAMONDHEAD ARPT	5/26/2011	1.00 in.	0/0	$0
DIAMONDHEAD ARPT	4/4/2012	1.00 in.	0/0	$0
DIAMONDHEAD ARPT	2/15/2016	1.00 in.	0/0	$0
DIAMONDHEAD ARPT	3/30/2017	1.00 in.	0/0	$0
Waveland				
Waveland	2/17/1995	0.75 in.	0/0	$0
Waveland	7/9/1995	0.75 in.	0/0	$0
WAVELAND	3/2/1999	0.75 in.	0/0	$0
WAVELAND	5/25/2010	1.00 in.	0/0	$0
WAVELAND	5/25/2010	1.75 in.	0/0	$0
WAVELAND	4/25/2015	1.50 in.	0/0	$0
Unincorporated Area				
HANCOCK CO.	6/26/1971	1.75 in.	0/0	$0
HANCOCK CO.	11/19/1974	1.75 in.	0/0	$0
HANCOCK CO.	5/24/1976	1.75 in.	0/0	$0
HANCOCK CO.	7/7/1980	1.75 in.	0/0	$0

HANCOCK CO.	4/18/1988	0.75 in.	0/0	$0
HANCOCK CO.	5/24/1988	1.75 in.	0/0	$0
HANCOCK CO.	6/14/1989	0.75 in.	0/0	$0
HANCOCK CO.	9/4/1990	0.75 in.	0/0	$0
HANCOCK CO.	9/4/1990	0.75 in.	0/0	$0
HANCOCK CO.	4/20/1992	0.75 in.	0/0	$0
Kiln	3/7/1995	1.00 in.	0/0	$0
Pearlington	7/9/1995	1.75 in.	0/0	$0
KILN	4/13/1996	0.75 in.	0/0	$0
SANTA ROSA	6/12/1996	1.00 in.	0/0	$0
LAKESHORE	1/24/1997	1.75 in.	0/0	$0
PEARLINGTON	3/6/1998	1.75 in.	0/0	$0
KILN	3/7/1998	1.00 in.	0/0	$0
LOGTOWN	3/7/1998	1.75 in.	0/0	$0
PEARLINGTON	3/7/1998	1.75 in.	0/0	$0
KILN	5/13/2000	1.00 in.	0/0	$0
KILN	7/22/2000	1.00 in.	0/0	$0
SELLERS	8/20/2000	0.75 in.	0/0	$0
PEARLINGTON	9/1/2000	0.75 in.	0/0	$0
FENTON	3/12/2002	0.75 in.	0/0	$0
CLERMONT HARBOR	3/31/2002	0.75 in.	0/0	$0
PEARLINGTON	7/29/2003	0.88 in.	0/0	$0
KILN	6/21/2004	1.75 in.	0/0	$0
KILN	3/26/2005	1.75 in.	0/0	$0
KILN	3/31/2005	0.75 in.	0/0	$0
KILN	3/31/2005	1.00 in.	0/0	$0
KILN	4/21/2006	0.75 in.	0/0	$0
KILN	6/23/2006	0.75 in.	0/0	$0
KILN	5/11/2007	1.25 in.	0/0	$0
KILN	6/13/2007	0.75 in.	0/0	$0
KILN	7/13/2007	0.88 in.	0/0	$0
KILN	6/25/2008	1.75 in.	0/0	$0
PEARLINGTON	4/2/2009	0.75 in.	0/0	$0
KILN	7/26/2009	1.00 in.	0/0	$0
KILN	4/4/2012	1.00 in.	0/0	$0

*Property damage is reported in 2022 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Figure B.19: Historical Hail Events (1950-2021)



PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard, it is assumed that Hancock County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table B.42: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HAIL EVENTS

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1.9 events/year	0.00	$29,636	$118,951	$2	$148,589	61.6	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table B:43: Hancock County Hazard Specific Risk Index Table

HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HAIL	
Risk Index Score	**Risk Index Rating**
56.8/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Hurricane And Tropical Storm

LOCATION AND SPATIAL EXTENT

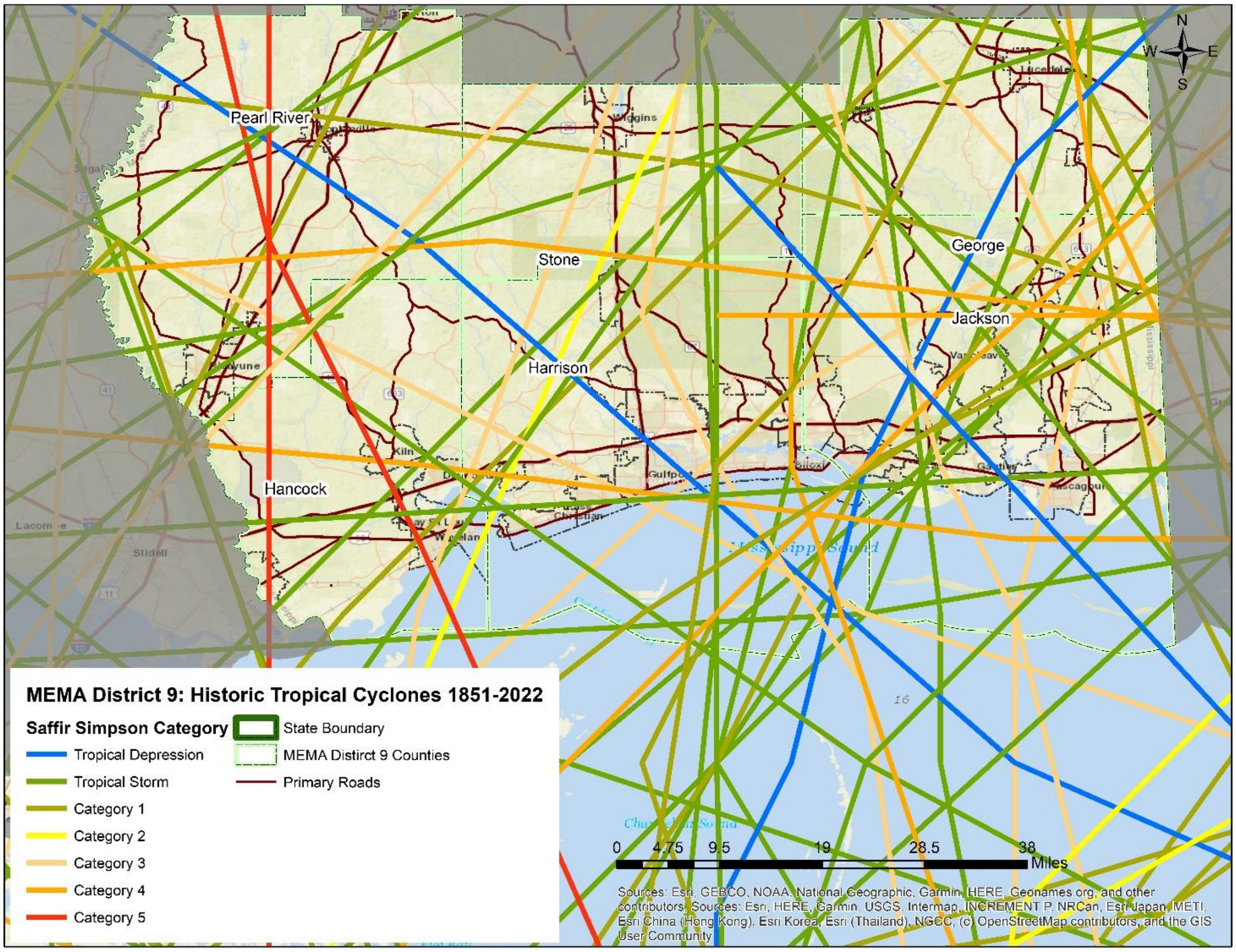
Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States, and while coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland. Hancock County is located in a region of the country that is susceptible to all of the hazards wrought by hurricanes and tropical storms. All areas throughout Hancock County are susceptible to the accompanying hazard effects of extreme wind, flooding, and tornadoes, and coastal areas are also extremely susceptible to the added effects of storm surge, wave action, coastal erosion, and tidal flooding.

HISTORICAL OCCURRENCES

According to the National Hurricane Center's historical storm track records, 119 hurricane or tropical storm/depression tracks have passed within 100 miles of the MEMA District 9 Region since 1855. This includes: 4 Category 3 hurricanes, 15 Category 2 hurricanes, 28 Category 1 hurricanes, 29 tropical storms, and 43 tropical depressions. Additionally, four other major storms had large-scale impacts on the region and are not included in these totals. These storms are listed below and range in Category from 1 to 4.

Of the recorded storm events, 58 hurricane or tropical storm/depression events traversed directly through the region as shown in Figure B.20. Notable storms include Hurricane Camille (1969), Hurricane Frederic (1979), and Hurricane Katrina (2005). Table B.44 provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 100 miles of the MEMA District 9 Region) and category of the storm based on the Saffir-Simpson Scale.

FIGURE B.20: HISTORICAL HURRICANE STORM TRACKS WITHIN 100 MILES OF THE MEMA DISTRICT 9 REGION



Source: National Oceanic and Atmospheric Administration, National Hurricane Center

TABLE B.44: HISTORICAL STORM TRACKS WITHIN 100 MILES OF THE MEMA 9 DISTRICT REGION (1842–2022)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/25/1852	UNNAMED	93	Category 2
8/3/1855	NOT NAMED	--	Tropical Depression
9/16/1855	UNNAMED	96	Category 2
6/24/1857	NOT NAMED	--	Tropical Depression
9/15/1859	UNNAMED	79	Category 1
8/11/1860	UNNAMED	96	Category 2
9/15/1860	UNNAMED	89	Category 2
8/17/1861	NOT NAMED	--	Tropical Depression
11/1/1861	NOT NAMED	--	Tropical Depression
9/15/1862	NOT NAMED	--	Tropical Depression
9/16/1862	NOT NAMED	--	Tropical Depression
10/1/1863	UNNAMED	43	Tropical Storm
6/3/1866	NOT NAMED	--	Tropical Depression
9/16/1867	NOT NAMED	--	Tropical Depression
10/5/1867	UNNAMED	89	Category 2
10/3/1868	NOT NAMED	--	Tropical Depression

9/5/1869	UNNAMED	79	Category 1
7/30/1870	NOT NAMED	--	Tropical Depression
7/11/1872	UNNAMED	59	Tropical Storm
9/18/1875	UNNAMED	18	Tropical Depression
9/18/1877	UNNAMED	79	Category 1
9/1/1879	UNNAMED	89	Category 2
10/7/1879	UNNAMED	59	Tropical Storm
8/31/1880	UNNAMED	70	Category 1
8/2/1881	NOT NAMED	--	Tropical Depression
8/3/1881	UNNAMED	59	Tropical Storm
8/30/1885	UNNAMED	59	Tropical Storm
9/26/1885	UNNAMED	70	Category 1
6/15/1886	UNNAMED	50	Tropical Storm
6/14/1887	UNNAMED	33	Tropical Depression
10/19/1887	UNNAMED	82	Category 1
6/27/1888	NOT NAMED	--	Tropical Depression
9/23/1889	UNNAMED	79	Category 1
8/27/1890	UNNAMED	43	Tropical Storm
9/21/1891	NOT NAMED	--	Tropical Depression
9/12/1892	UNNAMED	59	Tropical Storm
9/7/1893	UNNAMED	79	Category 1
10/2/1893	UNNAMED	97	Category 3
8/7/1894	UNNAMED	59	Tropical Storm
8/15/1895	UNNAMED	59	Tropical Storm
9/13/1900	UNNAMED	43	Tropical Storm
8/14/1901	UNNAMED	82	Category 1
10/9/1905	UNNAMED	43	Tropical Storm
9/27/1906	UNNAMED	93	Category 2

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/21/1907	UNNAMED	43	Tropical Storm
8/11/1911	UNNAMED	79	Category 1
6/13/1912	UNNAMED	59	Tropical Storm
7/17/1912	UNNAMED	5	Tropical Depression
9/13/1912	UNNAMED	82	Category 1
9/18/1914	UNNAMED	33	Tropical Depression
9/29/1915	UNNAMED	96	Category 2
7/5/1916	UNNAMED	95	Category 2
10/17/1922	UNNAMED	18	Tropical Depression
6/26/1923	UNNAMED	43	Tropical Storm
10/17/1923	UNNAMED	59	Tropical Storm
9/20/1926	UNNAMED	93	Category 2
9/1/1932	UNNAMED	82	Category 1
10/15/1932	UNNAMED	59	Tropical Storm
7/27/1936	UNNAMED	43	Tropical Storm
8/22/1936	UNNAMED	5	Tropical Depression
6/16/1939	UNNAMED	59	Tropical Storm

9/26/1939	UNNAMED	50	Tropical Storm
9/24/1940	UNNAMED	18	Tropical Depression
9/10/1944	UNNAMED	64	Category 1
9/5/1945	UNNAMED	18	Tropical Depression
9/19/1947	UNNAMED	92	Category 2
9/4/1948	UNNAMED	79	Category 1
9/4/1949	UNNAMED	43	Tropical Storm
8/31/1950	BAKER	82	Category 1
8/1/1955	BRENDA	70	Category 1
8/27/1955	UNNAMED	50	Tropical Storm
9/24/1956	FLOSSY	82	Category 1
9/18/1957	ESTHER	64	Category 1
10/8/1959	IRENE	43	Tropical Storm
9/15/1960	ETHEL	85	Category 2
9/26/1960	FLORENCE	1	Tropical Depression
10/4/1964	HILDA	70	Category 1
9/10/1965	BETSY*	117	Category 4
9/29/1965	DEBBIE	33	Tropical Depression
8/18/1969	CAMILLE	100	Category 3
8/8/1971	UNNAMED	5	Tropical Depression
9/4/1971	FERN	5	Tropical Depression
9/16/1971	EDITH	70	Category 1
7/29/1975	UNNAMED	18	Tropical Depression
10/17/1975	UNNAMED	5	Tropical Depression
9/24/1976	UNNAMED	5	Tropical Depression
7/19/1977	UNNAMED	18	Tropical Depression
9/6/1977	BABE	18	Tropical Depression
10/25/1977	UNNAMED	18	Tropical Depression
8/10/1978	UNNAMED	5	Tropical Depression

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
7/11/1979	BOB	74	Category 1
9/12/1979	FREDERIC	97	Category 3
7/20/1980	UNNAMED	5	Tropical Depression
10/27/1984	UNNAMED	18	Tropical Depression
9/2/1985	ELENA	95	Category 2
10/31/1985	JUAN	64	Category 1
8/12/1987	UNNAMED	5	Tropical Depression
8/8/1988	BERYL	5	Tropical Depression
8/9/1988	BERYL	50	Tropical Storm
9/10/1988	FLORENCE	79	Category 1
8/3/1995	ERIN	82	Category 1
7/19/1997	DANNY	79	Category 1
9/27/1998	GEORGES	92	Category 2
9/20/1998	HERMINE	33	Tropical Depression
6/11/2001	ALLISON	43	Tropical Storm
8/5/2002	BERTHA	33	Tropical Depression
9/14/2002	HANNA	59	Tropical Storm
9/26/2002	ISIDORE	64	Category 1
6/30/2003	BILL	59	Tropical Storm
7/1/2003	BILL	18	Tropical Depression
9/16/2004	IVAN	96	Category 2
6/11/2005	ARLENE	59	Tropical Storm
7/6/2005	CINDY	74	Category 1
7/10/2005	DENNIS*	100	Category 3
8/29/2005	KATRINA	98	Category 3
9/22/2007	TEN	5	Tropical Depression
8/24/2008	FAY	18	Tropical Depression
9/1/2008	GUSTAV*	87	Category 2
11/10/2009	IDA	70	Category 1
7/25/2010	BONNIE	5	Tropical Depression
8/12/2010	FIVE	5	Tropical Depression
9/5/2011	LEE	43	Tropical Storm
8/28/2012	ISAAC*	70	Category 1
10/28/2020	ZETA	90	Category 2
8/29/2021	IDA	130	Category 4

*It should be noted that the track of several major hurricanes that impacted the region fell outside of the 100-mile buffer. These storms were included in the table due to their significant impact (Betsy, 1965; Dennis, 2005; Gustav, 2008; and Isaac, 2012), but it should be noted that wind speed and storm category are estimated based on anecdotal information.

Source: National Hurricane Center

Federal records indicate that nine disaster declarations were made in 1979 (Hurricane Frederic), 1998 (Hurricane Georges), 2001 (Tropical Storm Allison), 2002 (Tropical Storm Isidore), 2004 (Hurricane Ivan), 2005 (Hurricane Dennis and Hurricane Katrina), 2008 (Hurricane Gustav), and 2012 (Hurricane Isaac). Hurricane and tropical storm events can cause substantial damage in the area due to high winds and flooding.

Flooding and high winds from hurricanes and tropical storms can cause damage throughout the county. Anecdotes are available from NCDC for the major storms that have impacted the county as found below:

Hurricane Georges – September 25-29, 1998
Hurricane Georges, a strong Category 2 hurricane moved slowly northwest across the Gulf of Mexico toward southeast Louisiana and coastal Mississippi on the September 25 and September 26. As the hurricane approached the mouth of the Mississippi River on September 27, it slowly turned toward the north making landfall along the Mississippi Coast just to the east of Biloxi, MS at 0400 CST on September
28. The hurricane moved only slowly north during the morning hours, at times becoming nearly stationary. The hurricane finally was downgraded to a tropical storm at 1500CST on September 28 when it was located north of Biloxi. The tropical storm then moved very slowly eastward into southern Alabama on September 29.

The greatest affect from the hurricane occurred over Jackson County which experienced the intense eastern portion of the hurricanes eyewall and highest storm surge.

Due to the slow forward speed of the hurricane very heavy rainfall occurred over eastern Harrison County and Jackson County leading to record flooding on streams and rivers. The barrier islands in the Mississippi Sound were also heavily damaged by wind and storm surge. A new three quarter mile cut developed in the east portion of Ship Island. Total insured property damage in Mississippi was estimated at near 310 million dollars by insurance industry sources. When uninsured losses and public property damage considered, total damages in Mississippi will likely approach $620 million.

Hancock County - Wind damage in Hancock County was mostly confined to large tree limbs snapped off, trees downed, and minor roof damage to houses and businesses, and damage to commercial signs. Storm surge was of minimal impact with the county remaining on the west side of the hurricane. Storm surge was 4 to 5 feet above normal with only minor coastal flooding and beach erosion occurring. Approximately 2,000 people were housed in public shelters.

Hurricane Katrina – August 24-30, 2005
Hurricane Katrina was one of the strongest and most destructive hurricanes on record to impact the coast of the United States. It will likely be recorded as one the worst natural disaster in the history of the United States to date resulting in catastrophic damage and numerous casualties in southeast Louisiana and along the Mississippi coast. Damage and casualties resulting from Hurricane Katrina extended as far east as Alabama and the panhandle of Florida. Katrina developed from a tropical depression southeast of the Bahamas on August 24th. After moving through the Bahamas as a tropical storm, Katrina strengthened to a category 1 hurricane prior to landfall in south Florida around the Miami area on the 25th of August. Katrina crossed south Florida and entered the Gulf of Mexico and began to strengthen. Hurricane Katrina strengthened to a category 5 storm on August 28th about 250 miles south southeast of the mouth of the Mississippi River with winds reaching their peak intensity of 175 mph and a central pressure of 902 mb. Post event analysis by the National Hurricane Center indicates that Katrina weakened slightly before making landfall as a strong category 3 storm in initial landfall in lower Plaquemines Parish. Maximum sustained winds were estimated at 110 knots or 127 mph and a central pressure of 920 mb around 610 AM CDT on August 29th in southeast Louisiana just south of Buras in Plaquemines Parish. The storm continued on a north northeast track with the center passing about 40 miles southeast of New Orleans with a second landfall occurring near the Louisiana and Mississippi border around 945 AM CDT as a category 3 storm with maximum sustained winds estimated around 105 knots or 121 mph. Katrina continued to weaken as it moved north northeast across Mississippi during the day, but remained at hurricane strength 100 miles inland near Laurel, Mississippi. Katrina weakened to a tropical depression near Clarksville, Tennessee on August 30th.

Damage across coastal Mississippi was catastrophic. The storm surge associated with Hurricane Katrina approached or exceeded the surge associated with Hurricane Camille and impacted a much more extensive area. Almost total destruction was observed along the immediate coast in Hancock and Harrison Counties with storm surge damage extending north along bays and bayous to Interstate 10. Thousands of homes and businesses were destroyed by the storm surge. Hurricane force winds also caused damage to roofs, power lines, signage, downed trees, and some windows were broken by wind and wind driven debris in areas away from storm surge flooding, wind damage was widespread with fallen trees taking a heavy toll on houses and power lines. Damage was less extensive in southwest Mississippi. Excluding losses covered by the Federal Flood Insurance Program, insured property losses in Mississippi were estimated at 9.8 billion dollars. Uninsured and insured losses combined were estimated to exceed 100 billion dollars across the Gulf Coast.

As of late October, the following fatality figures were reported in the Mississippi coastal counties; Hancock- 52, Harrison - 83, Jackson - 17. Additional details on fatalities will be given in later updates to storm data.

Due to the failure of power and equipment prior to the peak of the storm, data for wind, storm surge, pressure, and rainfall are incomplete. The lowest pressure on the Mississippi coast was estimated to be 928 mb where the hurricane made landfall near the Louisiana Mississippi border. A pressure of 976 mb was recorded at 0951 CDT by a university weather station deployed in Pascagoula, well east of the landfall location. At approximately the same time, the pressure at the NWS office in Slidell, just to the west of landfall location, recorded a pressure of 934.1 mb at 0938 AM CDT.

The highest wind gusts recorded in Mississippi and the adjacent coastal waters were 117 knots (134 mph) at the Pearl River County EOC office in Poplarville and 102 knots (118 mph) at 1000AM CDT by a university wind tower deployed at the Stennis Space Center in Hancock County. Maximum sustained winds in Mississippi were estimated around 105 knots (121 mph) near the storm's second landfall along the Mississippi and Louisiana border. Unofficial wind observations before the gage failed included a wind gust of 106 kt, (122 mph) at 0615 CDT by an amateur radio operator in Long Beach and a wind gust of 108 kt (124 mph) at the EOC in Pascagoula.

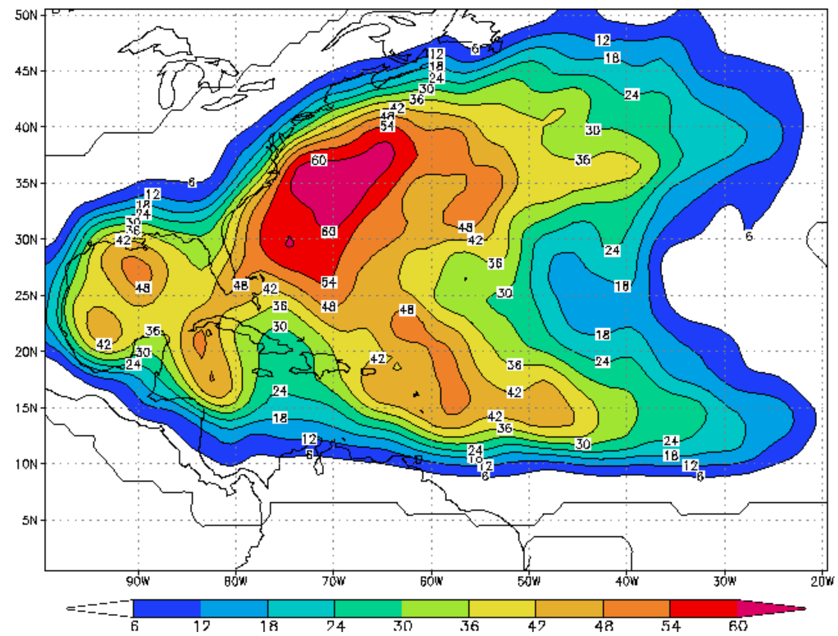
Most tide gages were destroyed by the storm surge so storm surge was determined primarily by post storm high water mark surveys conducted by FEMA. An estimated storm surge of approximately 23.0 feet occurred at the Hancock County EOC operations area in Waveland, and the high water mark measured on the Jackson County EOC building in Pascagoula was 16.1 feet. Preliminary estimates of storm surge along the Mississippi Coast include Hancock County 19-25 feet, Harrison County 19-25 feet, Jackson County 17- 21 ft. All storm surge heights are still water elevations referenced to NAVD88 datum.

Storm total rainfall amounts generally ranged from 10 to 16 inches across coastal and south Mississippi with much lower amounts observed over southwest Mississippi. The highest observed storm total rainfall was 11 inches at Stennis Space Center and near Picayune.

PROBABILITY OF FUTURE OCCURRENCES

According to NOAA statistical data, the region is located in an area with an annual probability of a named storm between 30 and 42 percent as presented in Figure B.21. This illustration was created by the National Oceanic and Atmospheric Administration’s Hurricane Research Division using data from 1944 to 1999 and counting hits when a storm or hurricane was within approximately 100 miles (165 km) of each location. As a reference point, the tip of Florida’s outline can be found near the 25N, 80W intersection, and the MEMA District 9 Region is near the 30N, 90W intersection. This empirical probability is fairly consistent with other scientific studies and observed historical data made available through a variety of federal, state, and local sources.

FIGURE B.21: EMPIRICAL PROBABILITY OF A NAMED HURRICANE OR TROPICAL STORM



Source: National Oceanic and Atmospheric Administration

The probability of storm occurrences will vary significantly based on the return interval for different categories of magnitude. The probability of less intense storms (lower return periods) is higher than more intense storms (higher return periods). Table B.45 profiles the potential peak gust wind speeds that can be expected in the MEMA District 9 Region during a hurricane event for various return periods according to FEMA's HAZUS-MH®.

TABLE B.45: POTENTIAL PEAK GUST WIND SPEEDS PER RETURN PERIOD

50-Year	100-Year	500-Year	1,000-Year
119.4 mph	133.9 mph	160.3 mph	170.0

Source: Federal Emergency Management Agency (Hazus-MH 3.2)

Overall, the probability level of future hurricane and tropical storm occurrence for Hancock County is highly likely (100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table B.46: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HURRICANE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.2 events/year	0.10	$1,131,594	$23,088,86	$48,634	$24,26 9,090	Relatively Moderate	92.9

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table B.47: Hancock County Hazard Specific Risk Index Table

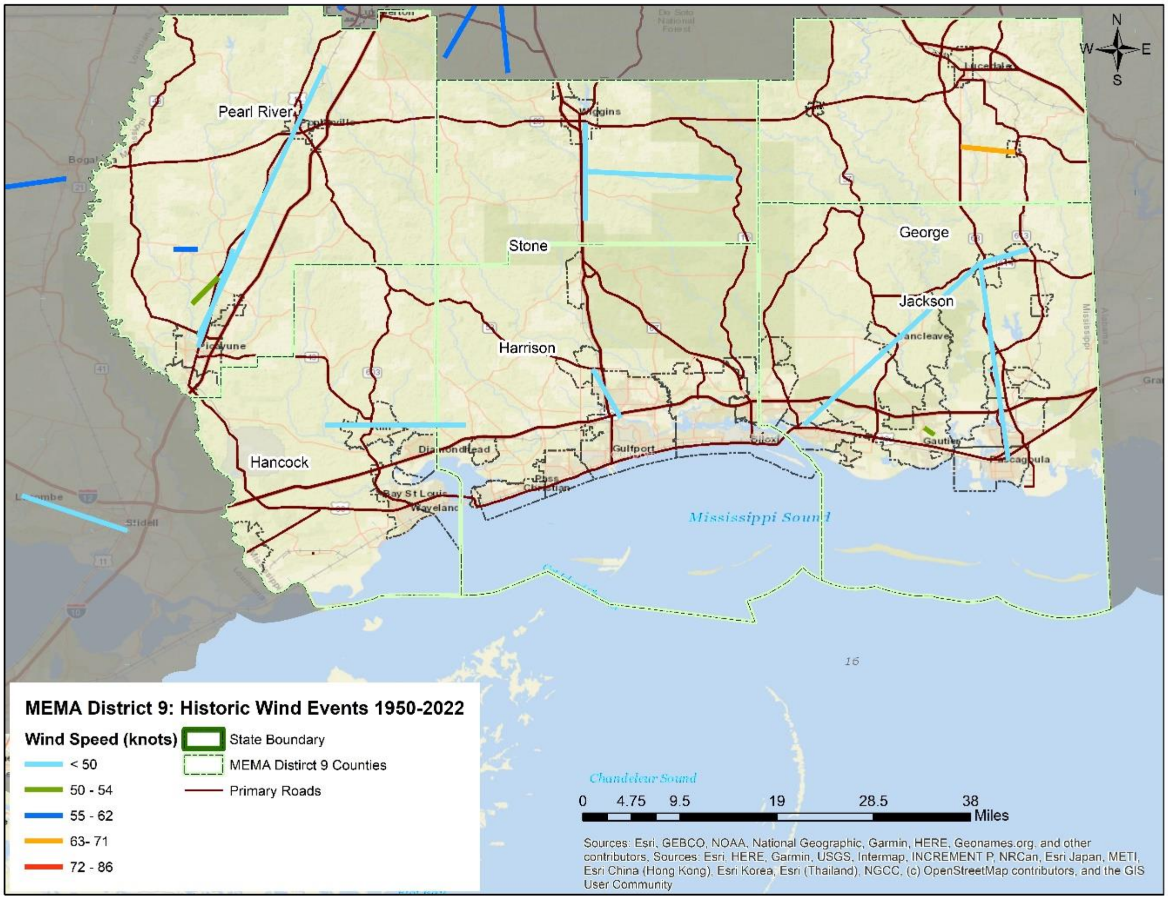
HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HURRICANE	
Risk Index Score	**Risk Index Rating**
92.7/100	Relatively Moderate
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Severe Thunderstorm/High Wind

LOCATION AND SPATIAL EXTENT

A thunderstorm event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. It is assumed that Hancock County has uniform exposure to an event and the spatial extent of an impact could be large. With that in mind, Figure B.22 shows the location of wind events that have impacted the county between 1955 and 2022.

FIGURE B.22: SEVERE THUNDERSTORM TRACKS IN HANCOCK COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Severe storms were at least partially responsible for three disaster declarations in Hancock County in 1979, 1991, and 1995. According to NCDC, there have been 102 reported thunderstorm and high wind events since 1968 in Hancock County. These events caused almost $429,000 (2016 dollars) in damages. There were also reports of four injuries. Table B.48 summarizes this information. Detailed thunderstorm and high wind event reports including date, magnitude, and associated damages for each event are presented in Table B.49.

TABLE B.48: SUMMARY OF THUNDERSTORM/HIGH WIND OCCURRENCES IN HANCOCK COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Bay St. Louis	8	0/0	$1,981	$37
Diamondhead	4	0/0	$17,584	$326
Waveland	14	0/0	$59,427	$1,101
Unincorporated Area	85	0/4	$349,561	$6,473
HANCOCK COUNTY TOTAL	111	0/4	$428,553	$7,937

Source: National Climatic Data Center

TABLE B.49: HISTORICAL THUNDERSTORM/HIGH WIND OCCURRENCES IN HANCOCK COUNTY

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*

Bay St. Louis					
BAY ST LOUIS	11/7/1996	Thunderstorm Wind	--	0/0	$768
BAY ST LOUIS	7/14/1998	Thunderstorm Wind	--	0/0	$739
BAY ST LOUIS	8/10/2000	Thunderstorm Wind	--	0/0	$140
BAY ST LOUIS	7/21/2002	Thunderstorm Wind	--	0/0	$335
BAY ST LOUIS	8/8/2015	Thunderstorm Wind	54 kts. MG	0/0	$0
BAY ST LOUIS	8/8/2015	Thunderstorm Wind	52 kts. EG	0/0	$0
BAY ST LOUIS	6/28/2017	Thunderstorm Wind	52 kts. EG	0/0	$0
BAY ST LOUIS	7/09/2019	Thunderstorm Wind	58 kts. EG	0/0	$0
Diamondhead					
DIAMONDHEAD ARPT	6/24/2000	Thunderstorm Wind	--	0/0	$1,399
DIAMONDHEAD ARPT	9/5/2000	Thunderstorm Wind	--	0/0	$2,797
DIAMONDHEAD ARPT	4/8/2002	Thunderstorm Wind	--	0/0	$13,388
DIAMONDHEAD ARPT	3/30/207	Thunderstorm Wind	55 kts EG	0/0	$0
Waveland					
Waveland	9/9/1994	Thunderstorm Wind	0 kts.	0/0	$8,126
WAVELAND	7/26/1999	Thunderstorm Wind	--	0/0	$723
WAVELAND	9/29/1999	Thunderstorm Wind	--	0/0	$145
WAVELAND	8/10/2000	Thunderstorm Wind	--	0/0	$1,399
WAVELAND	3/14/2001	Thunderstorm Wind	--	0/0	$680
WAVELAND	6/11/2001	Thunderstorm Wind	--	0/0	$20,400
WAVELAND	8/2/2002	Thunderstorm Wind	--	0/0	$1,339
WAVELAND	7/17/2003	Thunderstorm Wind	50 kts. EG	0/0	$13,090
WAVELAND	11/18/2003	Thunderstorm Wind	50 kts. EG	0/0	$6,545
WAVELAND	6/24/2004	Thunderstorm Wind	50 kts. EG	0/0	$638
WAVELAND	4/11/2005	Thunderstorm Wind	50 kts. EG	0/0	$2,466
WAVELAND	3/26/2009	Thunderstorm Wind	50 kts. EG	0/0	$1,123
WAVELAND	7/2/2009	Thunderstorm Wind	50 kts. EG	0/0	$1,684
WAVELAND	4/4/2011	Thunderstorm Wind	55 kts. EG	0/0	$1,071
Unincorporated Area					
HANCOCK CO.	6/11/1968	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	6/11/1968	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	1/10/1975	Thunderstorm Wind	0 kts.	0/0	$0

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
HANCOCK CO.	5/3/1978	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	4/13/1980	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	7/15/1980	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	9/15/1982	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	8/5/1983	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	2/12/1984	Thunderstorm Wind	0 kts.	0/4	$0
HANCOCK CO.	7/23/1984	Thunderstorm Wind	50 kts.	0/0	$0
HANCOCK CO.	5/21/1985	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	5/21/1985	Thunderstorm Wind	0 kts.	0/0	$0

HANCOCK CO.	5/26/1986	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	8/17/1986	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	8/17/1986	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	3/17/1987	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	2/15/1988	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	5/21/1988	Thunderstorm Wind	52 kts.	0/0	$0
HANCOCK CO.	6/9/1988	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	6/7/1989	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	1/25/1990	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	8/30/1990	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	4/25/1991	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	6/5/1991	Thunderstorm Wind	0 kts.	0/0	$0
HANCOCK CO.	6/29/1992	Thunderstorm Wind	0 kts.	0/0	$0
Pearlington	5/8/1995	Thunderstorm Wind	0 kts.	0/0	$0
Kiln	5/9/1995	Thunderstorm Wind	0 kts.	0/0	$0
PEARLINGTON	1/18/1996	Thunderstorm Wind	--	0/0	$13,048
KILN	1/24/1996	Thunderstorm Wind	--	0/0	$1,535
KILN	1/24/1996	Thunderstorm Wind	--	0/0	$4,605
PEARLINGTON	3/18/1996	Thunderstorm Wind	52 kts.	0/0	$0
LAKESHORE	11/7/1996	Thunderstorm Wind	--	0/0	$38,377
KILN	12/29/1996	Thunderstorm Wind	52 kts.	0/0	$0
KILN	5/3/1997	Thunderstorm Wind	--	0/0	$15,006
LAKESHORE	1/7/1998	Thunderstorm Wind	--	0/0	$1,478
SELLERS	6/5/1998	Thunderstorm Wind	--	0/0	$1,478
KILN	6/21/1998	Thunderstorm Wind	--	0/0	$739
VIDALIA	3/27/2000	Thunderstorm Wind	--	0/0	$140
SELLERS	6/25/2000	Thunderstorm Wind	--	0/0	$699
PEARLINGTON	7/14/2000	Thunderstorm Wind	--	0/0	$350
COUNTYWIDE	7/16/2000	Thunderstorm Wind	--	0/0	$2,797
PEARLINGTON	9/1/2000	Thunderstorm Wind	52 kts. E	0/0	$0
ANSLEY	6/11/2001	Thunderstorm Wind	--	0/0	$34,000
KILN	8/2/2002	Thunderstorm Wind	--	0/0	$1,339
KILN	10/29/2002	Thunderstorm Wind	--	0/0	$2,678
KILN	3/13/2003	Thunderstorm Wind	50 kts. EG	0/0	$13,090
COUNTYWIDE	4/7/2003	Thunderstorm Wind	52 kts. EG	0/0	$65,449
KILN	5/31/2004	Thunderstorm Wind	50 kts. EG	0/0	$0
PEARLINGTON	6/2/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,913

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
KILN	6/6/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,913
KILN	6/21/2004	Thunderstorm Wind	50 kts. EG	0/0	$6,375
KILN	6/23/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,275
KILN	6/24/2004	Thunderstorm Wind	52 kts. EG	0/0	$1,913
KILN	10/19/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,913
KILN	11/6/2006	Thunderstorm Wind	50 kts. EG	0/0	$2,389
KILN	11/15/2006	Thunderstorm Wind	50 kts. EG	0/0	$5,974
HANCOCK (ZONE)	6/9/2007	Strong Wind	45 kts. EG	0/0	$5,808
PEARLINGTON	4/2/2009	Thunderstorm Wind	50 kts. EG	0/0	$1,684

HANCOCK (ZONE)	3/1/2010	Strong Wind	45 kts. EG	0/0	$5,523
KILN	5/25/2010	Thunderstorm Wind	52 kts. EG	0/0	$5,523
PEARLINGTON	11/30/2010	Thunderstorm Wind	50 kts. MG	0/0	$0
KILN	3/9/2011	Thunderstorm Wind	61 kts. EG	0/0	$10,707
KILN	4/4/2011	Thunderstorm Wind	52 kts. EG	0/0	$5,354
KILN	4/4/2011	Thunderstorm Wind	52 kts. EG	0/0	$1,071
KILN	8/24/2011	Thunderstorm Wind	56 kts. EG	0/0	$5,354
SELLERS	2/18/2012	Thunderstorm Wind	52 kts. EG	0/0	$1,049
SELLERS	2/18/2012	Thunderstorm Wind	56 kts. EG	0/0	$5,245
SELLERS	2/18/2012	Thunderstorm Wind	52 kts. EG	0/0	$5,245
SELLERS	2/18/2012	Thunderstorm Wind	52 kts. EG	0/0	$15,736
CRANE CREEK	2/18/2012	Thunderstorm Wind	61 kts. EG	0/0	$10,490
CRANE CREEK	2/18/2012	Thunderstorm Wind	52 kts. EG	0/0	$2,098
KILN	3/21/2012	Thunderstorm Wind	55 kts. EG	0/0	$2,098
PEARLINGTON	3/21/2012	Thunderstorm Wind	55 kts. EG	0/0	$3,147
GAINESVILLE	7/6/2012	Thunderstorm Wind	55 kts. EG	0/0	$2,098
HANCOCK (ZONE)	4/3/2013	High Wind	52 kts. MG	0/0	$10,339
KILN	4/8/2014	Thunderstorm Wind	56 kts. EG	0/0	$30,522
PEARLINGTON	1/3/2015	Thunderstorm Wind	52 kts. EG	0/0	$0
KILN	9/5/2015	Thunderstorm Wind	60 kts. EG	0/0	$0
CRANE CREEK	5/19/2016	Thunderstorm Wind	60 kts. EG	0/0	$0
KILN	11/01/2018	Thunderstorm Wind	55 kts. EG	0/0	$0
VIDALIA	4/19/2020	Thunderstorm Wind	65 kts. EG	0/0	$0
SANTA ROSA	4/10/2021	Thunderstorm Wind	50 kts. EG	0/0	$0
KILN	4/10/2021	Thunderstorm Wind	50 kts. EG	0/0	$0
VIDALIA	4/10/2021	Thunderstorm Wind	50 kts. EG	0/0	$0
LAKESHORE	4/10/2021	Thunderstorm Wind	50 kts. EG	0/0	$0

*Property damage is reported in 2022 dollars; all damage may not have been reported.
†E = estimated; EG = estimated gust; ES = estimated sustained; MG = measured gust; MS = measured sustained
Source: National Climatic Data Center

PROBABILITY OF FUTURE OCCURRENCES

Given the high number of previous events, it is certain that thunderstorm events, including straight-line wind events, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for the entire county.

FEMA NRI Expected Annual Loss Estimates

Table B.50: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HIGH WIND EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1.5 events/year	0.02	$176,933	$24,762	$14	$201,709	37.3	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table B.51: Hancock County Hazard Specific Risk Index Table

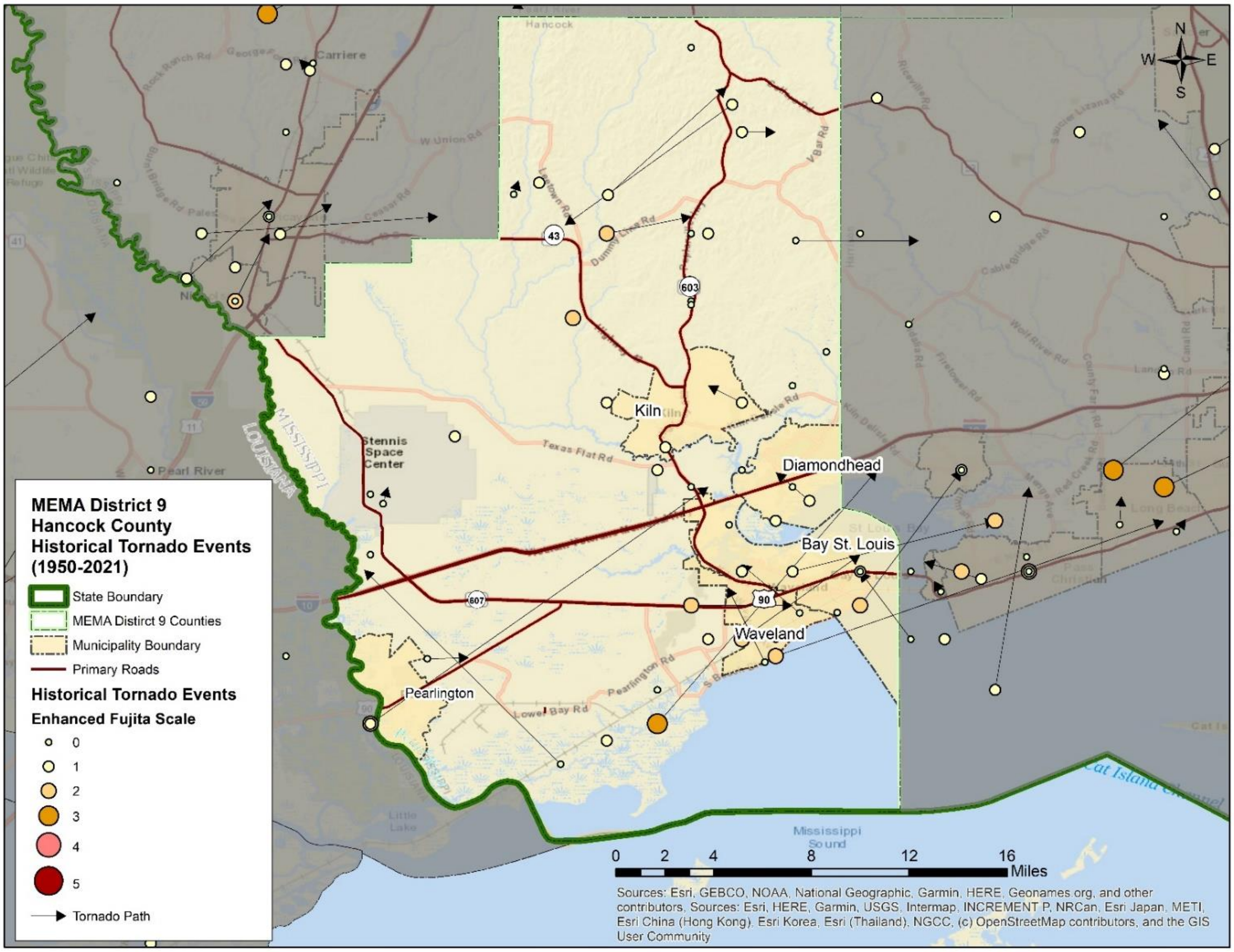
HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HIGH WIND	
Risk Index Score	**Risk Index Rating**
31.4/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

TORNADO

LOCATION AND SPATIAL EXTENT

Tornadoes occur throughout the state of Mississippi, and thus in Hancock County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Hancock County is uniformly exposed to this hazard. With that in mind, Figure B.23shows tornado track data for many of the major tornado events that have impacted the county between 1950 and 2015. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE B.23: HISTORICAL TORNADO TRACKS IN HANCOCK COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Tornadoes were at least partially responsible for three disaster declarations in Hancock County in 1979, 1991, and 1995.20 According to the National Climatic Data Center, there have been a total of 55 recorded tornado events in Hancock County since 1952, resulting in over $78.6 million in property damages. In addition, 14 injuries were reported. The magnitude of these tornadoes ranged from F0 to

F3 and EF0 to EF1 in intensity. A summary of these events is presented in Table B.52. Detailed information on historic tornado events can be found in Table B.53.

TABLE B.52: SUMMARY OF TORNADO OCCURRENCES IN HANCOCK COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Bay St. Louis	9	0/0	$22,776	$325
Diamondhead	2	0/0	$24,437	$349
Waveland	6	0/0	$332,971	$4,757
Unincorporated Area	38	0/14	$78,597,377	$122,820
HANCOCK COUNTY TOTAL	55	0/14	$78,977,561	$1,128,251

Source: National Climatic Data Center

TABLE B.53: HISTORICAL TORNADO IMPACTS IN HANCOCK COUNTY

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Bay St. Louis					
BAY ST LOUIS	4/29/1996	Waterspout	0/0	$0	Sheriff's Office reported a waterspout one mile offshore.
					A tropical depression that formed in the central Gulf of Mexico on September 17th strengthened to a minimal tropical storm named Hermine on the morning of the 18th. Tropical Storm Hermine meandered in the Gulf of Mexico for a period of time before beginning a slow north northeast motion that brought it ashore in the early morning hours of the 20th near Cocodrie, LA in Terrebonne Parish. Tropical Storm Hermine then drifted north over southeast Louisiana and was downgraded to a tropical depression 50 miles northwest of New Orleans during the evening of the 20th. Winds associated with Hermine were of minimal tropical storm force and were mainly contained in squalls. A peak wind gust of 46 mph in a squall was measured just off the southeast coast of Louisiana at the Burrwood NOAA C-MAN station near the mouth of the Mississippi River at 1139 CST on September 19th.

BAY ST LOUIS	9/20/1998	F0	0/0	$14,776	Two tornadoes developed in rainbands associated with Tropical Storm Hermine on September 20th. The first tornado occurred around 0730 CST 10 miles south of Poplarville, MS and destroyed two mobile homes, damaged seven cars, and caused one injury. A second weak tornado briefly touched down near Bay St. Louis, MS around 0850 CST resulting in only minor damage.

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					Isolated flash flooding also occurred with Tropical Storm Hermine on September 20th when 4 to 5 inches of rain fell on areas of Walthall county. Sections of a few roadways in southern Walthall county were briefly under water including Mississippi Highway 27 which was covered by up to a foot of water in places.
BAY ST LOUIS	7/1/1999	Waterspout	0/0	$0	Two waterspouts were observed off the Hancock County coast.
BAY ST LOUIS	10/6/2000	Funnel Cloud	0/0	$0	A funnel cloud was observed just south of the Bay St. Louis bridge.
BAY ST LOUIS	7/2/2001	Waterspout	0/0	$0	Several waterspouts were sighted south of Bay St. Louis and Point Henderson.
BAY ST LOUIS	7/2/2001	Waterspout	0/0	$0	Several waterspouts were sighted south of Bay St. Louis and Point Henderson.

BAY ST LOUIS	8/12/2003	F0	0/0	$0	A waterspout developed just southeast of Bay St. Louis and moved onshore briefly as a weak tornado before dissipating. No significant damage was reported.
BAY ST LOUIS	1/13/2005	Funnel Cloud	0/0	$0	A funnel cloud was observed.
BAY ST LOUIS	4/2/2009	EF0	0/0	$0	A weak tornado was briefly observed near the coast between Bay St. Louis and Waveland.
BAY ST LOUIS ARPT	4/25/2019	EF1	0/0	$0	**A weak tornado initially touched down near the intersection of Mississippi Highway 603 and Apache Drive. Small tree limbs were down along this intersection. The tornado tracked east-northeast along Apache Drive. A few softwood trees were snapped and multiple large limbs were broken. As the tornado continue eastward, it crossed near the intersection of Apache Drive and Comanche Street, were a few more trees were snapped and uprooted, with a lot of tree limbs down. The tornado then moved to Choctaw Place, snapping a few more softwood trees and then lifted before crossing Shawnee Street. Estimated maximum wind speed 90 mph, path length 0.25 miles, path width 25 yards.**
BAY ST LOUIS	7/14/2020	Waterspout	0/0	$8,000	
Diamondhead					
DIAMONDHEA D ARPT	7/22/2000	F0	0/0	$1,049	A small tornado briefly touched down near Diamondhead knocking down trees and power lines.
DIAMONDHEA D ARPT	10/3/2002	F0	0/0	$13,388	A weak tornado touched down briefly downing several trees.
DIAMONDHEA D ARPT	8/29/2021	EF1	0/0	$10,000	**A waterspout that crossed the Bay of St Louis moved into Diamondhead, crossing I-10 near Diamondhead Drive N where it damaged and peeled shingles off of the Memorial Woodland Village Rehabilitation and Nursing Center. It likely lifted shortly afterwards west of Gex Rd and Leisure Time Dr. Survey conducted remotely via high-res aerial photography. Estimated peak winds of 90 mph.**
Waveland					

WAVELAND	8/13/1998	F0	0/0	$0	Mississippi Highway Patrol reported a brief touchdown of a weak tornado near the Interstate Highway 10 and Mississippi Highway 603 interchange. No damage was reported.
WAVELAND	8/27/2001	Waterspout	0/0	$0	A waterspout was observed by police officers just of the off the coast south of Waveland.
WAVELAND	6/30/2003	F0	0/0	$1,309	A weak tornado in the outer rainbands of Tropical Storm Bill touched down briefly, blowing down several trees resulting in minor damage to house roofs.
WAVELAND	6/6/2004	Funnel Cloud	0/0	$0	A funnel cloud was observed just west of Waveland.
WAVELAND	4/6/2005	F1	0/0	$61,662	A tornado moved through the community of Bayside Park damaging around 30 houses and 8 mobile homes. Some of the homes received severe damage. The tornado also knocked down numerous trees and damaged several vehicles. Most of the damage was produced by trees falling on structures and automobiles.
WAVELAND	4/2/2009	Funnel Cloud	0/0	$0	A funnel cloud was observed.
WAVELAND	8/29/2021	Waterspout	0/0	$270,000	**A waterspout moved onshore near Morris St., Amar St., and Singleton St., damaging roofs on 8-10 houses in this neighborhood, and snapping or uprooting several trees. The tornado then tracked northwest, damaging roofs on 4-5 houses on Waveland Ave. and Sycamore St. There was evidence of roof damage to numerous apartments in the Oak Place Apartments near Hwy 90 and an additional 8-10 homes along Mediterranean St., Pacific St., and Danube St. The tornado likely lifted just south of Route 43/Kiln Rd in Hancock County, MS. Survey conducted remotely via high-res satellite imagery. Estimated peak winds of 80 mph.**

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Unincorporated Area					
HANCOCK CO.	2/13/1952	F1	0/2	$0	--
HANCOCK CO.	4/13/1969	F1	0/0	$164,069	--
HANCOCK CO.	7/14/1969	--	0/0		At 1:18 p.m. radar indicated a thunderstorm 22 W Biloxi with tops 62,000 ft. Highway Patrol reported funnel cloud touched down at Bay St. Louis Bridge at 1:30 p.m. (lat. 30.4º N, long. 89.6º W); also reported another funnel cloud west of area approaching at 1:32 p.m. Afterwards a Highway Department spokesman indicated an inspection showed no structural damage to the bridge. Newspaper noted "The only apparent damage sustained was to the auto guard rail used for stopping traffic." The end of this traffic draw gate arm was broken off and tossed into the bay's waters. At 1:45 p.m. radar showed heavy thunderstorms increasing along the Mississippi Coast with the strongest in the Pass Christian area moving to the E.
HANCOCK CO.	2/1/1970	F1	0/0	$0	--

HANCOCK CO.	12/29/1970	F1	0/0	$155,189	A low-pressure trough and a nearly stationary front spawned numerous thundershowers. A tornado was first reported in Bay St. Louis, then lifted to make several touchdowns between there and north of Gulfport. HANCOCK COUNTY: County Civil Defense Director estimated $20,000 damages in an area 1/20 mile long and 50 yards wide, north of U.S. 90 and east of Highway 603, Bay St. Louis. About 9:55 a.m. to 9:58 a.m., five buildings were heavily damaged during severe thunderstorm; County sheriff reported a house trailer flipped over in area to rear of Stuckey's Gift Shop, U.S. 90, Bay St. Louis. A few hundred feet away, at least 3 residences along U.S. 90 had roof damage; an unoccupied house in the neighborhood lost its roof and received other damage. Newspaper noted, "About the same time, a small trailer...was damaged and a concrete block wall...in the same area was blown over. The sheriff's office said there were also trees and utility poles knocked about." HARRISON COUNTY: County Civil Defense Director reported 1 funnel with spotty touchdowns causing damages of $20,000 to property and $3,000 to timber within 20 minutes along path from WSW towards ENE. Tornado struck Grayson Avenue near Pass Christian business section: leveled 2 sheds, destroyed 1 garage, ripped roof off 1 home. At Condike Avenue, north of Long Beach: hit in wooded area. At Gulfport Municipal Airport, air traffic control tower

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					operator saw 1 funnel briefly touch ground (3 WSW Airport) 10:14 a.m. and go back up in cloud. Near junction U.S. 49 and Old Highway 49, on Arkansas Street in Gulfport (lat. 30.4º N, long. 89.1º W), 4 persons in paint supply shop escaped injury as roof was torn off concrete building. Highway Patrol at Gulfport received public reports of 3 funnels, 2 of which remained aloft; 1 sighted about 300 yards north of Holloway Transfer Co. on Highway 49 with no extensive wind damage but several utility poles were knocked down about 10:20 a.m.
					High first on Highway 90 at Holiday Sands Motel, about 5 1/2 W Bay St. Louis (lat. 30.3º N, long. 89.5º W); the motel, being expanded, sustained about $10,000 damage when one wing and part of another were destroyed. About a mile SE of the motel, the funnel hit again, causing about $30,000 damage to the home of Dr. Laton Weinberg on the Lower Bay Road. Touching down again in Spanish Acres, the tornado destroyed a brick home occupied by Mr. and Mrs. E. J. Vicknair and their two children; Mrs. Vicknair sustained a leg laceration. About 150 feet away an unoccupied small frame dwelling was leveled. About a block away a large pine tree was blown down on to a house causing rood and structural damage. Roof damage also occurred to 2 to 3 other homes in the neighborhood. There also was moderate flooding in several streets in the Spanish Acres area. Before hitting the subdivision, the high winds caused damage to the Aloha Trailer Park on Old Spanish Trail at Highway 90, where one unoccupied trailer was splintered and another partially damaged when a portion of

HANCOCK CO.	3/2/1972	F2	0/2	$1,440,508	the first was blown on it. Other damage was a tree on the trailer home of Mr. and Mrs. Will Nicholson on Old Spanish Trail behind the subdivision, shattered billboards along Highway 90, strong wind damage to trees and a boat blown from its trailer on Chantilly Terrace in Waveland; one home in Waveland had roofing blown off it. Street flooding and power failure were also experienced in Bay St. Louis.
HANCOCK CO.	5/7/1972	F2	0/1	$144,051	--
HANCOCK CO.	4/7/1973	F2	0/0	$135,615	Public reported tornado damaged 2 trailer houses in Dedeaux Community and extensive damage to Hancock North Central School.
HANCOCK CO.	5/2/1977	F2	0/0	$99,362	--

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
HANCOCK CO.	8/1/1977	F1	0/0	$9,936	A tiny twister touched down momentarily in the Ansley community southwest of Lakeshore in coastal Hancock County. One utility shed was lifted, tossed a hundred feet, and destroyed. Damage less than $5,000.
HANCOCK CO.	4/13/1980	F2	0/0	$730,743	--
HANCOCK CO.	5/15/1980	F1	0/0	$7,307	A small tornado touched down briefly just north of Stennis Airport in a wooded area inside the buffer zone of the National Space Technology Laboratories, or 10 miles NW of Bay St. Louis. Airport personnel watched the tornado touch down and reported seeing "a pine tree fall out of the sky." A sheriff's deputy described the tornado as "a little bitty one."
HANCOCK CO.	5/19/1980	F3	0/8	$73,074,333	The tornado first touched down at the Gulfview School near Waveland. Damage to the school totaled half a million dollars, but relatively little damage was done to the gymnasium where 8th grade graduation ceremonies were in progress. No injuries occurred at the school. The tornado then moved NE and struck the Garden Isles subdivision, destroyed 23 houses and heavily damaging at least 30 others. The Bay marina was demolished and numerous boats and vehicles were destroyed. Property damage was estimated at $5,000,000.
HANCOCK CO.	4/20/1982	F2	0/0	$623,972	--
HANCOCK CO.	5/21/1985	F1	0/0	$55,960	--
HANCOCK CO.	5/21/1985	F1	0/0	$55,960	--
HANCOCK CO.	5/21/1985	F1	0/0	$5,596	--
HANCOCK CO.	11/16/1987	F2	0/0	$530,046	A tornado moved through a sparsely inhabited portion of Hancock County. The tornado, however, passed across Mississippi Highway 603 destroying a brick home and a barn. The house was valued at 80,000 dollars.
HANCOCK CO.	9/16/1988	F1	0/0	$50,899	A small tornado north of Waveland unroofed a home.

Santa Rosa	4/12/1994	F1	0/1	$812,594	Two mobile homes were totally destroyed in the Benville community. One person was injured in one of these mobile homes. Several trees and power lines were blown down.
Kiln	5/3/1994	F0	0/0	$81,259	This weak tornado touched down in the Diamondhead community and did minor damage to a couple of homes and blew down a few trees.
Pearlington	4/22/1995	F0	0/0	$0	A tornado touched down briefly north of Pearlington. No significant damage reported.
Lakeshore	5/9/1995	F0	0/0	$0	A tornado touched down briefly in Lakeshore with no significant damage. Path length and width were estimated. Several trees were blown down near Kiln.

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
KILN	11/7/1996	F0	0/0	$0	Several motorists reported a north moving tornado touched down briefly near the Interstate Highway 10 exit at Kiln.
SELLERS	10/25/1997	F1	0/0	$112,548	A tornado destroyed two mobile homes and damaged a house. The tornado was sighted by Sheriff's Office personnel when it touched down.

SELLERS	11/21/1997	F1	0/0	$75,032	A severe thunderstorm moved out of St. Tammany Parish, Louisiana into extreme south Mississippi. Several short-lived tornadoes touched down as it crossed Pearl River, Hancock, and Harrison Counties. Near Nicholson, a tornado touched down near Nicholson, moving through a mobile home park and also passing across the Mississippi Visitors Center on Interstate Highway 59. Damage path was estimated at approximately four miles, due to lack of ground access in Pearl River drainage area to the west of Nicholson. Preliminary reports from Pearl River County and state officials indicated that 3 single family homes were destroyed and 18 others heavily damaged; and 21 mobile homes were destroyed and 8 others heavily damaged. Several car windows were blown out when the tornado passed through the Visitors Center. One person was injured in the mobile home park and another person suffered minor injuries in a nearby subdivision when their auto was hit by falling trees and limbs. Large hail was also reported by the Sheriff's Office in McNeil. Two additional tornado touch-downs were reported in north Hancock County and north Harrison County as the severe thunderstorm moved northeast. In north Hancock County, civil defense reported two homes were damaged along with two mobile homes when a tornado touched down in a rural area. In north Harrison County, a tornado damaged a convenience store along with heavily damaging a couple of mobile homes. The tornado path lengths in Hancock and Harrison Counties were estimated from damage reports.
KILN	7/16/2000	F0	0/0	$0	A small tornado briefly touched down near Kiln-Delisle Road causing no damage.
					A weak tornado briefly touched down

KILN	7/22/2000	F0	0/0	$0	resulting in no damage.
KILN	6/11/2001	F1	0/0	$67,999	A tornado touched down on intermittent patch in rural Hancock County. Several houses suffered minor damage, several large trees

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					were blown down as well as large tree branches. A barn was also damaged
CLERMONT HARBOR	3/31/2002	Funnel Cloud	0/0	$0	--
KILN	6/22/2004	F0	0/0	$0	A weak tornado briefly touched down causing no damage in rural northern Hancock County.
KILN	5/29/2005	F0	0/0	$0	A weak tornado touched down briefly causing no damage.
KILN	4/21/2006	Funnel Cloud	0/0	$0	A funnel cloud sighted near mile marker 20 on Interstate 10.
SELLERS	3/27/2009	EF1	0/0	$22,453	A National Weather Service storm survey indicated that a tornado traveled along a 7 mile long path in Hancock County. The tornado caused substantial damage to the roof of a church on Highway 603 and to a large outbuilding south of Necaise. The debris from large trees blocked Highway 603, Highway 43, and Highway 53.
LOGTOWN	4/2/2009	EF0	0/0	$2,245	A weak tornado with estimated winds of 70 to 80 mph touched down near the intersection of Whites Road and Whipple Road. The tornado snapped trees in half in this area. The tornado then moved to the east through forested areas approximately 1.5 miles before ending near the intersection of Whites Road and U.S. Highway 90 where tree damage was again observed.
PEARLINGTON	11/30/2010	EF0	0/0	$1,105	Delayed report from Stennis security of a sighted waterspout on the service canal. The waterspout moved onshore briefly before lifting. Minor shingle damage was done to one structure.

KILN	9/3/2011	EF0	0/0	$32,122	A weak tornado moving southeast to northwest touched down for a short distance. A mobile home was turned on its side, the tops of trees were snapped, and a few small trees snapped. Estimated strength was upper end EF0. Path length was 0.1 mile and the path width 30 yards.
SELLERS	9/30/2012	EF1	0/0	$31,471	A weak tornado touched down along an intermittent track from the Cypress Lake area northeastward to just southwest of the community of Necaise. A few homes had minor roof damage, one home was shifted off its foundation. One home had a portion of siding roof peeled off, and a few trees were snapped or blown down. Most of the damage path was rated as WF0 with an isolated area of EF1 damage. Path length was 6 miles, path width 40 yards. Maximum winds were approximately 100 mph. Time of event was based on radar.
VIDALIA	12/13/2016	EF0	0/0	$0	**A tornado touched down just east of Standard Cemetary Road in Hancock County. The storm moved eastward causing intermittent damage to trees before crossing the county line into Harrison County near Bell Creek Road. Estimated wind speed 75 mph. Event times estimated by radar.**
SANTA ROSA	9/06/2018	EF0	0/0	$0	**NWS Storm Survey indicated a weak tornado touched down for a short distance in northern Hancock County. The tornado initially touched down at the intersection of Pinecrest and E Fork Road. At this location, several patches of shingles were ripped off of the east side of a manufactured home and thrown onto the west side of a trailer as well as into surrounding trees. A satellite dish mounted on a pole next to the home was thrown to the ground and a free standing swing was broken. The tornado moved north-northeast to Long Vue Road. It produced minor**

					damage to multiple manufactured homes ranging from a few shingles to small sections of skirting. The most intense damage occurred at a manufactured home near the end of the track. Several large sections of shingles were ripped from the roof and thrown into the nearby field, and skirting was torn in many places. A 10 foot by 12 foot plywood shed was also destroyed.
GAINESVILLE	4/08/2021	EF0	0/0	$25,000	**A brief tornado touched down behind a house and tore its carport off and lifted most of the roof off. It then ripped part of the roof off a nearby building and peeled back the tin on the porch. Tin was peeled back on a building across the street. All debris was thrown around a quarter of a mile to the northeast.**
CLAIBORNE	8/29/2021	Waterspout	0/0	$50,000	**A waterspout over Heron Bay moved inland across Hancock County Marsh Coastal Preserve. Numerous road signs and posts were blown over in the Magnolia Ridge area. The tornado tracked northwest across eastern and northern Pearlington. Numerous trees were uprooted and large branches snapped on Dean Road, Whipple Road, Russ Street and Napoleon-Westonia Road. Roof damage to multiple Roof homes on Dean Road was noted. Survey conducted remotely via high-res aerial photography. The true beginning and ending points of the track are unknown without the ability to perform a ground or aerial survey in the wake of Hurricane Ida. Estimated peak winds of 75 mph.**

*Property damage is reported in 2016 dollars; all damage may not have been reported.

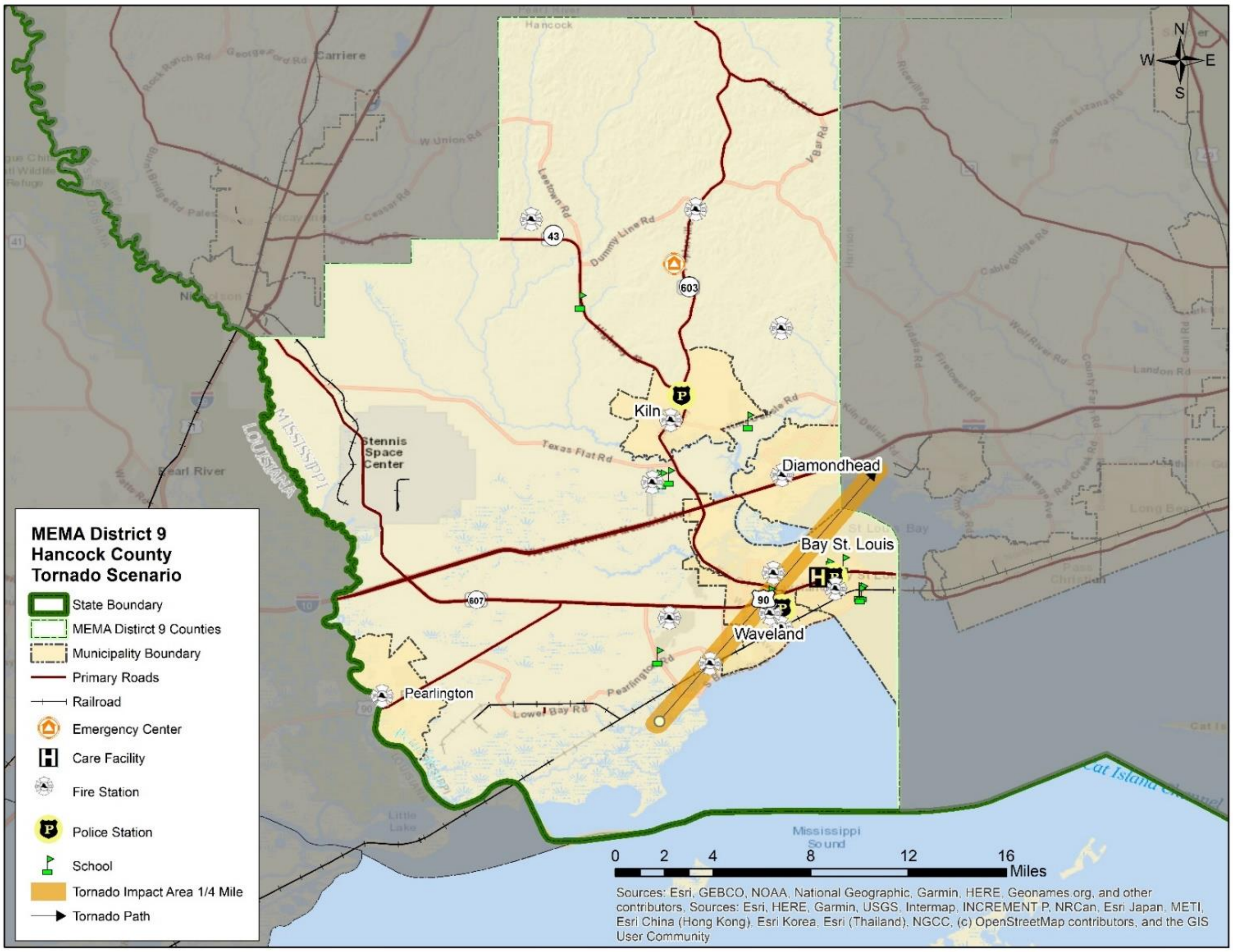
Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details

Source: National Climatic Data Center

PROBABILITY OF FUTURE OCCURRENCES

According to historical information, tornado events pose a significant threat to Hancock County. The probability of future tornado occurrences affecting Hancock County is highly likely (100 percent annual probability). The following graphic demonstrates a potential scenario.

Figure B.25: Tornado Scenario



FEMA NRI Expected Annual Loss Estimates

Table B.54: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS

FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR TORNADO EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.4 events/year	0.12	$1,389,734	$779,279	$260	$2,169,273	72.1	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table B.55: Hancock County Hazard Specific Risk Index Table

HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – TORNADO	
Risk Index Score	Risk Index Rating
67.9/100	Relatively Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Winter Weather

LOCATION AND SPATIAL EXTENT

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. Hancock County is not accustomed to severe winter weather conditions and rarely receives severe winter weather, even during the winter months. Events tend to be mild in nature; however, even relatively small accumulations of snow, ice, or other wintery precipitation can lead to losses and damage due to the fact that these events are not commonplace. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

HISTORICAL OCCURRENCES

According to the National Climatic Data Center, there have been a total of four recorded winter storm events in Hancock County since 1996. These events did not result in any property damage. A summary of these events is presented in Table B.56. Detailed information on the recorded winter storm events can be found in Table B.57.

TABLE B.56: SUMMARY OF WINTER STORM EVENTS IN HANCOCK COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2016)	Annualized Property Losses
Hancock County	4	0/0	$0	$0

Source: National Climatic Data Center

TABLE B.57: HISTORICAL WINTER STORM IMPACTS IN HANCOCK COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Bay St. Louis				
None reported	--	--	--	--
Diamondhead				
None reported	--	--	--	--
Waveland				
None reported	--	--	--	--
Unincorporated Area				
HANCOCK (ZONE)	12/18/1996	Heavy Snow	0/0	$0
HANCOCK (ZONE)	12/25/2004	Winter Storm	0/0	$0
HANCOCK (ZONE)	1/24/2014	Winter Weather	0/0	$0
HANCOCK (ZONE)	1/28/2014	Sleet	0/0	$0
HANCOCK (ZONE)	12/08/2017	Winter Weather	0/0	$0
HANCOCK (ZONE)	1/16/2018	Winter Weather	0/0	$0

*Property damage is reported in 2022 dollars; all damage may not have been reported.
Source: National Climatic Data Center

There have been several severe winter weather events in Hancock County. The text below describes one of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

December 2004

A mixture of sleet and snow fell off and on during much of Christmas day resulting in a dusting to one half inch of accumulation across much of southwest, south, and coastal Mississippi. Although not heavy, accumulation of ice and snow in coastal Mississippi is unusual and the winter weather impacted transportation. The mixture of sleet and snow caused a number of bridges and overpasses to become icy which resulted in some traffic accidents and closure of some the elevated roadways.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

PROBABILITY OF FUTURE OCCURRENCES

Winter storm events will continue to occur in Hancock County. Based on historical information, the probability is likely (between 10 and 100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table B.58: Hancock County Expected Annual Loss Table

HANCOCK COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WINTER WEATHER EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.3 events/year	0.00	$16,709	$15	$3	$16,728	26,5	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table B59: Hancock County Hazard Specific Risk Index Table

HANCOCK COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WINTER WEATHER	
Risk Index Score	Risk Index Rating
21.6/100	Very Low

FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.*

FEMA Hazard-Type ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*

Source: FEMA National Risk Index (2023)

OTHER HAZARDS

Climate Change/Sea Level Rise

LOCATION AND SPATIAL EXTENT

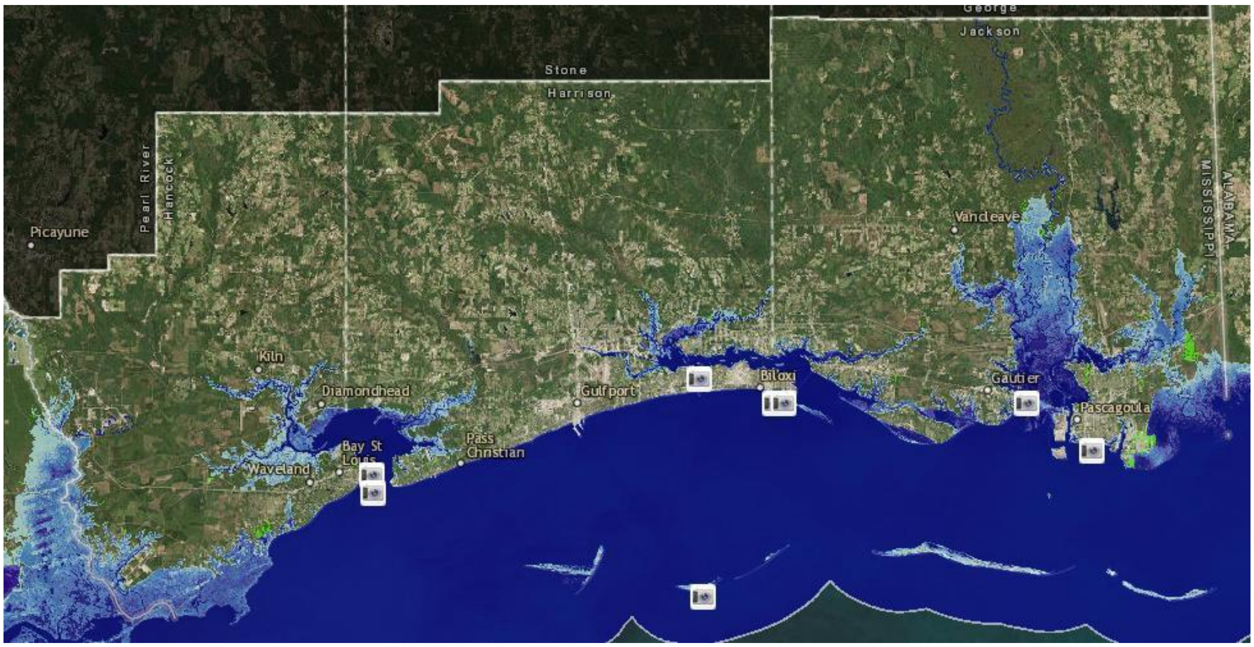
Climate Change

Climate change can have direct implications on many of the other hazards addressed in this plan since it has the potential to alter the nature and frequency of hazards, including increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, strong storms (wind, hurricane). Therefore, it is assumed that Hancock County is uniformly exposed to this hazard.

Sea Level Rise

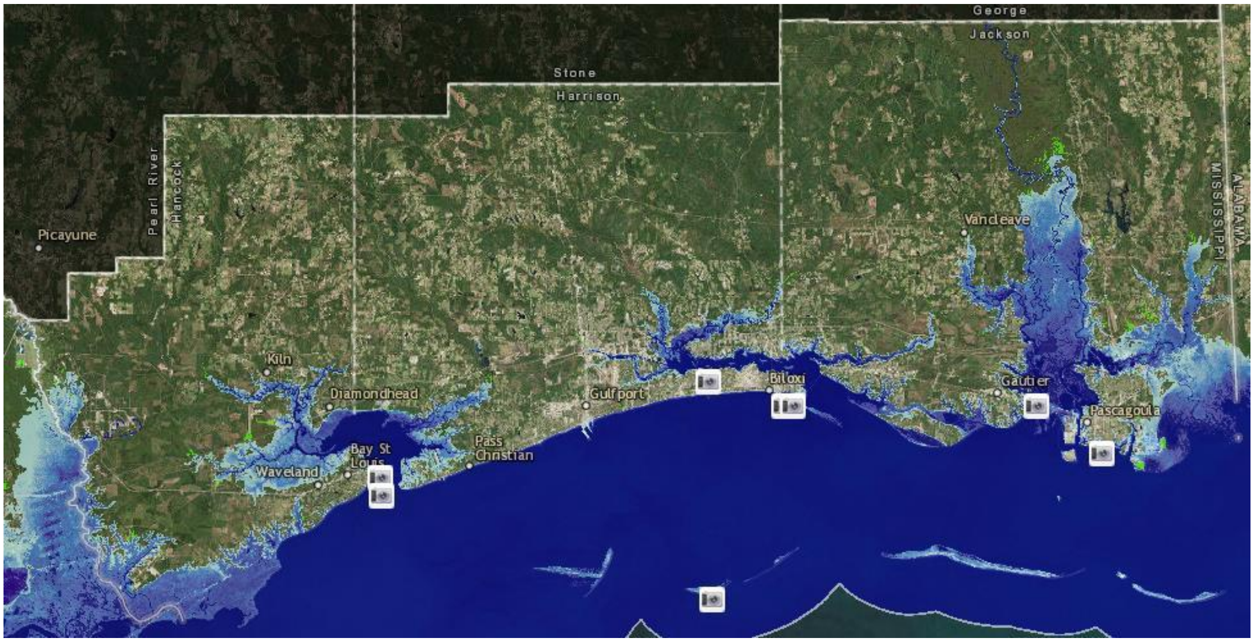
Sea level rise is occurring at a global scale. However, it does not affect areas uniformly and will be more severe in some places. Figure B.26 identifies areas in MEMA District 9 that would be inundated by water as a result of three feet in sea level rise as per projections by NOAA. The highest level of sea level rise projected by NOAA is shown in Figure B.27. This figure shows the inundation areas in the case of six feet of sea level rise. This demonstrates the additional areas that would be impacted beyond the three feet scenario.

FIGURE B.26: THREE FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

FIGURE B.27: SIX FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

HISTORICAL OCCURRENCES

Climate Change
According to the National Climate Assessment, there have been increasing numbers of days above 95ºF and nights above 75ºF, and decreasing numbers of extremely cold days since 1970 in the Southeast. Daily and five-day rainfall intensities have also increased and summers have been either increasingly dry or extremely wet. The number of Category 4 and 5 hurricanes in the Atlantic basin has increased substantially since the early 1980s compared to the historic record that dates back to the mid-1880s. This can be attributed to both natural variability and climate change.

Sea Level Rise
Sea level rise is a slow-onset hazard and specific events/occurrences are not possible to determine.

PROBABILITY OF FUTURE OCCURRENCES

Climate Change
According to the National Climate Assessment, temperatures across the Southeast are expected to increase during this century, with shorter-term (year-to-year and decade-to-decade) fluctuations over time due to natural climate variability. Major consequences of warming include significant increases in the number of hot days (95ºF or above) and decreases in freezing events. Regional average increases are in the range of 4ºF to 8ºF by the year 2100.

Projections of future precipitation patterns are less certain than projections for temperature increases. Because the Southeast is located in the transition zone between projected wetter conditions to the north and drier conditions to the southwest, many of the model projections show only small changes relative to natural variations. Additionally, projections further suggest that warming will cause tropical storms to be fewer in number globally, but stronger in force, with more Category 4 and 5 storms, and substantial further increases in extreme precipitation are projected as this century progresses.

Overall, future climate change is considered likely (between 10 and 100 percent annual probability).

Sea Level Rise
There is still much debate regarding the probability of future occurrence of sea level rise. This section will be updated as more information becomes available. Future sea level rise is considered likely (between 10 and 100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

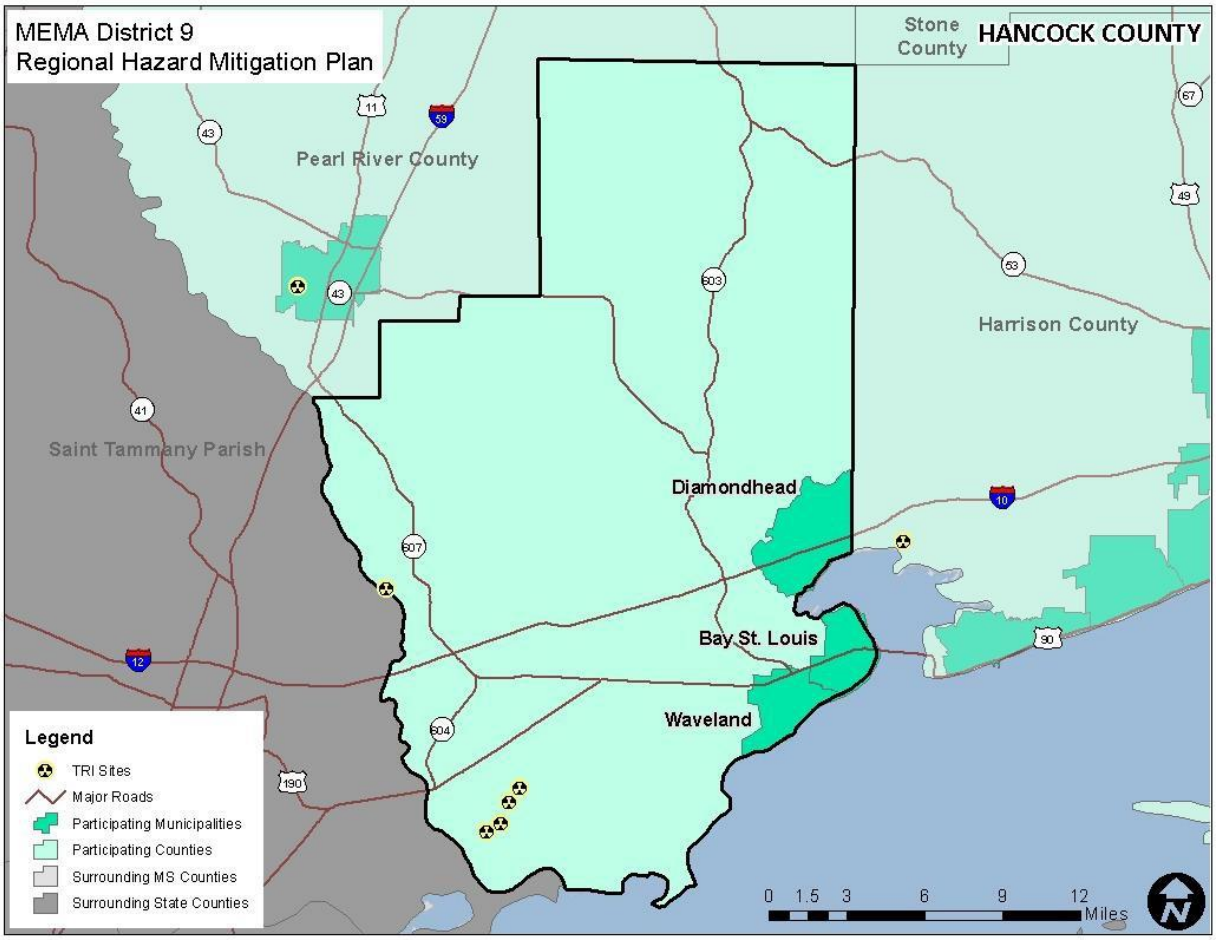
The FEMA NRI does not assess Climate Change/Sea Level Rise

Hazardous Materials Incident/Train Derailment

LOCATION AND SPATIAL EXTENT

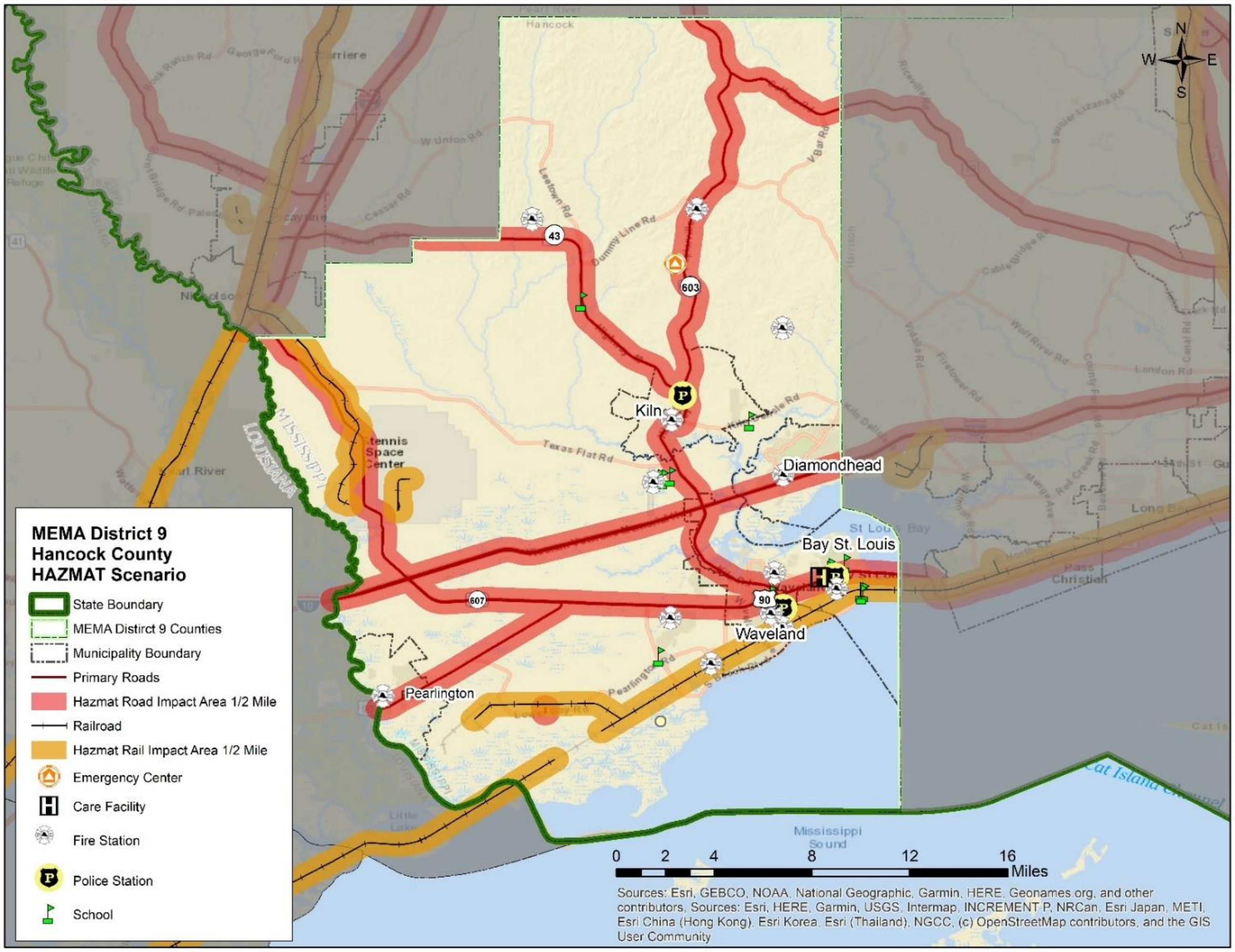
Hancock County has five TRI sites. These sites are shown in Figure B.28.

FIGURE B.28: TOXIC RELEASE INVENTORY (TRI) SITES IN HANCOCK COUNTY



Source: Environmental Protection Agency

Figure B.29: HAZMAT Scenario



In addition to “fixed” hazardous materials locations, hazardous materials may also impact the county via roadways and railways. Many roads and railways in the county are subject to hazardous materials transport and all roads and railways that permit hazardous material transport are considered potentially at risk to an incident.

HISTORICAL OCCURRENCES

There have been a total of 25 recorded HAZMAT incidents in Hancock County since 1975. These events resulted in almost $275,000 (2016 dollars) in property damage as well as four injuries. Table B.60 summarizes the HAZMAT incidents in Hancock County as reported by PHMSA. Detailed information on these events is presented in Table B.61.

TABLE B.60: SUMMARY OF HAZMAT INCIDENTS IN HANCOCK COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2016)	Annualized Property Losses
Bay St. Louis	6	0/0	$101,364	$2,599
Diamondhead	2	0/0	$57	$2
Waveland	6	0/1	$131,053	$4,680
Unincorporated Area	11	0/3	$42,283	$1,031
HANCOCK COUNTY TOTAL	25	0/4	$274,757	$8,313

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE B.61: HAZMAT INCIDENTS IN HANCOCK COUNTY

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
Bay St. Louis							
I-1977120573	11/30/1977	BAY ST LOUIS	Highway	Yes	0/0	$0	4,800 LGA
I-1978110459	10/30/1978	BAY ST LOUIS	Rail	No	0/0	$0	10 LGA
X-2008020013	1/22/2008	BAY ST LOUIS	Highway	No	0/0	$0	0.046875 LGA
X-2008020011	1/22/2008	BAY ST LOUIS	Highway	No	0/0	$0	0.046875 LGA
Diamondhead							
E-2008020320	1/31/2008	BAY SAINT LOUIS	Highway	Yes	0/0	$96,206	896 LGA
E-2012070481	6/26/2012	BAY SAINT LOUIS	Highway	No	0/0	$5,158	3 LGA
Waveland							
I-1988050379	4/13/1988	WAVELAND	Highway	No	0/0	$0	2
I-1994080853	7/21/1994	WAVELAND	Highway	No	0/0	$5,545	12
I-1995020660	12/25/1994	WAVELAND	Highway	No	0/0	$121,889	
I-2003050247	10/6/2002	WAVELAND	Rail	Yes	0/0	$0	
I-2007030565	5/6/2006	WAVELAND	Highway	No	0/0	$0	20
E-2013050227	5/8/2013	WAVELAND	Highway	No	0/1	$3,619	2

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
Unincorporated Area							
I-1975020425	1/13/1975	ANSLEY	Rail	No	0/3	$0	0
I-1977020157	1/26/1977	KILN	Highway	No	0/0	$0	8 SLB
I-1991100100	9/15/1991	HANCOCK	Highway	No	0/0	$0	0
I-1996031040	1/17/1996	PEARLINGTON	Highway	No	0/0	$154	1.5 LGA
I-1998090553	8/10/1998	LAKESHORE	Highway	No	0/0	$0	0
I-1999070283	6/21/1999	PEARLINGTON	Highway	No	0/0	$7,445	0
I-2001060933	5/31/2001	PEARLINGTON	Highway	No	0/0	$25,335	100 LGA
I-2008010207	1/7/2008	PEARLINGTON	Rail	No	0/0	$0	10 LGA
X-2008100105	9/25/2008	PEARLINGTON	Highway	Yes	0/0	$0	0.015625 LGA
I-2015110501	9/29/2015	KILN	Highway	No	0/0	$4,674	50 LGA
I-2016010044	9/29/2015	KILN	Highway	No	0/0	$4,674	50 LGA

* all damage may not have been reported.
Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

PROBABILITY OF FUTURE OCCURRENCES

Given the location of five toxic release inventory sites in Hancock County and prior roadway and railway incidents, it is highly likely (100 percent annual probability) that a hazardous material incident may occur in the county. County and city officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

The FEMA NRI does not assess HAZMAT Release Events

INFECTIOUS DISEASE

LOCATION AND SPATIAL EXTENT

Due to the nature of a public health/emerging disease threat, it is difficult to identify a precise location where this type of event would occur. Moreover, a large-scale event would have impacts that spread throughout the county. Therefore, all areas in Hancock County are considered equally susceptible to infectious diseases.

HISTORICAL OCCURRENCES

Mosquito-borne illness in Mississippi include West Nile virus, Chikungunya virus, and Zika virus. These illnesses affect birds, animals, and humans, causing flu-like symptoms in people who are bitten by infected mosquitoes. Occasionally illness can be severe, leading to meningitis or encephalitis. According to the Mississippi State Department of Health (MSDH), there have been no reported cases of mosquito-borne illnesses in Hancock County as of November 2016. Table B.62 summarizes the mosquito-borne illnesses in humans reported in the county.

TABLE B.62: SUMMARY OF MOSQUITO-BORNE ILLNESSES IN HANCOCK COUNTY

Location	West Nile Virus	Chikungunya	Zika	Other*	Deaths
Hancock County	0	0	0	0	0

*Other mosquito-borne illnesses include La Crosse encephalitis, St. Louis encephalitis, and Eastern Equine encephalitis.
Source: Mississippi State Department of Health

Diseases like influenza and norovirus are regularly occurring health issues in Hancock County. These conditions are not legally reportable to county or state public health agencies, so data on disease incidence is not readily available. MSDH relies upon selected sentinel health practitioners across the state to report the percentage and total patient visits consistent with an influenza-like illness (ILI): fever of 100°F or higher and cough or sore throat. Reports are used to estimate the state's ILI rate and the magnitude of state's influenza activity on a weekly basis. Reports represent only the distribution of flu in the state, not an actual count of all flu cases statewide.

PROBABILITY OF FUTURE OCCURRENCES

Due to some recent incidents that have been recorded across the State of Mississippi and in counties neighboring Hancock County, future occurrences are considered possible (between 1 and 10 percent annual probability).

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

The FEMA NRI does not assess Infectious Diseases

Conclusions On Hazard Risk

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

HAZARD EXTENT

Table B.63 describes the extent of each hazard identified for Hancock County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE B.63: EXTENT OF HANCOCK COUNTY HAZARDS

Flood-related Hazards	
Dam and Levee Failure	Dam failure extent is defined using the Mississippi Division of Environmental Quality classifications which include Low, Significant, and High. One dam is classified as high-hazard in Hancock County.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. Some areas of the barrier islands are eroding at 6 to 8 meters per year near Hancock County according to the USGS Coastal and Marine Geology Program's U.S. Gulf of Mexico Interactive Map.
Flood	Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest flood recorded for the county was at Jourdan River at

Kiln. The maximum historic crest was recorded at 19.97 feet, or 9.97 feet above the major flood stage (reported on August 29, 2005). Additional historic crest heights and the corresponding flood categories are in the table below.

Location/ Jurisdiction	Date	Maximum Historic Crest (ft)	Flood categories			
			Action Stage (ft)	Flood Stage (ft)	Moderate Flood Stage (ft)	Major Flood Stage (ft)
Hancock County						
JOURDAN RIVER AT KILN	8/29/2005	19.97	5	6	8	10

Storm Surge	Storm surge can be defined by the depth of inundation which is defined by the category of hurricane/tropical storm. Since Hancock County could easily be impacted by a Category 3 storm, depth of inundation could be at least 9 feet in many areas.
Fire-related Hazards	
Drought	Drought extent is defined by the U.S. Drought Monitor classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought. According to the U.S. Drought Monitor classifications, the most severe drought condition is Exceptional. Hancock County has received this ranking twice over the 17-year reporting period.
Lightning	According to the Vaisala's flash density map, Hancock County is located in an area that experiences 4 to 12 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Wildfire	Wildfire data was provided by the Mississippi Forestry Commission and is reported annually by county from 2007-2022. The greatest number of fires to occur in Hancock County in any year 181 in 2009. The greatest number of acres to burn in the county in a single year occurred in 2011 when 3,921 acres were burned. Information on specific occurrences of wildfire and the most severe fires in each jurisdiction is not available. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale, the Modified Mercalli Intensity (MMI) scale, and the distance of the epicenter from Hancock County. According to data provided by the National Centers for Environmental Information, the greatest earthquake to impact the county had an MMI of IV (moderate) and a correlating Richter Scale magnitude estimated at less than 4.8 (reported on September 9, 1975). The epicenter of this earthquake was located 57.0 km away.
Wind-related Hazards	

Extreme Cold	The extent of extreme cold can be defined by the minimum temperature reached. Official long term temperature records are not kept for any areas in Hancock County. However, the temperature has previously ranged from 15 to 20 degrees Fahrenheit in southwest and coastal Mississippi (reported on December 18, 1996).
Extreme Heat	The extent of extreme heat can be measured by the record high temperature recorded. Official long term temperature records are not kept for any areas in Hancock County. However, the highest recorded temperature in Beaumont (northeast of the county) was 105°F and heat index values were recorded as high as 115°F (reported in July 2000).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Hancock County was 1.75 inches (last reported on May 25, 2010). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5. The greatest classification of hurricane to traverse directly through Hancock County was Hurricane Camille, a Category 3 storm which carried tropical force winds of 100 knots upon arrival in the county.
Severe Thunderstorm/High Wind	Thunderstorm extent is defined by wind speeds reported. The strongest recorded wind event in Hancock County was 61 knots (last reported on February 18, 2012). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by the Fujita/Enhanced Fujita. The greatest magnitude reported in Hancock County was an F3 (reported on May 19, 1980).
Winter Weather	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest snowfall reported in Hancock County was 1-2 inches (reported on December 18, 1996).
Other Hazards	
Climate Change/Sea Level Rise	It is still uncertain what the extent of climate change will be in the future. However, increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, stronger storms (wind, hurricanes) can be expected. Sea level rise is defined by the areas impacted, but is more often associated with the amount of sea level rise that is expected to take place. Although it is difficult to predict an exact amount of rise, the Climate Change Surging Seas Report intermediate high sea level rise scenario projects 1 foot of rise locally by 2050 and 3.7 feet by 2100.
Hazardous Materials Incident/Train Derailment	According to USDOT PHMSA, the largest hazardous materials incident reported in Hancock County was 4,800 LGA released on the highway (reported on November 30, 1977). It should be noted that larger events are possible.
Infectious Disease	An infectious disease threat could have large-scale effects throughout the county and may cause illness in many people. Possible impacts from a disease threat depend largely on the impacted population, but might include anything from absenteeism and loss of productivity in the workplace to death or serious illness to humans or livestock. A serious disease threat could affect many thousands of people.

In order to draw some meaningful planning conclusions on hazard risk for Hancock County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). More information on the PRI and how it was calculated can be found in Section 5.21.2.

Table B.64 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this subsection, as well as input from the Regional Hazard Mitigation Council. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE B.64: SUMMARY OF PRI RESULTS FOR HANCOCK COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Flood-related Hazards						
Dam and Levee Failure	Possible	Critical	Small	Less than 6 hours	Less than 6 hours	2.4
Erosion	Likely	Limited	Small	More than 24 hours	More than 1 week	2.4
Flood	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 24 hours	3.2
Storm Surge	Highly Likely	Critical	Moderate	More than 24 hours	Less than 24 hours	3.0
Fire-related Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Lightning	Highly Likely	Limited	Negligible	6 to 12 hours	Less than 6 hours	2.4
Wildfire	Highly Likely	Minor	Small	Less than 6 hours	Less than 1 week	2.6
Geologic Hazards						
Earthquake	Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	2.0
Wind-related Hazards						
Extreme Cold	Possible	Minor	Large	More than 24 hours	Less than 1 week	2.1
Extreme Heat	Highly Likely	Minor	Large	More than 24 hours	More than 1 week	2.8
Hailstorm	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	2.8
Hurricane and Tropical Storm	Highly Likely	Critical	Large	More than 24 hours	Less than 24 hours	3.2
Severe Thunderstorm/ High Wind	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	3.1
Tornado	Highly Likely	Critical	Small	Less than 6 hours	Less than 6 hours	3.0
Winter Weather	Likely	Minor	Moderate	More than 24 hours	Less than 24 hours	2.1
Other Hazards						
Climate Change/Sea Level Rise	Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Hazardous Materials Incident/ Train Derailment	Highly Likely	Limited	Small	Less than 6 hours	Less than 24 hours	2.8
Infectious Disease	Possible	Limited	Large	More than 24 hours	More than 1 week	2.5

Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Hancock County, including the PRI results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (Table B.65). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Hancock County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: Vulnerability Assessment and below in Section B.3. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

Some priorities have changed since the previous plans were adopted due to the merging of multiple local plans to form this regional plan; however, most priorities remain the same.

TABLE B.65: CONCLUSIONS ON HAZARD RISK FOR HANCOCK COUNTY

HIGH RISK	Hurricane and Tropical Storm Flood Severe Thunderstorm/High Wind Storm Surge Tornado
MODERATE RISK	Hailstorm Hazardous Materials Incident/Train Derailment Extreme Heat Wildfire Drought Climate Change/Sea Level Rise Infectious Disease
LOW RISK	Lightning Dam and Levee Failure Erosion Winter Weather Extreme Cold Earthquake

HANCOCK COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Hancock County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: Vulnerability Assessment.

ASSET INVENTORY

Table B.66 lists the estimated number of buildings, parcels, and the total value of improvements for Hancock County and its participating jurisdictions (study area of vulnerability assessment). Because digital parcel data was not available for every community, data obtained from Hazus-MH 3.2 inventory was utilized to supplement the analysis where gaps existed.

TABLE B.66: IMPROVED PROPERTY IN HANCOCK COUNTY

Location	Counts of Buildings	Counts of Parcels	Total Value of Improvements
Bay St. Louis	5,699	5,313	$128,600,369
Diamondhead	4,682	7,368	$389,782,736
Waveland	4,707	5,443	$94,730,326

Unincorporated Area	41,573	34,178	$378,637,604
HANCOCK COUNTY TOTAL	41,036	52,302	$991,751,035

Source: MDEQ, Hazus-MH 3.2

Table B.67 lists the critical facilities located in Hancock County by type according to data provided by local government officials.

In addition, Figure B.30 shows the locations of critical facilities in Hancock County. Table B.84, at the end of this subsection, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. Further, it should be noted that the table below may show that some communities do not have any critical facilities of in certain type, when in reality, that particular type of facility may actually be located within the community. This may occur because spatial data for that facility type was not available or because the facility may have been classified under a different category type for that particular community.

TABLE B.67: CRITICAL FACILITY INVENTORY IN HANCOCK COUNTY

Location	Communications	EOC	Fire Stations	Medical	Police Station	Power/ Gas	Private/Non-Profit
Bay St. Louis	2	0	2	0	1	1	0
Diamondhead	0	0	1	0	1	0	0
Waveland	0	0	2	0	2	0	1
Unincorporated Area	2	1	3	3	2	2	2
HANCOCK COUNTY TOTAL	4	1	8	3	6	3	3

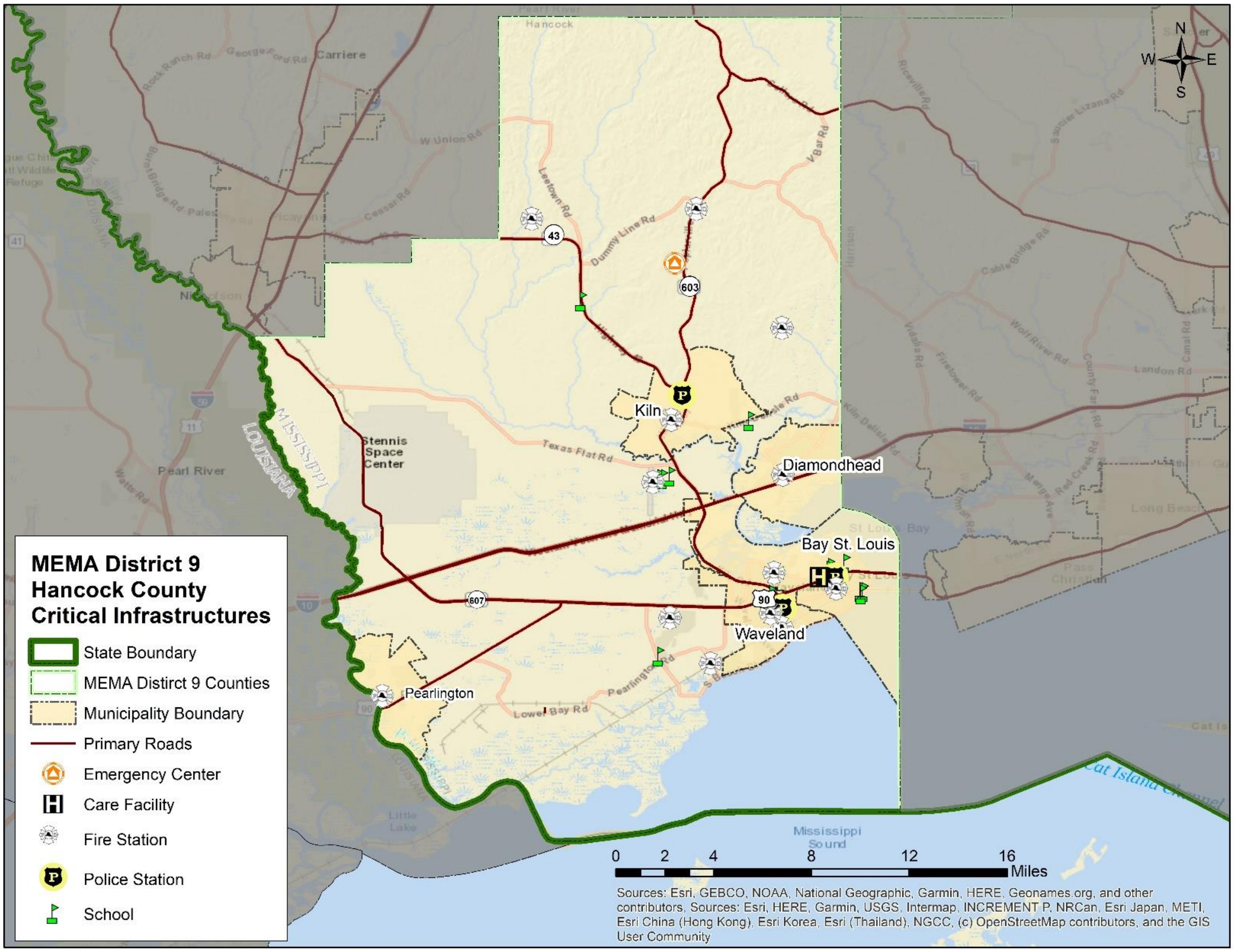
Source: Local Governments

TABLE B.68: CRITICAL FACILITY INVENTORY IN HANCOCK COUNTY (CONT.)

Location	Public Facility	School	Shelter	Special Populations	Transportation	Water/ Wastewater
Bay St. Louis	3	3	0	1	1	4
Diamondhead	3	0	0	0	0	0
Waveland	6	0	0	0	0	5
Unincorporated Area	10	15	1	7	11	7
HANCOCK COUNTY TOTAL	22	18	1	8	12	16

Source: Local Governments

Figure B.30: Critical Infrastructures



Source: Local Governments

Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Hancock County that are potentially at risk to these hazards.

Table B.69 lists the population by jurisdiction according to American Community Survey 2015 population estimates. The total population in Hancock County according to Census data is 45,627 persons. Additional population estimates are presented above in Section B.1.

TABLE B.69: TOTAL POPULATION IN HANCOCK COUNTY

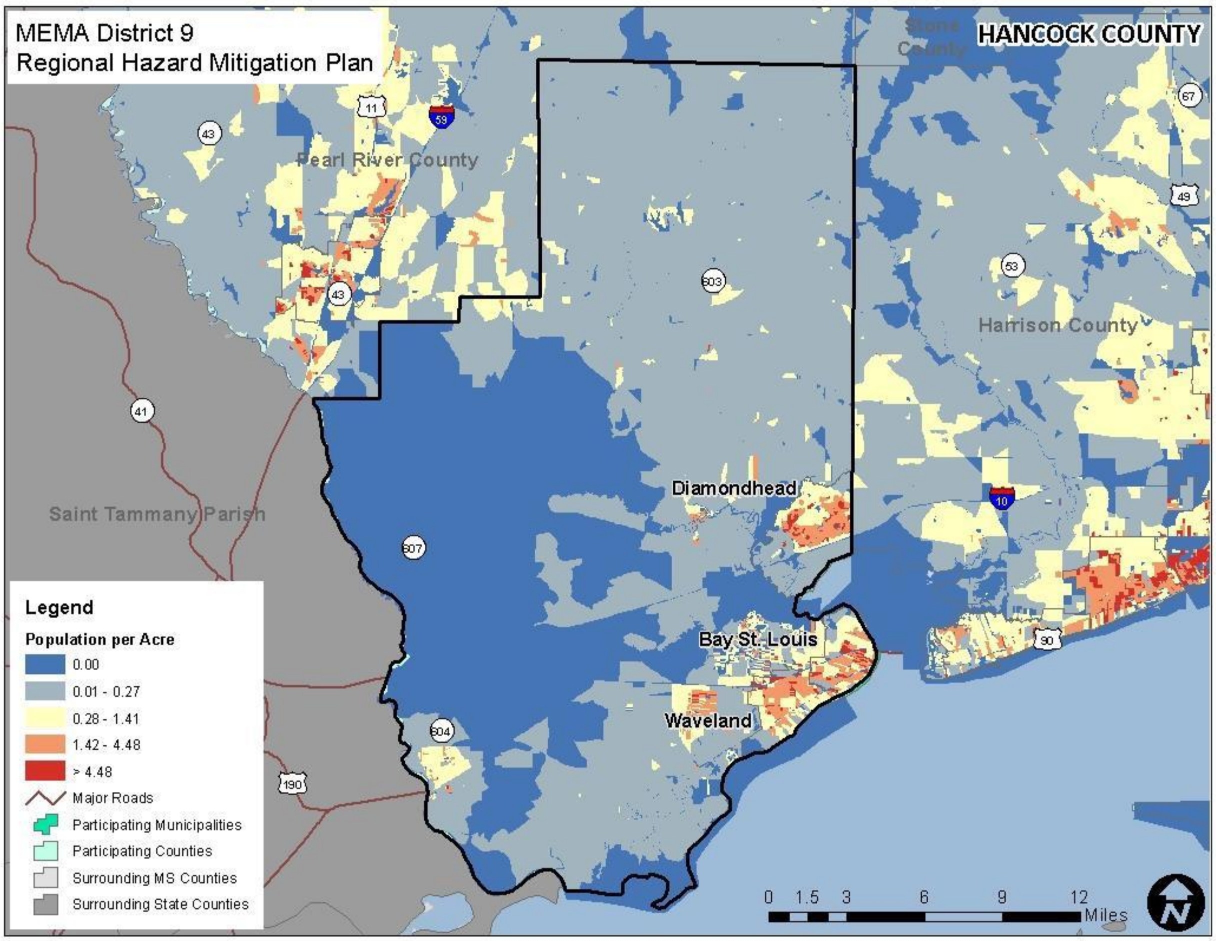
Location	Total 2015 Population
Bay St. Louis	10,861
Diamondhead	8,246
Waveland	6,449

Location	Total 2015 Population
Unincorporated Area	20,071
HANCOCK COUNTY TOTAL	45,627

Source: United States Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

In addition, Figure B.31 illustrates the population density per acre by census block as it was reported by the U.S. Census Bureau in 2010. As can be seen in the figure, the population is spread out through most of the county, with heavy concentrations in Bay St. Louis, Diamondhead, and Waveland.

FIGURE B.31: POPULATION DENSITY IN HANCOCK COUNTY



Source: United States Census Bureau, 2010 Census

<u>DEVELOPMENT TRENDS AND CHANGES IN VULNERABILITY</u>

Since the previous local-level hazard mitigation plans were approved, Hancock County has experienced moderate growth and development. Table B.70 shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

TABLE B.70: BUILDING COUNTS FOR HANCOCK COUNTY

Location	2010	2011	2012	2013	2014	2015	% Building Stock Built Post-2010
Bay St. Louis	5,171	5,511	5,860	5,741	5,868	6,373	23.2%
Diamondhead*	--	--	--	4,330	4,113	4,104	-5.2%
Waveland	3,349	3,311	3,195	3,270	3,306	3,007	-10.2%
Unincorporated Area	15,172	15,055	15,013	10,794	10,995	10,939	-27.9%
HANCOCK COUNTY TOTAL	19,756	20,869	21,639	22,237	22,787	23,196	3.1%

*Diamondhead officially incorporated into a city in 2012, so the city's first housing estimate was not available until 2013. Percent change in population is calculated from 2013 to 2015.
Source: United States Census Bureau, American Community Survey

Table B.71 shows population growth estimates for the county from 2010 to 2015 based on the based on the American Community Survey's annual population estimates.

TABLE B.71: POPULATION GROWTH FOR HANCOCK COUNTY

Location	Population Estimates						% Change 2010-2015
	2010	2011	2012	2013	2014	2015	
Bay St. Louis	9,349	9,385	9,614	9,899	10,313	10,861	16.2%
Diamondhead*	--	--	--	8,777	8,275	8,246	-6.0%
Waveland	6,490	6,504	6,492	6,487	6,463	6,449	-0.6%
Unincorporated Area	26,569	27,433	27,938	19,434	20,085	20,071	-24.5%
HANCOCK COUNTY TOTAL	42,408	43,322	44,044	44,597	45,136	45,627	7.6%

*Diamondhead officially incorporated into a city in 2012, so the city's first population estimate was not available until 2013. Percent change in population is calculated from 2013 to 2015.
Source: United States Census Bureau, American Community Survey

Based on the data above, there has been a moderate rate of residential development and population growth in the county since 2010, and the City of Bay St. Louis has experienced a significant increase in population and housing development, resulting in an increased number of structures and people that are vulnerable to the potential impacts of the identified hazards. However, the cities of Diamondhead and Waveland as well as the unincorporated area have all experienced a decline in both population and housing development since 2010 according to estimates. Therefore, development and population growth have impacted the county's vulnerability since the previous local hazard mitigation plans were approved and there has been an increase in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains or other identified areas of high risk.

VULNERABILITY ASSESSMENT RESULTS

As noted in Section 6: Vulnerability Assessment, only hazards with a specific geographic boundary, available modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Hancock County, are presented here. All other hazards are assumed to impact the entire planning region (e.g., drought) or, due to lack of data, analysis would not lead to credible results (e.g., infectious disease). The total county exposure, and thus risk to these hazards, was presented in Table B.65.

The hazards to be further analyzed in this subsection include: flood, wildfire, earthquake, hurricane and tropical storm winds and storm surge, hazardous materials incident, dam and levee failure, and sea level rise.

The annualized loss estimate for all hazards is presented near the end of this subsection in Table B.51.

FLOOD

Historical evidence indicates that Hancock County is susceptible to flood events. A total of 29 flood events have been reported by the National Climatic Data Center resulting in around $1.1 million (2016 dollars) in property damage. On an annualized level, these damages amounted to $63,260 for Hancock County.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with improved property records for Hancock County. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified floodplain.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table B.72 shows the results of the analysis.

TABLE B.72: ESTIMATED EXPOSURE OF PROPERTY TO THE FLOOD HAZARD

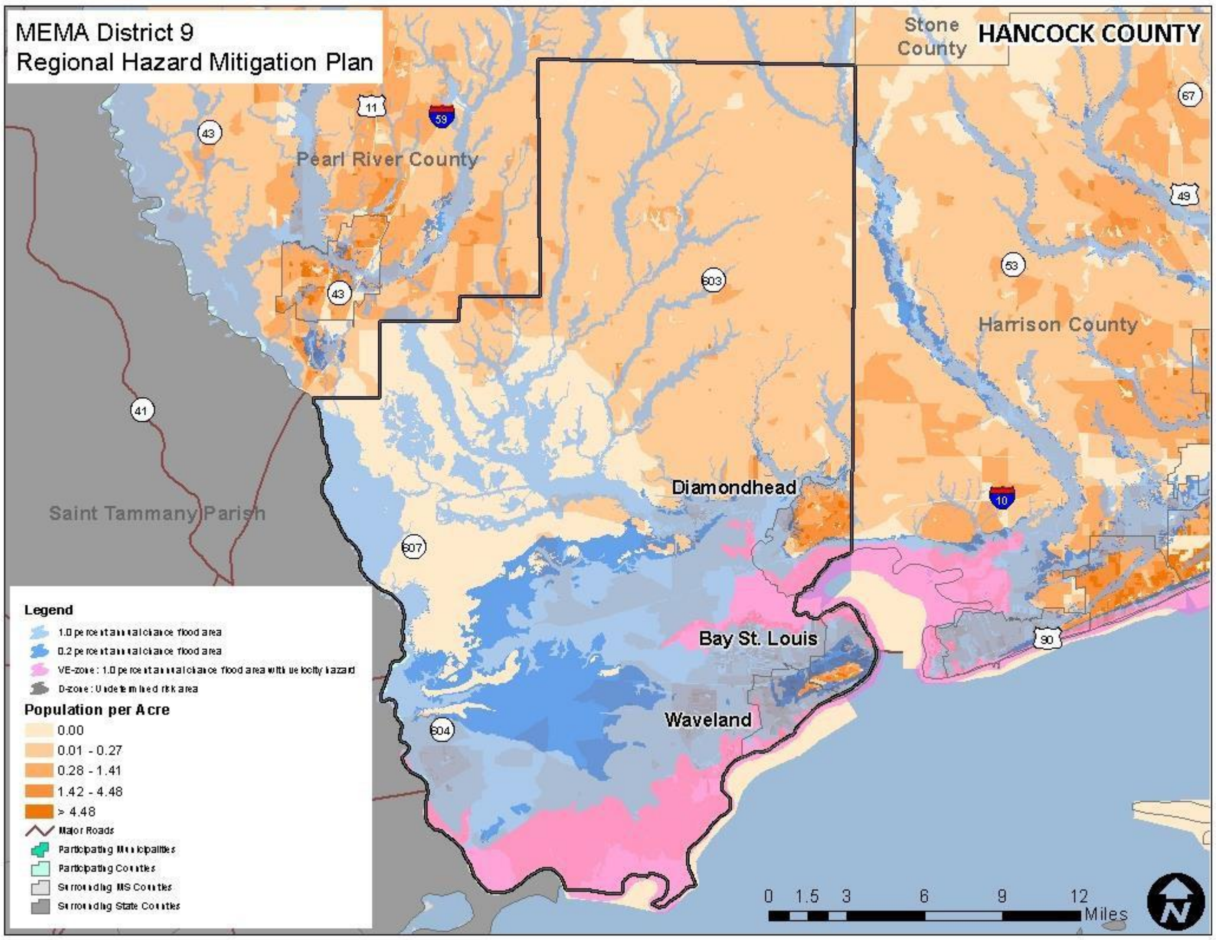
Location	1.0-percent ACF		0.2-percent ACF		VE Zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Bay St. Louis	1,047	$30,854,870	3,527	$77,458,001	123	$2,438,213
Diamondhead	676	$47,769,318	410	$36,591,925	39	$1,809,468
Waveland	2,698	$51,863,509	1,653	$38,060,990	200	$2,741,359
Unincorporated Area	10,878	$123,383,849	756	$10,743,305	798	$9,830,634
HANCOCK COUNTY TOTAL	15,299	$253,871,546	6,346	$162,854,221	1,160	$16,819,674

Source: Federal Emergency Management Agency DFIRM, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Figure B.32 is presented to gain a better understanding of at-risk population by evaluating census block level population data against mapped floodplains. There are areas of concern in most of the population centers in the county. Indeed, each of the incorporated municipalities is potentially at risk of being impacted by flooding in some areas of its jurisdiction. Therefore, there is significant population vulnerability to flooding.

FIGURE B.32 : POPULATION DENSITY NEAR FLOODPLAINS IN HANCOCK COUNTY



Source: Federal Emergency Management Agency DFIRM, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are 64 facilities located in one of the identified floodplain zones. (Please note, as previously indicated, this analysis does not consider building elevation, which may negate risk.) Of these facilities, 26 are located in the 1.0 percent annual chance flood zone, 35 are located in the 0.2 percent annual chance flood zone, and 3 are located in a VE-zone. A list of specific critical facilities and their associated risk can be found in Table B.84 at the end of this subsection.

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in Hancock County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. Such site-specific vulnerability determinations are outside the scope of this assessment but may be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

WILDFIRE

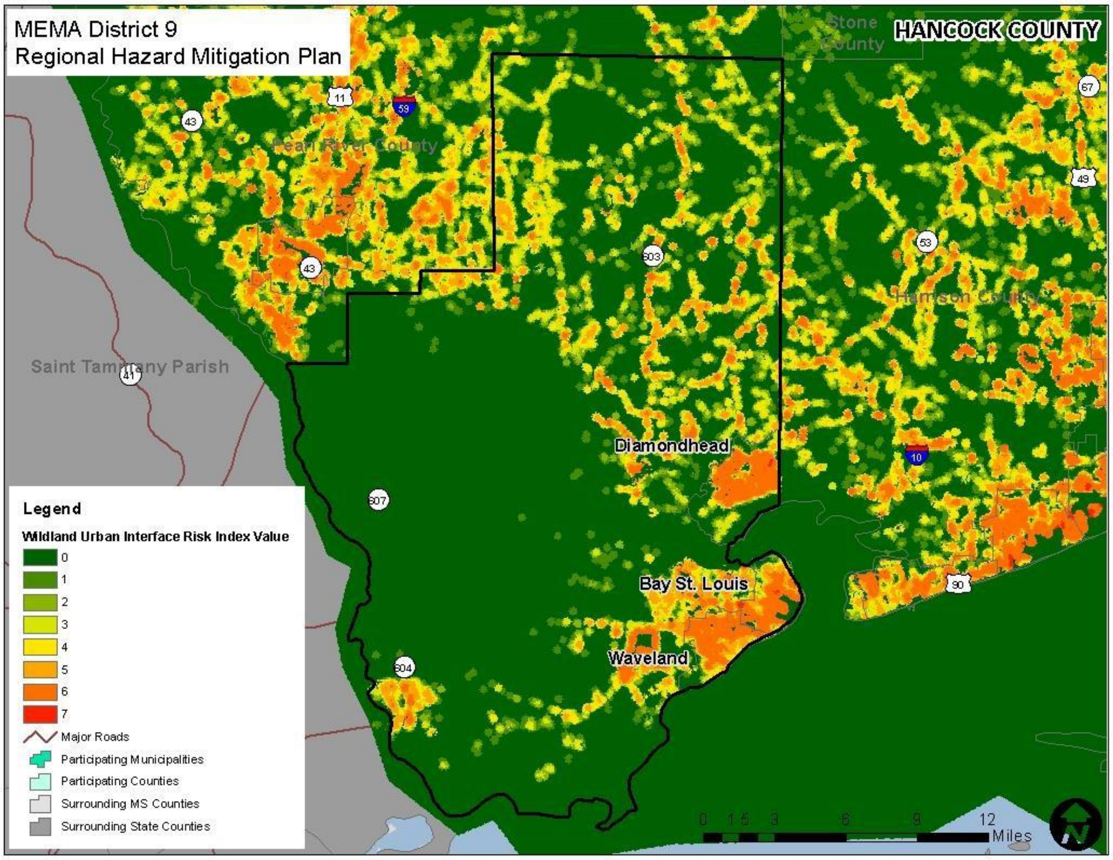
Although historical evidence indicates that Hancock County is susceptible to wildfire events, there are few reports which include information on historic dollar losses. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered relatively low, though it should be noted that a single event could result in significant damages throughout the county.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones. For the critical facility analysis, areas of concern were intersected with critical facility locations.

Figure B.33 shows the Wildland Urban Interface Risk Index (WUIRI) data, which is a data layer that shows a rating of the potential impact of a wildfire on people and their homes. The key input, Wildland Urban Interface (WUI), reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the WUI and rural areas is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, it was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to 7 with higher values being most severe (as noted previously, this is only a measure of relative risk). Figure B.34 shows the areas of analysis where any grid cell is less than 3. Areas with a value below 3 were chosen to be displayed as areas of risk because this showed the upper echelon of the scale and the areas at highest risk.

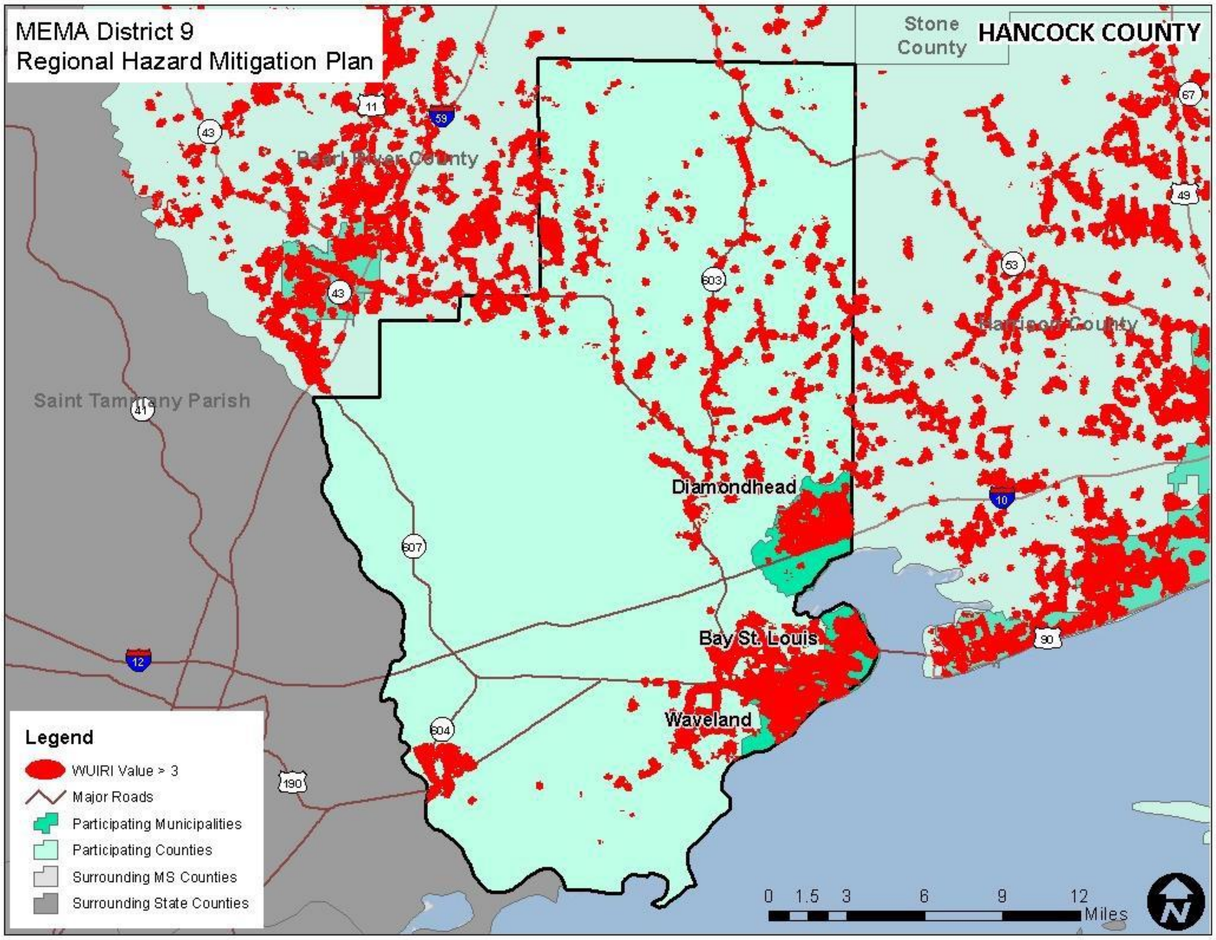
Table B.73 shows the results of the analysis.

FIGURE B.33: WUI RISK INDEX AREAS IN HANCOCK COUNTY



Source: Southern Wildfire Risk Assessment Data

FIGURE B.34: WILDFIRE RISK AREAS IN HANCOCK COUNTY



Source: Southern Wildfire Risk Assessment Data

TABLE B.73: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE RISK AREAS

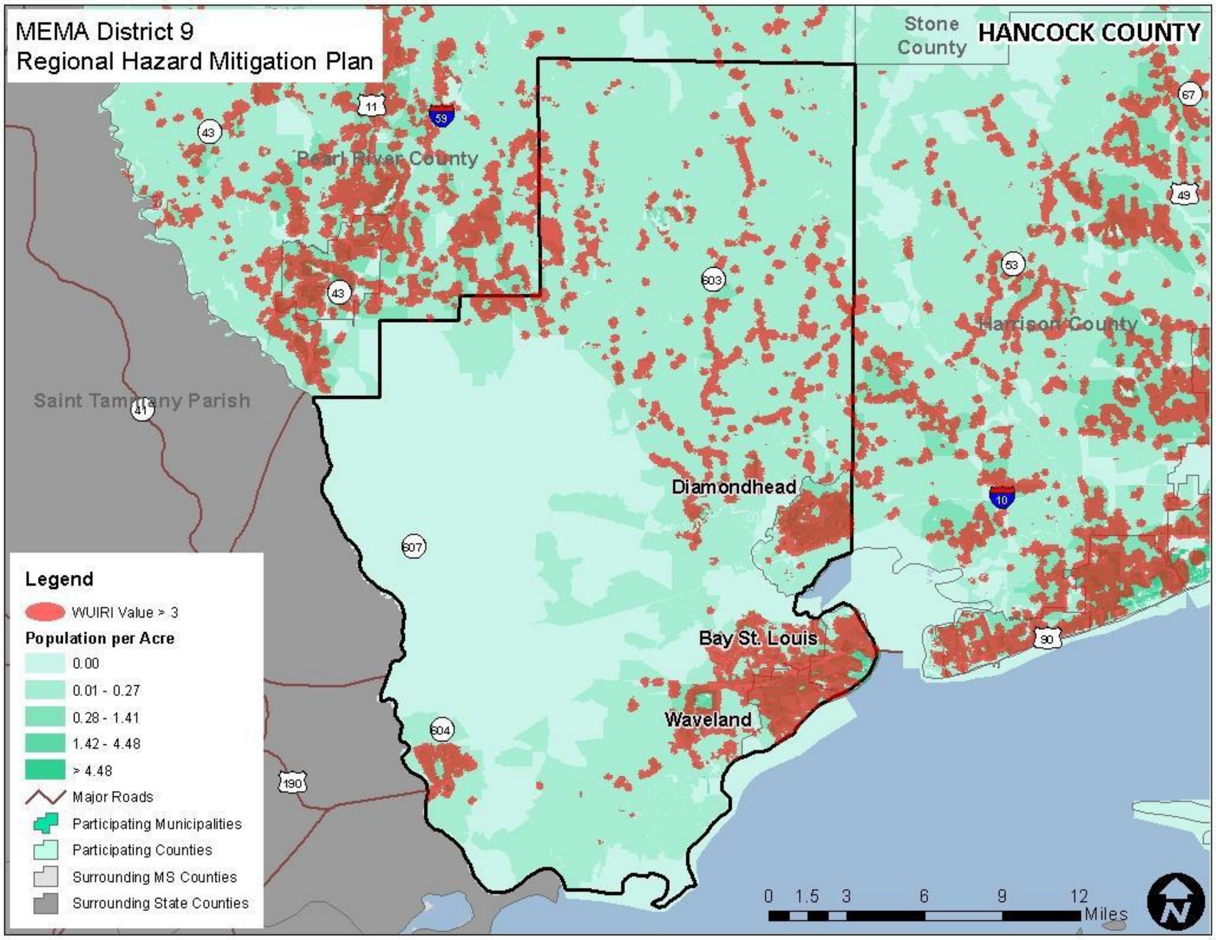
Location	Wildfire Risk	
	Approx. Number of Buildings	Approx. Improved Value
Bay St. Louis	4,266	$104,713,588
Diamondhead	4,438	$376,562,919
Waveland	4,601	$91,012,766
Unincorporated Area	15,770	$221,335,181
HANCOCK COUNTY TOTAL	29,075	$793,624,454

Source: SWRA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Given some level of susceptibility across the county, it is assumed that the total population is at risk to the wildfire hazard. Figure B.35 shows an overlay of the wildfire risk areas identified above with the population density by census block. This shows that many of the areas of high population concentration are susceptible to wildfire because of their proximity to the wildland urban interface.

FIGURE B.35: WILDFIRE RISK AREAS IN HANCOCK COUNTY



Source: Southern Wildfire Risk Assessment Data; United States Census

Critical Facilities

The critical facility analysis revealed that there are 63 critical facilities located in wildfire areas of concern, including 2 communications, 1 EOC, 8 fire stations, 3 medical, 4 police stations, 2 power/gas, 2 private/non-profits, 16 public facilities, 11 schools, 3 special populations, 2 transportation, and 9 water/wastewater. It should be noted, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in Table B.84 at the end of this subsection.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Hancock County.

EARTHQUAKE

As the Hazus-MH model suggests below, and historical occurrences confirm, any earthquake activity in the area is likely to inflict only minor to moderate damage to the county. Hazus-MH 3.2 estimates a total annualized loss of $15,000 which includes buildings, contents, and inventory throughout the county.

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the average annualized loss for the county. The results of the analysis are generated at the Census Tract level within Hazus-MH and then aggregated to the county level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to structure failure, building loss, contents damage, and inventory loss. They do not include losses to business interruption, lost income, or relocation. Table B.74 summarizes the findings with results rounded to the nearest thousand.

TABLE B.74: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Structural Damage	Non-Structural Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Hancock County	$4,000	$9,000	$2,000	$0	$15,000

Source: Hazus-MH 3.2

Social Vulnerability

It can be assumed that all existing and future populations are at risk to the earthquake hazard.

Critical Facilities

The Hazus-MH probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Hancock County. The Hazus-MH scenario indicates that minimal to moderate damage is expected from an earthquake occurrence. While Hancock County may not experience a large earthquake, localized damage is possible with an occurrence. A list of specific critical facilities and their associated risk can be found in Table B.84 at the end of this subsection.

HURRICANE AND TROPICAL STORM

Historical evidence indicates that Hancock County has very significant risk to the hurricane and tropical storm hazard. There have been 9 disaster declarations due to hurricanes or tropical storms (Hurricanes Frederic, Georges, Ivan, Dennis, Katrina, Gustav, and Isaac, as well as Tropical Storms Allison and Isidore). A large number tracks have come near or traversed through the county, as shown and discussed in Section B.2.12. Hazus-MH 3.2 estimates a total annualized loss of $19,423,000 which includes buildings, contents, and inventory throughout the county.

Hurricane Winds

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and storm surge and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore, only these two aspects of hurricane losses are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to hurricane and tropical storm wind hazard. Hazus-MH 3.2 was used to determine average annualized losses for the county as shown below in Table B.75. Only losses to buildings, inventory, and contents are included in the results.

TABLE B.75: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Hancock County	$13,931,000	$5,455,000	$37,000	$19,423,000

Source: Hazus-MH 3.2

Storm Surge

In addition, although it was treated as a separate hazard throughout this plan, storm surge is most often associated with hurricanes and tropical storms. Indeed, Hazus incorporates the storm surge model for estimating damage from storm surge as part of the hurricane model. The storm surge model can only be run as part of a historic hurricane model run and not as part of an annualized loss model. Unfortunately, in this model, storm surge impacts are calculated as part of the total damage from the historic event and thus could not be separated out and evaluated solely in terms of storm surge loss. As such, the estimated losses presented below are combined losses from hurricane winds and storm surge. The historic Hurricane Katrina model was utilized as this was certainly one of the most impactful storms in the region and therefore estimates the potential losses that are possible from a large hurricane event. Table B.76 presents the losses from this modeled event.

TABLE B.76: POTENTIAL LOSS ESTIMATIONS FOR LARGE HURRICANE EVENT

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Hancock County	$279,895,000	$95,284,000	$600,000	$375,779,000

Source: Hazus-MH 3.2

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population, both current and future, is at risk to the hurricane and tropical storm wind hazard. In terms of social vulnerability to storm surge, coastal populations are at much higher risk than inland populations. Since large concentrations of population are located along the coast of Hancock County, there is significant social vulnerability to storm surge in the county.

Critical Facilities

Given equal vulnerability across Hancock County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among factors. Determining individual building response to wind and storm surge is beyond the scope of this plan. However, this plan will consider mitigation action for especially vulnerable structures and/or critical facilities to mitigate against the effects of the hurricane hazard. A list of specific critical facilities can be found in Table B.84 at the end of this subsection.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Hancock County.

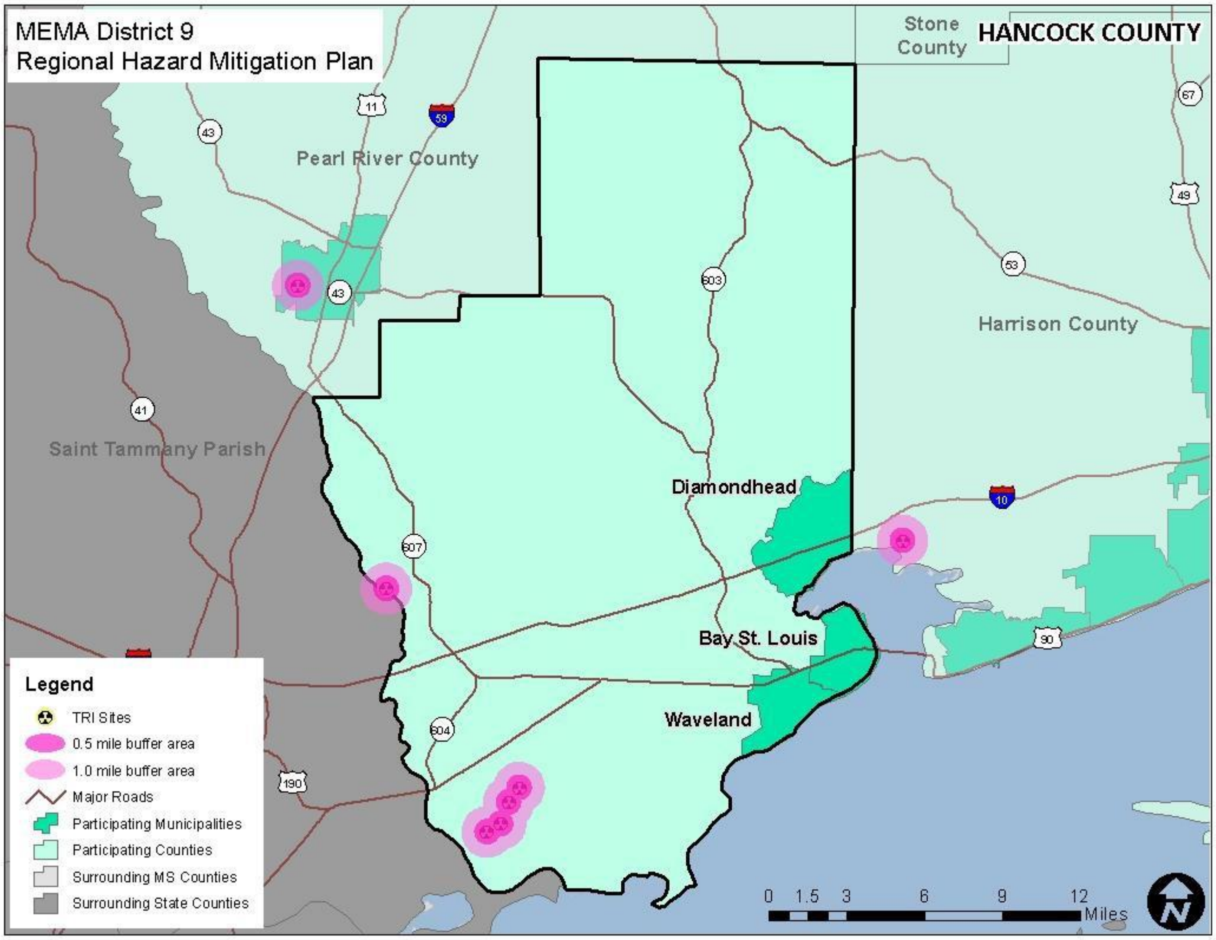
HAZARDOUS MATERIALS INCIDENT

Historical evidence indicates that Hancock County is susceptible to hazardous materials events. A total of 25 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration, resulting in $274,757 in property damage as well as 4 deaths. On an annualized level, these damages amount to $8,313 for the county.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities, and cause affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and building footprints/parcels where available and Census block data where footprints/parcels were not available. In both scenarios, two sizes of buffers—0.5-mile and 1.0-mile— were used. These areas are assumed to represent the different levels of effect: immediate (primary) and secondary. Primary and secondary impact zones were selected based on guidance from the PHMSA Emergency Response Guidebook. For the fixed site analysis, geo-referenced TRI sites in the region, along with buffers, were used for analysis as shown in Figure B.36. For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. Figure B.37 shows the areas used for mobile road toxic release buffer analysis and Figure B.38 shows the areas used for the mobile railroad toxic release buffer analysis. The results indicate the approximate number of improved properties and improved value, as shown in Table B.77 (fixed sites), Table B.78 (mobile roads), and Table B.79 (mobile railroad sites).

FIGURE B.36: TRI SITES WITH BUFFERS IN HANCOCK COUNTY



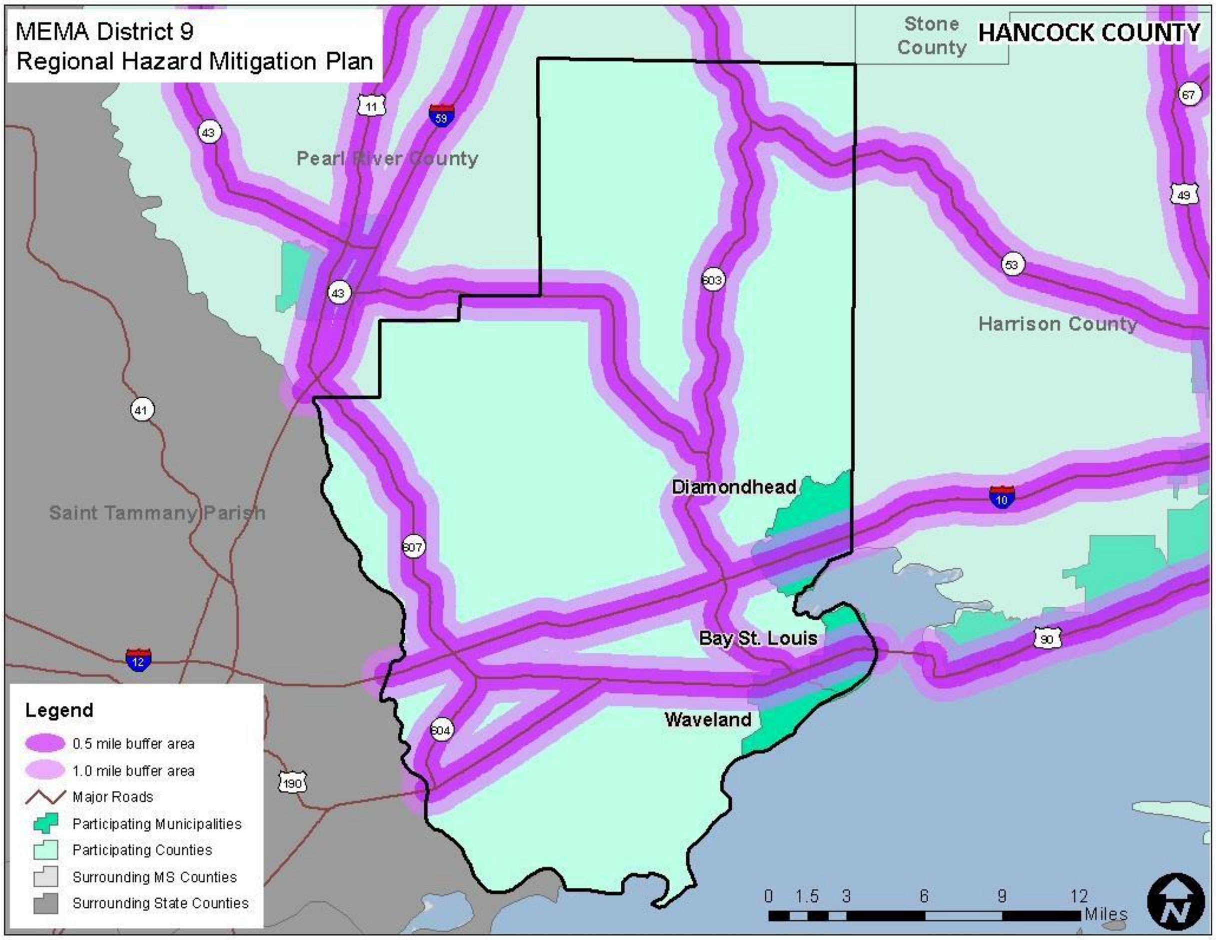
Source: Environmental Protection Agency

TABLE B.77: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Bay St. Louis	0	$0	0	$0
Diamondhead	0	$0	0	$0
Waveland	0	$0	0	$0
Unincorporated Area	209	$2,679,000	351	$21,265,000
HANCOCK COUNTY TOTAL†	209	$2,679,000	351	$21,265,000

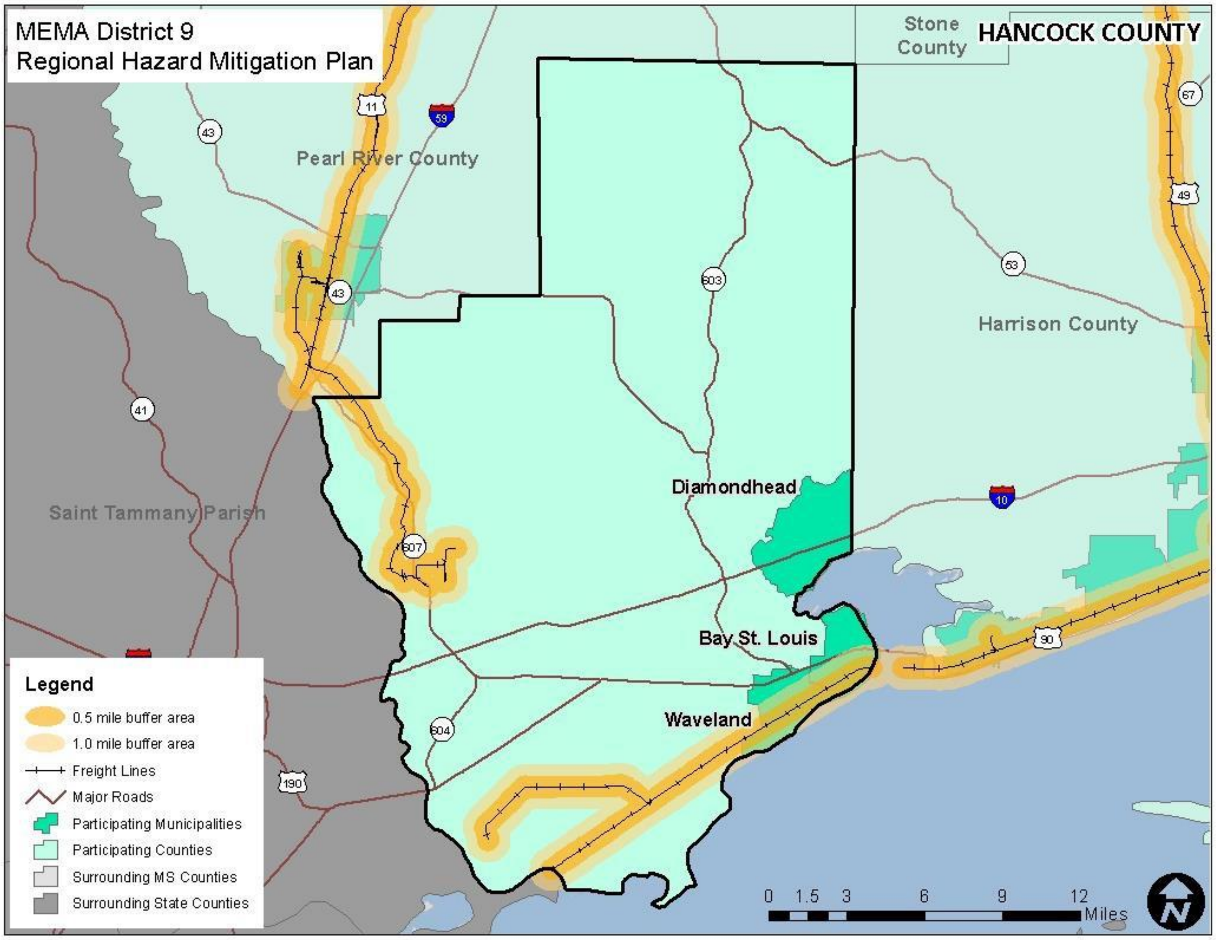
†A small area of the Hancock County parcel data does not contain dollar values. Upon examination of the data, these parcels do have structures located on them. As such, Census Block estimates for values were used in this case.
Source: EPA, MDEQ, Hazus MH 3.2 Data

FIGURE B.37: MOBILE (ROAD) HAZMAT BUFFERS IN HANCOCK COUNTY



Source: Federal Highway Administration National Highway Planning Network

FIGURE B.38: MOBILE (RAIL) HAZMAT BUFFERS IN HANCOCK COUNTY



Source: U.S. Department of Transportation Federal Railroad Administration

TABLE B.78: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Bay St. Louis	3,091	$73,331,871	5,153	$115,765,377
Diamondhead	1,144	$94,088,219	2,515	$232,470,277
Waveland	1,553	$26,881,381	2,902	$57,568,580
Unincorporated Area	9,117	$122,354,193	13,824	$188,187,741
HANCOCK COUNTY TOTAL	14,905	$316,655,664	24,394	$593,991,975

Source: NHPN, MDEQ, Hazus MH 3.2 Data

TABLE B.79: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Bay St. Louis	2,602	$50,395,193	4,125	$81,202,156
Diamondhead	0	$0	0	$0
Waveland	2,093	$41,357,755	3,346	$70,790,946
Unincorporated Area	1,084	$5,575,328	1,892	$14,002,776
HANCOCK COUNTY TOTAL	5,779	$97,328,276	9,363	$165,995,878

Source: USDOT FRA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are no facilities located in a fixed HAZMAT risk zone. A list of specific critical facilities and their associated risk can be found in Table B.52 at the end of this subsection.

Mobile Analysis:

The critical facility analysis for transportation corridors revealed that there are 63 facilities located in the primary and secondary road HAZMAT buffer areas. Of these, there were 45 critical facilities located in the primary risk zone including 1 communications, 1 EOC, 5 fire stations, 3 medical, 3 police stations, 2 power/gas, 1 private/non-profit, 9 public facilities, 10 schools, 4 special populations, 1 transportation, and
5 water/wastewater.

For the rail line buffer areas, there were a total of 40 critical facilities located in primary and secondary buffer areas. Of these, 21 facilities are located within the primary buffer area including 1 communications, 2 fire stations, 1 police station, 1 power/gas, 2 private/non-profit, 7 public facilities, 5 schools, and 2 water/wastewater.

A list of specific critical facilities and their associated risk can be found in Table B.84 at the end of this subsection.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Hancock County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in condition that could alter the impact area (i.e., direction and speed of wind, volume of release, etc.).

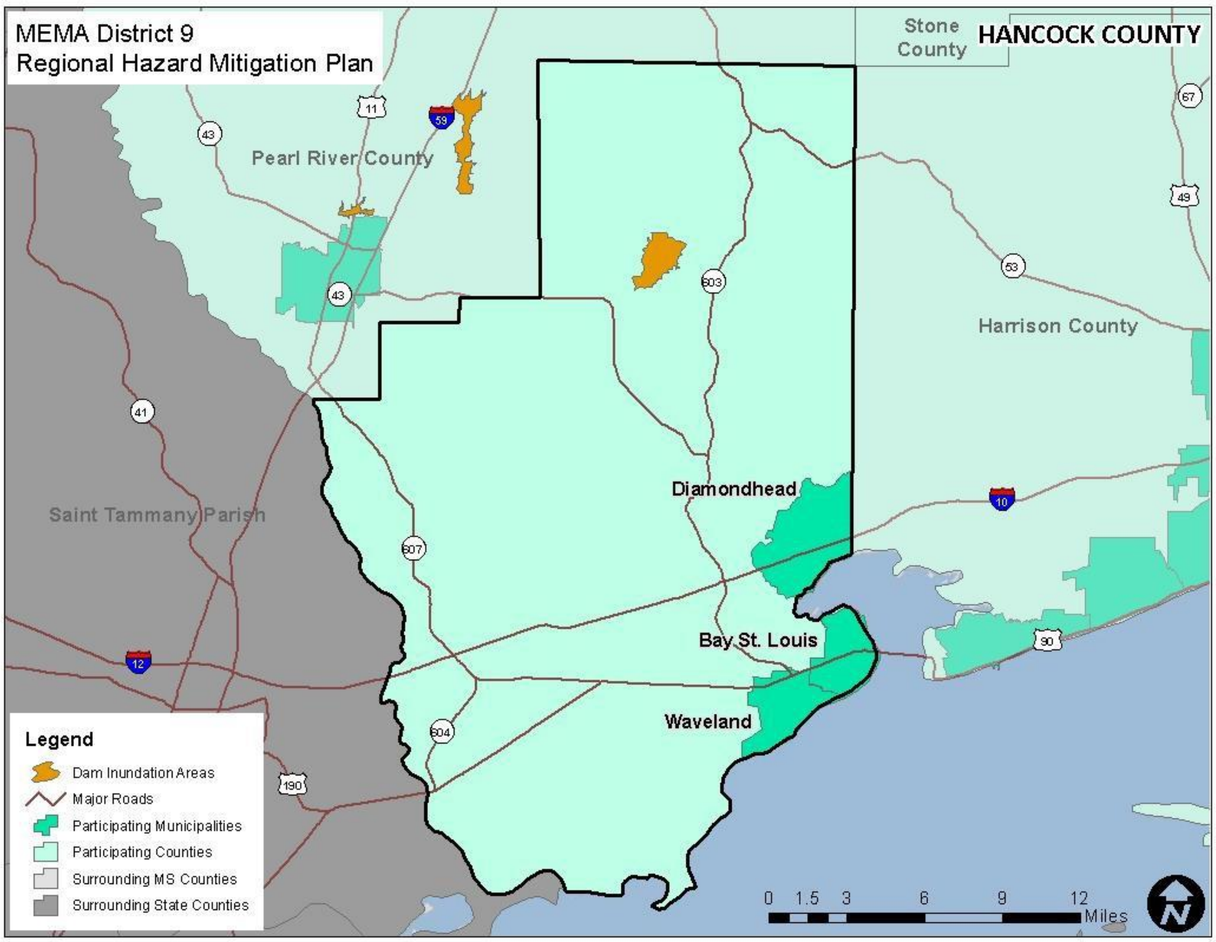
DAM/LEVEE FAILURE

In order to assess risk to a dam or levee failure, a GIS-based analysis was used to estimate exposure to one of the areas delineated by the Mississippi Department of Environmental Quality as a potential inundation area in the event of a failure. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified inundation area. As mentioned previously, this type of inundation mapping has not been completed for every dam/levee in the region, so the results of this analysis likely underestimate the overall vulnerability to a dam or levee failure. However, the analysis is still useful as a sort of baseline minimum of property that is potentially at-risk. The identified inundation areas can be found in Figure B.39.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table B.39 presents the potential at-risk property. Both the number of buildings and the approximate improved value are presented

FIGURE B.39: DAM INUNDATION AREAS IN HANCOCK COUNTY



Source: Mississippi Department of Environmental Quality

TABLE B.80: ESTIMATED EXPOSURE OF IMPROVEMENTS TO THE DAM/LEVEE FAILURE HAZARD

Location	Dam Inundation Area	
	Approx. Number of Buildings	Approx. Improved Value
Bay St. Louis	0	$0
Diamondhead	0	$0

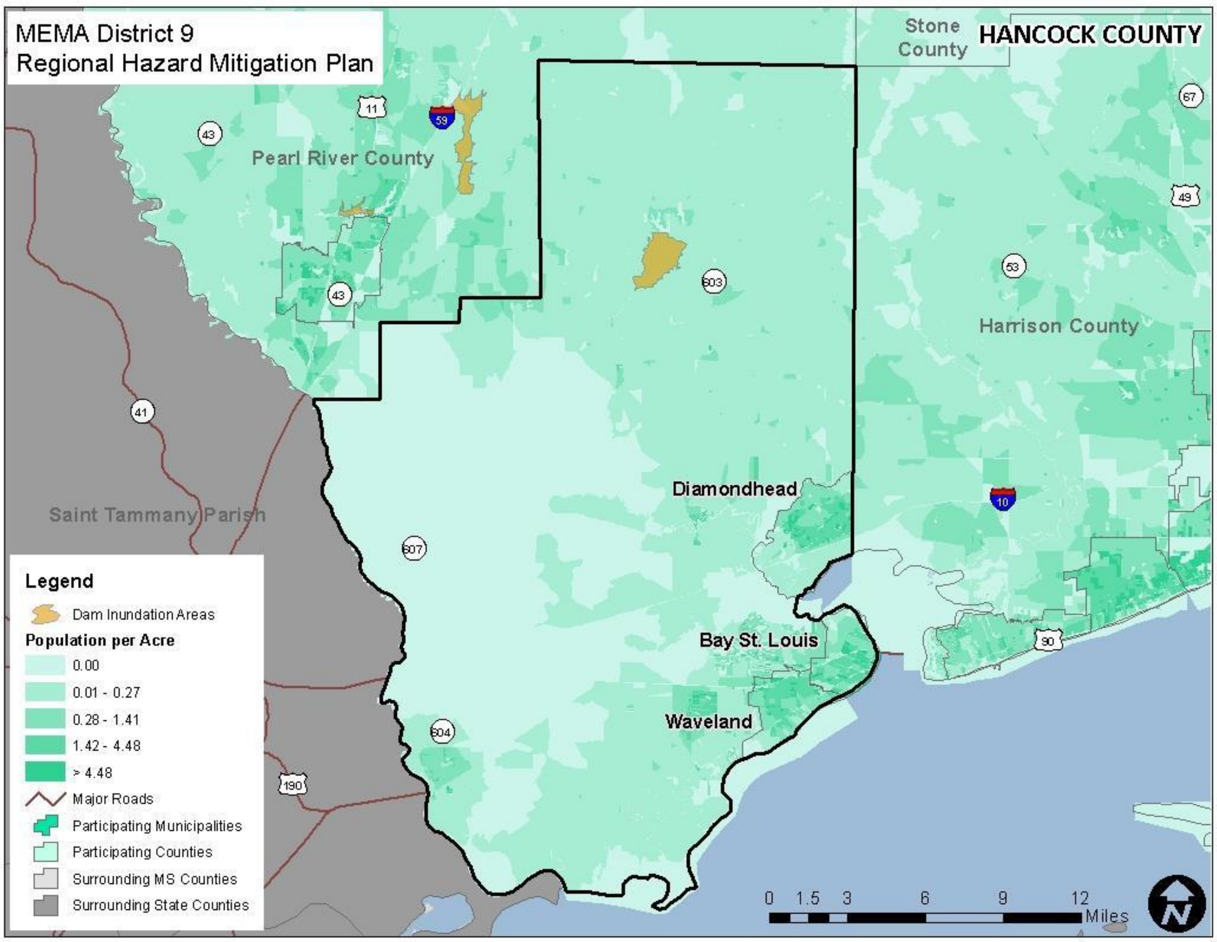
Waveland	0	$0
Unincorporated Area	92	$1,852,055
HANCOCK COUNTY TOTAL	92	$1,852,055

Source: MDEQ, Hazus 3.2

Social Vulnerability

Figure B.40 is presented to gain a better understanding of at-risk population by evaluating census block level population data against dam inundation areas. There is an area of concern in the northern part of the county, although it should be noted that most of the population of the county is not at risk to a dam/levee failure.

FIGURE B.40: POPULATION DENSITY NEAR DAM INUNDATION AREAS IN HANCOCK COUNTY



Source: MDEQ, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are no facilities located in dam inundation areas. A list of specific critical facilities and their associated risk can be found in Table B.84 at the end of this subsection.

In conclusion, a dam has the potential to impact a number of existing and future buildings, facilities, and populations in Hancock County, though this analysis is not all-encompassing in terms of risk to a dam or levee failure because inundation mapping is not available for all dams in the region.

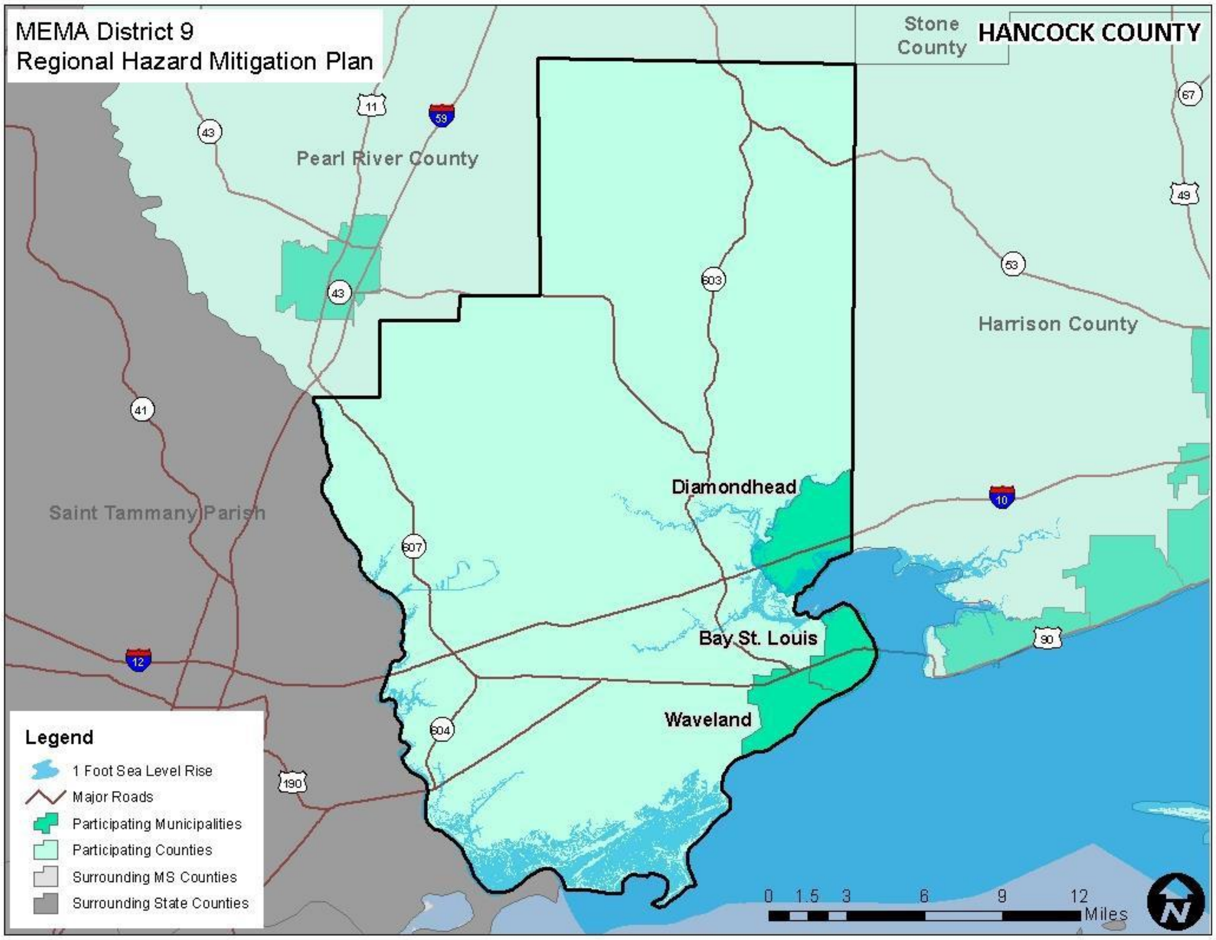
<u>CLIMATE CHANGE/SEA LEVEL RISE</u>

Most assessments carried out across the globe have concluded that climate change is a phenomenon that will impact our planet in the foreseeable future. Among others, the National Climate Assessment, International Panel on Climate Change, and National Oceanic and Atmospheric Administration all project that climate change will impact the United States and will have a major impact on coastal communities due to the effects of sea level rise. As such, projections concerning sea level rise are important to incorporate into planning efforts in order to identify people and property that may be impacted.

In order to assess sea level rise risk, a GIS-based analysis was used to estimate exposure to future projections of sea level rise using data produced by the National Oceanic and Atmospheric Administration in combination with improved property records for the county. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within the inundation zone that would be created in the event of 1 foot, 3 feet, and 6 feet of sea level rise. A number of different sea level rise scenarios were available via NOAA (from 1 foot to 6 feet, at 1 foot intervals), however these scenarios were selected to demonstrate a range of potential sea level rise scenarios from low to moderate to high projections. These scenarios can be found in Figure B.41, Figure B.42, and Figure B.43.

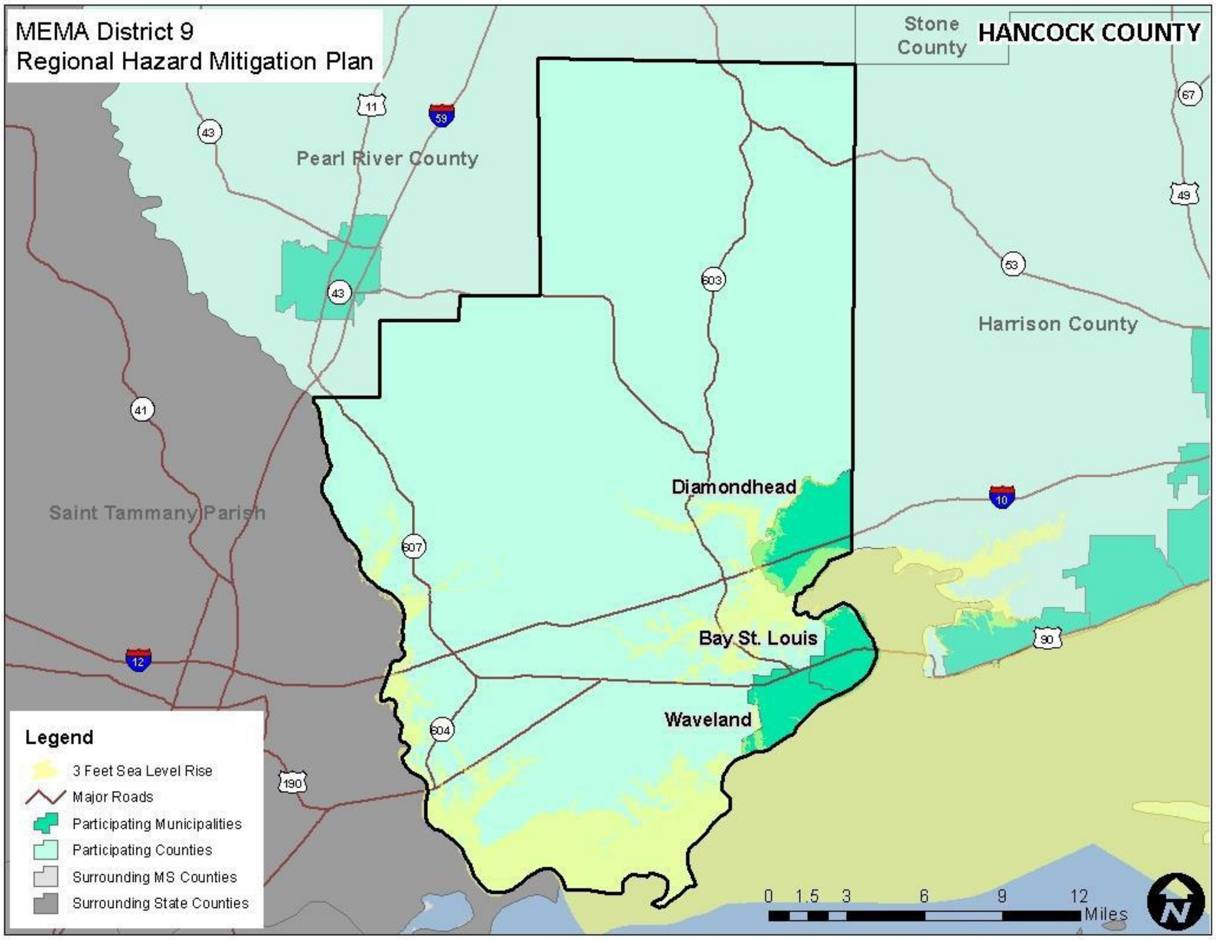
Table B.81 presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

FIGURE B.41: 1 FOOT SEA LEVEL RISE SCENARIO IN HANCOCK COUNTY


MEMA District 9
Regional Hazard Mitigation Plan
HANCOCK COUNTY
Stone County
Pearl River County
Harrison County
Saint Tammany Parish
Diamondhead
Bay St. Louis
Waveland
Legend
1 Foot Sea Level Rise
Major Roads
Participating Municipalities
Participating Counties
Surrounding MS Counties
Surrounding State Counties
0 1.5 3 6 9 12 Miles

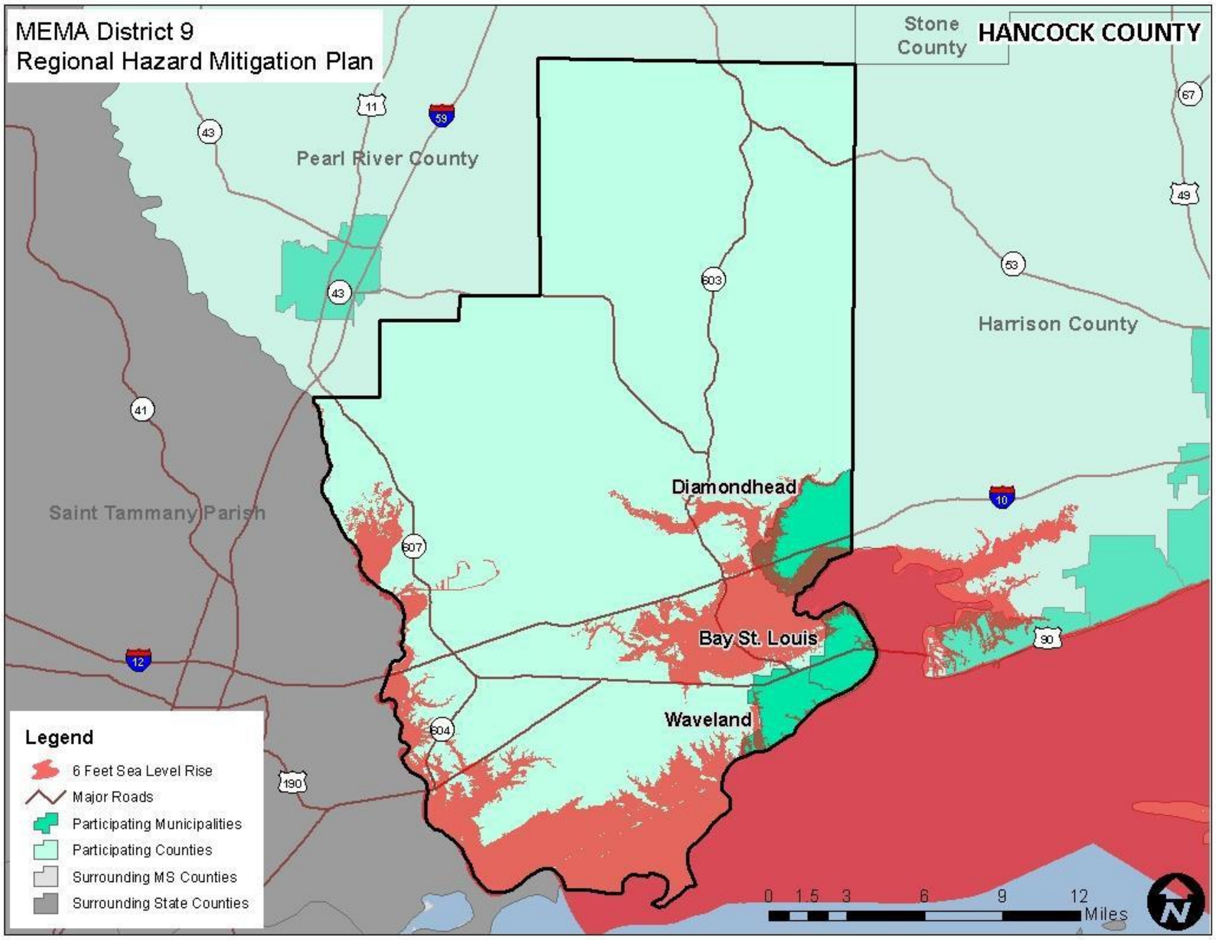
Source: NOAA

FIGURE B.42: 3 FEET SEA LEVEL RISE SCENARIO IN HANCOCK COUNTY



Source: NOAA

FIGURE B.43: 6 FEET SEA LEVEL RISE SCENARIO IN HANCOCK COUNTY



Source: NOAA

TABLE B.81: ESTIMATED EXPOSURE OF PARCELS TO THE SEA LEVEL RISE HAZARD

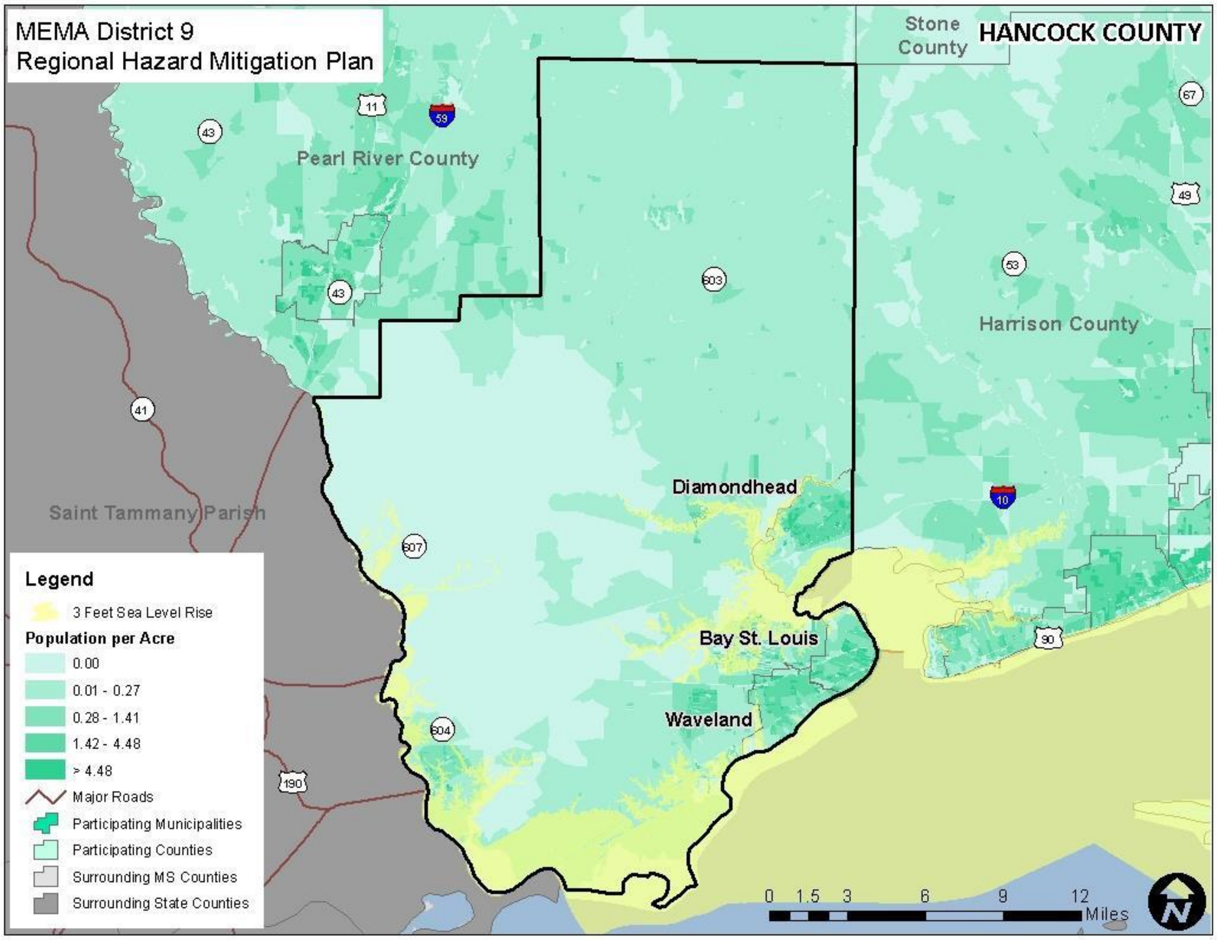
Location	1.0 foot		3.0 feet		6.0 feet	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Bay St. Louis	0	$0	7	$282,410	61	$1,200,443
Diamondhead	30	$2,087,223	52	$3,752,217	115	$8,691,488
Waveland	0	$0	0	$0	36	$264,371
Unincorporated Area	248	$6,391,403	2,748	$42,892,982	5,296	$77,430,042
HANCOCK COUNTY TOTAL	248	$6,391,403	2,755	$43,175,392	5,357	$78,630,485

Source: NOAA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Figure B.44 is presented to gain a better understanding of at-risk population by evaluating census block level population data against the 3 feet sea level rise scenario. The three feet scenario was selected since this is a moderate level projection. Based on this analysis, a significant part of the coastal population in the county is vulnerable to sea level rise.

FIGURE B.44: POPULATION DENSITY WITH 3 FEET SEA LEVEL RISE IN HANCOCK COUNTY



Source: NOAA, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are 3 facilities located in the 3 feet of sea level rise scenario inundation area. As mentioned above, this scenario was selected as it is a mid-range projection for sea level rise based on a number of studies. The 3 facilities include 1 private/non-profit, 1 special population, and 1 transportation. A list of specific critical facilities and their associated risk can be found in Table B.84 at the end of this subsection.

CONCLUSIONS ON HAZARD VULNERABILITY

Table B.82 presents an overall summary of the community's vulnerability for each jurisdiction. This summary provides key problem statements and identifies the community's greatest vulnerabilities that will be addressed in the mitigation strategy.

TABLE B.82: SUMMARY OF VULNERABILITY FOR HANCOCK COUNTY

	Key Problem Statements
Hancock County	Hancock County, Bay St. Louis, Diamondhead, and Waveland have many low-lying neighborhoods and streets that are especially vulnerable to coastal flooding and storm surge. Vulnerable and at- risk populations including low-income, minority, elderly, or disabled persons disproportionately live in flood prone areas. Additionally, many employers like casinos, resorts, and hotels are located in these vulnerable locations. Disruption or loss of these employers and facilities can result in significant unemployment, economic loss, and migration from the county and cities.

Table B.83 presents a summary of annualized loss for each hazard in Hancock County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the county.

It should also be noted that many of these estimates are based on incomplete data and likely underestimate the historic dollar damage sustained in each county. Especially for hazards such as extreme cold, extreme heat, hail, lightning, and winter weather, it is very likely that more damage occurred historically than has been identified.

TABLE B.83: ANNUALIZED LOSS FOR HANCOCK COUNTY

Hazard	Hancock County
Flood-related Hazards	
Dam and Levee Failure	Not Available
Erosion	Not Available
Flood	$63,260
Storm Surge	$231,917,975
Fire-related Hazards	
Drought	Not Available
Lightning	$24,550
Wildfire	Not Available
Geologic Hazards	
Earthquake†	$4,000
Wind-related Hazards	
Extreme Cold	$0
Extreme Heat/Heat Wave	Not Available
Hailstorm	$0

Hurricane and Tropical Storm	$97,894,098
Severe Thunderstorm/High Wind	$11,182

Hazard	Hancock County
Tornado	$1,232,052
Winter Weather	Not Available
Climate Change/Sea Level Rise	Not Available
Hazardous Materials Incident/Train Derailment	$8,313
Infectious Disease	Not Available

†Historic dollar damage was not available for this hazard, but since estimated annualized losses from Hazus were available, those numbers were used in this table.
*In this table, the term “Not Available” is used to indicate that no records of dollar losses for the particular hazard were recorded. This could be the case either because there were no events that caused dollar damage or because documentation of that particular type of event is not well kept.

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to impacts from atmospheric hazards such as drought and hailstorm. Some buildings may be more vulnerable to some of these hazards based on locations, construction, and building type. In addition, all populations are vulnerable to hazards like infectious disease which could presumably impact any segment of the population without regard to geographic location. Table B.84 shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an “X”).

For a listing of vulnerable critical assets within Hancock County please see the below link:

MEMA_District9_Hazard_TabularData.xlsx

SECTION 14 HANCOCK COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Hancock County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: Capability Assessment.

<u>PLANNING AND REGULATORY CAPABILITY</u>

Table B.85 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Hancock County. An x(x) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. A dagger (†) indicates that the given item is administered for that municipality by the county. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the MEMA District 9 Regional Hazard Mitigation Plan.

TABLE B.85: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Threat and Hazard Identification and Risk Assessment (THIRA)	Comprehensive Land Use Plan	Floodplain Management Plan/Flood Mitigation Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Emergency Management Accreditation Program (EMAP Accreditation)	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment/ Reconstruction Plan/ Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System (CRS
HANCOCK COUNTY	x		x	x	x	x	x		x			x			x		x	x	x			x	x	x	
Bay St. Louis	x		x			x	†		†			†			†		x	x	x			x	x	x	x
Diamondhead	†		x	†		x			†			†		x	†		x	x	x			x	x	x	
Waveland	x		x			x	†		†			†		x	†		x	x	x			x	x	x	x

A more detailed discussion on the county's planning and regulatory capabilities follows.

EMERGENCY MANAGEMENT

Hazard Mitigation Plan
Hancock County has previously adopted a hazard mitigation plan. The City of Diamondhead was also included in this plan. The cities of Bay St. Louis and Waveland have also previously adopted municipal- level hazard mitigation plans.

Emergency Operations Plan
Hancock County maintains an emergency operations plan through its Emergency Management Agency. The cities of Bay St. Louis, Diamondhead, and Waveland are each covered by this plan.

GENERAL PLANNING

Comprehensive Land Use Plan
Hancock County has adopted a county comprehensive plan. The cities of Bay St. Louis, Diamondhead, and Waveland have also adopted municipal comprehensive plans.

Capital Improvements Plan
Hancock County has not adopted a capital improvements plan. However, the cities of Diamondhead and Waveland have adopted municipal capital improvements plans.

Historic Preservation Plan
Neither Hancock County nor any of its participating municipalities have a historic preservation plan. However, the City of Bay St. Louis has adopted a historic preservation ordinance.

Zoning Ordinance
Hancock County and the cities of Bay St. Louis, Diamondhead, and Waveland have each adopted a zoning ordinance.

Subdivision Ordinance
Hancock County and the cities of Bay St. Louis, Diamondhead, and Waveland have each adopted a subdivision ordinance.

Building Codes, Permitting, and Inspections
After Hurricane Katrina, Mississippi Legislature mandated the adoption of the International Building Code and International Residential Code in five coastal counties including Hancock County. The cities of Bay St. Louis, Diamondhead, and Waveland have also adopted building codes.

FLOODPLAIN MANAGEMENT

Table B.86 provides NFIP policy and claim information for each participating jurisdiction in Hancock County.

TABLE B.86: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
HANCOCK COUNTY†	09/09/70	10/16/09	4,265	$1,097,650,600	5,929	$404,676,960
Bay St. Louis	09/11/70	10/16/09	2,240	$647,565,200	1,244	$148,880,718
Diamondhead	05/22/12		14	$3,275,000	0	$0

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
Waveland	09/11/70	10/16/09	1,795	$489,605,500	1,385	$183,867,798

†Includes unincorporated areas of county only
Source: NFIP Community Status information as of 1/10/2017; NFIP claims and policy information as of 10/31/2016

Community Rating System
The cities of Bay St. Louis (Class 7) and Waveland (Class 5) participate in the CRS. Participation in the CRS program should be considered as a mitigation action by Hancock County and the City of Waveland. The program would be most beneficial to the county which has 4,265 NFIP policies in force.

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Hancock County and the cities of Bay St. Louis, Diamondhead, and Waveland all participate in the NFIP and have adopted flood damage prevention ordinances.

Floodplain Management Plan
Hancock County has adopted a floodplain management plan to help prevent damages associated with flooding and flood loss. The City of Diamondhead is also included in this plan.

Open Space Management Plan
Hancock County has adopted a county greenways plan.

Stormwater Management Plan
The cities of Diamondhead and Waveland have both adopted a stormwater management plan. Hancock County and the City of Bay St. Louis have adopted local stormwater management ordinances.

Implement the substantial improvement/substantial damage provisions:
Damage Estimates are a part of the National Flood Insurance Program (NFIP). If a community participates in the NFIP, part of the responsibility of the local participating community is to perform damage estimates. These estimates are performed using a FEMA Substantial Damage Estimate software program. This program is used by the Mississippi Emergency Management Agency's (MEMA) Office of Mitigation Floodplain Management (FPM) Bureau to assist local communities in determining damage estimates as it relates to the NFIP. The FPM Bureau is tasked with assisting local communities with the training and deployment of the SDE program. Local building officials/Stormwater management and floodplain managers for each participating jurisdiction are responsible for ensuring that the substantial improvement/substantial damage provisions are implemented following a flood related event within their respective jurisdiction. The local officials will ensure that all NFIP criteria/requirements are implemented and met following a flood event, local officials will work with FEMA to ensure proper documentation/designations are made and properly recorded for structures deemed substantially damaged during an event.

ADMINISTRATIVE AND TECHNICAL CAPABILITY
Table B.87 provides a summary of the capability assessment results for Hancock County with regard to relevant staff and personnel resources. An x(x) indicates the presence of a staff member(s) in that jurisdiction with the

specified knowledge or skill. A dagger (†) indicates a county-level staff member(s) provides the specified knowledge or skill to that municipality.

TABLE B.87: RELEVANT STAFF/PERSONNEL RESOURCES

Staff/Personnel Resource	Planners with knowledge of land development/land management	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human- caused hazards	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
HANCOCK COUNTY	x	x	x	x	x		x	x	x	x
Bay St. Louis		x	x	†	x		†	x	x	x
Diamondhead	x	x	x	x	x		†	x	x	x
Waveland		x	x	x	x		†	x	x	x

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community’s vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan’s planning committee.

FISCAL CAPABILITY

Table B.88 provides a summary of the results for Hancock County with regard to relevant fiscal resources. An x(x) indicates that the given fiscal resource has previously been used to implement hazard mitigation actions. A dagger (†) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

TABLE B.88: RELEVANT FISCAL RESOURCES

Fiscal Tool/Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: HMGP and other federal, state, and private grants/resources
HANCOCK COUNTY	†	†	†	†	†			†	†	x
Bay St. Louis	†	†							†	†
Diamondhead	†	†	†	†	†			†	†	†
Waveland	†	†	†	†	†			†	†	x

POLITICAL CAPABILITY

During the months immediately following a disaster, local public opinion in Hancock County is more likely to shift in support of hazard mitigation efforts.

Table B.89 provides a summary of the results for Hancock County with regard to political capability. An x(x) indicates the expected degree of political support by local elected officials in terms of adopting/funding information.

TABLE B.89: LOCAL POLITICAL SUPPORT

Political Support	Limited	Moderate	High
HANCOCK COUNTY			x
Bay St. Louis			x
Diamondhead		x	
Waveland			x

CONCLUSIONS ON LOCAL CAPABILITY

Table B.90 shows the results of the capability assessment using the designed scoring methodology described in Section 7: Capability Assessment. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. This information was reviewed by all jurisdictions and each jurisdiction provided feedback on the information included in the capability assessment. Local government input was vital to identifying capabilities. According to the assessment, the average local capability score for the county and its jurisdictions is 47.5, which falls into the moderate capability ranking.

TABLE B.90: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
HANCOCK COUNTY	55	High
Bay St. Louis	42	Moderate
Diamondhead	44	Moderate
Waveland	49	Moderate

SECTION 15 HANCOCK COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Hancock County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Council and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: Mitigation Strategy and Section 9: Mitigation Action Plan.

MITIGATION GOALS

Hancock County developed nine mitigation goals in coordination with the other participating MEMA District 9 Region jurisdictions. The regional mitigation goals are presented in Table B.91.

TABLE B.91: MEMA DISTRICT 9 REGIONAL MITIGATION GOALS

	Goal
Goal #1	Minimize risk and vulnerability of the community to hazards. Objective 1: Improve understanding of hazard risks through monitoring and assessment projects.
Goal #2	Minimize loss of life, injury, and damages to property, the economy, and the environment. Objective 1: Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment. Objective 2: Improve hazard assessment information to make recommendations for encouraging higher standards for safer development in areas vulnerable to natural and technological hazards. Objective 3: Implement sustainable activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resilient to natural and technological hazards.
Goal #3	Minimize loss to critical facilities and infrastructure, utilities, and services.

	Objective 1: Prioritize mitigation projects for critical facilities, services, and infrastructure.
Goal #4	Improve, expand, and enhance public education, awareness, and preparedness. Objective 1: Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.
Goal #5	Build and enhance local mitigation capabilities to improve the region's ability to prepare for, respond to, and recover. Objective 1: Strengthen communication and coordinate participation among and within public agencies, community members, non-profit organizations, business, and industry to gain a vested interest in implementation.
Goal #6	Enter into partnerships with neighboring jurisdictions, federal and state agencies, and others to share information and develop a more hazard resistant community. Objective 1: Encourage leadership within the public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.
Goal #7	Enhance response procedures and emergency management capabilities. Objective 1: Coordinate and integrate natural and technological hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
Goal #8	Reduce economic losses, minimize social disruptions, and maintain quality of life. Objective 1: Reduce losses and repetitive damages for hazard events while promoting insurance coverage for catastrophic hazards.
Goal #9	Protect the environment and natural resources. Objective 1: Preserve, rehabilitate, re-establish, and enhance natural systems to serve natural hazard mitigation functions.

MITIGATION ACTION PLAN

The mitigation actions proposed by Hancock County and the cities of Bay St. Louis, Diamondhead, and Waveland are listed in the following individual Mitigation Action Plans.

Hancock County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Join the Community Rating System Program.	Hurricane, Flooding, Climate Change	High	Building and Zoning Department	Local	2025	Ongoing have not joined the CRS as of 2023 update.
P-2	Develop a Repetitive Loss Plan.	Hurricane, Flooding	High	Building and Zoning Department	FEMA-Flood Loss Planning	2028	Ongoing continuing to develop plans and reduces losses
P-3	Encourage household hazardous waste collection days to collect hazardous chemicals.	Hurricane, Flooding	Moderate	Hancock County Board of Supervisors	MS DEQ	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Encourage the Hancock County Solid Waste Authority to contract for a monthly household hazardous waste collection.	Hurricane, Flooding	Low	Hancock County Solid Waste Authority	MS DEQ	2028	Ongoing
P-5	Update typographic information to 1 foot contours to assist with planning for sea level rise.	Climate Change, Flooding	Low	Building and Zoning Office	Local funds	2025	Ongoing
P-6	Consider setbacks from canals and natural waterways to protect structures from sea level rise.	Climate Change, Flooding	Low	Building and Zoning Department	Local funds	2024	Ongoing
P-7	Assess and develop continuity plans for Volunteer Fire Departments.	All	High	Hancock County Emergency Management Agency	Local funds	2026	Ongoing

P-8	Adopt and implement updates to the International Building Code as the updates become available.	Hurricane, Earthquake, Severe Weather	High	Building Office	Local funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Continue to implement recommendations of the Drainage Master Plan and continue to upgrade drainage facilities throughout the community to protect private and public property.	Hurricane, Flooding, Dam Failure	Low	Hancock County Road Dept.	Local funds, FEMA- HMGP	2028	Partially completed/Ongoing
P-10	Continue to implement the county's substantial damage and cumulative impact requirements.	Hurricane, Flooding	High	Hancock County Building and Zoning Office	Local funds	2028	Ongoing
P-11	Continue to maintain FEMA Elevation certificates on each building in the floodplain in Hancock County.	Hurricane, Flooding	High	Hancock County and Diamondhead Building Office	Local funds	2028	Ongoing
P-12	Continue to enforce the county's Erosion Control Ordinance to include erosion and sediment control BMPs as required by NPDES Phase II Program.	Hurricane, Flooding	Moderate	Hancock County Building Official; Diamondhead Building Official	Local funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Continue to implement drainage standard operating procedure.	Hurricane, Flooding	Moderate	Hancock County Road Manager	Local funds	2028	Ongoing
P-14	Draft and adopt a Stream Dumping Ordinance to prohibit deposition of debris in the drainage systems.	Hurricane, Flooding	Low	Hancock County Road Manager	Local funds	2025	Ongoing
P-15	Purchase, install, and use the STAMP software program to make flood elevations available for review by building and zoning officials.	Hurricane, Flooding	Moderate	Hancock County Building Office	Local funds	2025	Ongoing
P-16	Continue to enforce tie down requirements for mobile homes.	All Severe Weather	Moderate	Hancock County Building and Zoning	Local funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-17	Hancock County Board of Supervisors should require a maintenance plan and an emergency operations plan for dams built as infrastructure within a subdivision. These plans should be required and recorded as part of the subdivision plan.	Dam Failure	Low	Building and Zoning Dept.	Local funds	2024	Ongoing
P-18	Continue to implement a plan to conserve green spaces.	Erosion, Climate Change, Flooding	Low	Hancock County Board of Supervisors	CIAP, Tidelands	2028	Ongoing
P-20	Require subdivisions and community development projects to be submitted by a professional engineering and reviewed by a professional engineer employed by the county.	Flooding	Moderate	Hancock County Board of Supervisors; Building and Zoning Department	Local funds	2028	Ongoing
P-21	Keep drainage channels open.	Flooding	Moderate	Road Department	Local funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-22	Update drainage study to include areas beyond the surge areas identified with Hurricane Katrina.	Flooding	Moderate	Hancock County Board of Supervisors	Corps of Engineers	2025	Ongoing
Property Protection							
PP-1	Elevate section of Highway 604 to ensure a safe evacuation route.	Hurricane, Flooding	Moderate	Hancock County Board of Supervisors; Gulf Regional Planning Commission	FHWA	2024	Ongoing
PP-2	Relocate Diamondhead Sewer System treatment facilities and other new treatment facilities in Hancock County to areas located outside of the floodplain and elevated above BFE.	Hurricane, Flooding	High	Diamondhead Water and Sewer District	CDBG, CWA-RLF, EPA, FEMA-HMGP	2026	Ongoing
PP-3	Continue to harden key lift stations to ensure safe operation during times of no power.	Hurricane, Flooding	High	Hancock County Sewer Organizations	CWA-RLF, FEMA-HMGP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-4	Retrofit existing sewer systems: equip grinder pumps with surge protectors and provide back-up generators.	All	High	Hancock County Utility Authority Sewer Districts	CWA-RLF, FEMA-HMGP	2028	Ongoing
PP-5	Build new public buildings above base flood elevation and provide protection from hurricane force winds.	Hurricane, Flooding	High	Hancock County Board of Supervisors; Diamondhead City Council	FEMA-HMGP	2026	Partially complete/Ongoing
PP-6	Establish back-up emergency operations locations throughout the county by strengthening new buildings as they are developed and by hardening existing suitable structures.	Hurricane, Flooding, Tornado, Earthquake	Moderate	Hancock County Emergency Management Agency	FEMA-HMGP	2026	Ongoing
PP-7	Mitigate the library system structures to ensure these buildings are functional after a natural hazard event.	All	High	Hancock County Library System; Hancock County Board of Supervisors	FEMA-HMGP	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-8	Retrofit existing public buildings for wind and water.	Hurricane, Flooding, Tornado, Hailstorm, Severe Thunderstorm / High Wind	High	Hancock County Board of Supervisors	FEMA-HMGP	2026	Ongoing
PP-9	Encourage people to protect property by insuring, floodproofing, and elevating their homes	Hurricane, Flooding, Dam Failure	High	Hancock County Emergency Management Agency, Hancock County Building and Zoning Office, Diamondhead Building Office	Local funds	2028	Ongoing
PP-10	Seek funding to assist property owners located in Special Flood Hazard Areas in mitigating their homes from flooding through elevation and acquisition, and identify programs to help property owners mitigate their structures from wind damage.	Hurricane, Flooding	High	Hancock County Board of Supervisors	Local funds, FEMA- HMGP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-11	Encourage the development of safe rooms in homes and businesses in Hancock County.	Tornado	Moderate	Hancock County Building and Zoning	Local funds	2028	Ongoing
PP-12	Promote the purchase of earthquake insurance by homeowners and business owners.	Earthquake	Low	Building and Zoning Dept.	Local funds	2028	Ongoing
Natural Resource Protection							
NRP-1	Adopt the “Beneficial Use of Dredge Material” Plan for placement of all new erosion control and reef development activities in near shore water.	Hurricane, Erosion, Climate Change	Moderate	Corps of Engineers	Private funds	2025	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
NRP-2	Continue to renourish the beach and adopt beach protection measures.	Hurricane, Climate Change, Coastal Erosion	High	Hancock County Board of Supervisors	Seawall Tax	2028	Completed/Ongoing
NRP-3	Support marsh re-nourishment and restoration by participating with coastal states to protect wetlands and marshes as protective barriers from storms. Actions may minimize storm surge.	Hurricane	High	Hancock County Board of Supervisors	Restore Act	2028	Ongoing
NRP-4	Restore barrier islands.	Hurricane, Climate Change, Erosion	Moderate	MS Secretary of State	National Park Service	2028	Ongoing
Structural Projects							
SP-1	Determine feasibility to construct levee system to protect southern Hancock County including the areas of Pearlington, Ansley, Clermont Harbor, Waveland, and Bay St. Louis as well as the Port Bienville Industrial Park.	Hurricane, Climate Change	Moderate	Hancock County Board of Supervisors	US Army Corps of Engineers	2025	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-2	Request that the US Army Corps of Engineers study the impact on southern Hancock County of existing structural flood protection impacts undertaken in southern Louisiana and project structural improvements in southern Louisiana.	Hurricane, Flooding	High	Hancock County Board of Supervisors	Corps of Engineers	2025	Ongoing
SP-3	Investigate the need for a second north-south roadway in Hancock County.	Hurricane, Flooding	Moderate	Hancock County Board of Supervisors; Gulf Regional Planning Commission	FWHA	2026	Ongoing
SP-4	Increase the capacity of Highway 603 between Highway 43 and Highway 53, and Highway 53 between Highway 603 and Interstate 59, to four lanes.	Hurricane, Flooding	Moderate	Hancock County Board of Supervisors; Gulf Regional Planning Commission	FHWA	2026	Ongoing
SP-5	Increase the capacity of Highway 43 to Interstate 59 from two lanes to four lanes.	Hurricane, Flooding	Moderate	Hancock County Board of Supervisors; Gulf Regional Planning Commission	FHWA	2026	Ongoing

SP-6	Continue to develop centralized water and sewer systems to serve flood- prone areas to assist with recovery by protecting drinking water.	Flooding, Hurricane	High	Hancock County Board of Supervisors; Hancock County Utility Authority	USDA, CIAP, CWA, RLF, CDBG	2026	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-7	Modify storm drainage system to implement structural projects that relive existing and projected flood conditions.	Flooding	Moderate	Hancock County Board of Supervisors	NRCS, FEMA-HMGP, CDBG	2028	Partially completed/Ongoing
SP-8	Continue county culvert replacement program.	Flooding	High	Road Department	Local funds	2028	Partially completed/Ongoing
Emergency Services							
ES-1	Where possible and legal, continue to pre-select and negotiate contracts for emergency response and recovery.	All	High	Hancock County Board of Supervisors; Diamondhead City Council	Local	2028	Ongoing
ES-2	Complete and maintain a new EOC that provides a safe area for sheltering, staging of equipment, response supplies, and emergency responders after a natural hazard event.	All	High	Hancock County Emergency Management Agency; Hancock County Board	Insurance, FEMA-HMGP	2026	Completed/Ongoing

				of Supervisors			

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-3	Secure and utilize effective new technologies to communicate with residents before, during, and after a hazardous event.	All	High	E-911 Commission	Local funds, FEMA	2028	Completed/Ongoing
ES-4	Continue to use the E-911 call out system to alert people living in evacuation zones of the need to evacuate.	Hurricane, Flooding	High	E-911 Commission	Local funds	2028	Completed/Ongoing
ES-5	Investigate incentives to help mobile home parks establish tornado shelters for their residents.	Tornado, All Severe Weather	Moderate	Hancock County Emergency Management Agency	Private Funding	2025	Ongoing
ES-6	Maintain a special needs only shelter and establish partnerships for operations.	Hurricane, Flooding, Tornado, Earthquake	High	Hancock County Emergency Management Agency; Hancock	Local funds	2026	Ongoing

				Medical Center			

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-7	Maintain shelter standards.	Hurricane. Flooding, Tornado, Earthquake	Moderate	Hancock County Emergency Management Agency; Hancock County Board of Supervisors	Local funds, FEMA- HMGP	2028	Ongoing
ES-8	Support regional pet friendly shelters.	Hurricane, Flooding, Earthquake	Moderate	Hancock County Animal Shelter; Friends of the Animal Shelter	Local funds	2028	Ongoing
ES-9	Establish a program to micro-chip pets. Pets that have a micro-chip are more likely to be returned to their owners after any hazardous event.	All	Low	Hancock County Animal Shelter; Friends of the Animal Shelter	Foundation/non-profit grants	2026	Partially completed/Ongoing
ES-10	Maintain shelters in Hancock County.	Hurricane, Flooding, Tornado, Earthquake	High	Hancock County Emergency Management Agency; Hancock County Board	Local funds	2028	Ongoing

				of Supervisors			

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-11	Establish telecommunications links with Stennis Space Center, Pearl River County, Harrison County, MEMA, and FEMA, and increase reliability of the communications system and interoperability between emergency services responders. Improve public safety internal communications and ensure reliability in any type of disaster.	All	High	E-911 Commission	Local funds, FEMA- HMGP	2026	Partially completed/Ongoing
ES-12	Request cellular phone companies to provide HCEMA with an emergency operations plan for cellular communications during emergency situations.	All	Moderate	Hancock County Emergency Management Agency; Hancock County Building Office	Local funds to review and file plans	2028	Ongoing
ES-13	Enhance E-911 call system to recognize the location of cell phone calls received at the dispatch center.	All	High	E-911 Commission	Local funds, FEMA	2025	Ongoing
ES-14	Join the NOAA Storm Ready Community Alert Program.	All	High	Hancock County Emergency Management Agency	Local funds	2025	Completed/Ongoing Certification Needed

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-15	Provide pre-hurricane season exercise.	Hurricane, Flooding	High	Hancock County Emergency Management Agency	Local funds	2024	Completed/Ongoing annually
ES-16	Augment warning systems throughout Hancock County.	All Severe Weather	High	Hancock County Emergency Management Agency	FEMA-HMGP	2028	Ongoing
ES-17	Purchase brush trucks or quick attack trucks and strategically place the trucks throughout the county for use by multiple stations.	Wildfire	Moderate	Fire Protection Districts	FEMA-AFG, CDBG, RDA	2025	Partially completed/Ongoing
ES-18	Encourage joint exercises among departments to train together for large wildfires.	Wildfire	High	Hancock County Emergency Management Agency; Fire Protection Districts	Local funds	2024	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-19	Purchase a marine fire fighting vehicle.	Wildfire	Low	Hancock County Board of Supervisors	FEMA-AFG, Coast Restore Act Funds	2026	Ongoing contingent upon funding
ES-20	Diamondhead Property Owners Association will continue to use a warning system to alert golfers of threatening lightning.	All Severe Weather	Moderate	Diamondhead Property Owner's Association	Property dues	2028	Completed/Ongoing
ES-21	Subscribe to the Lightning Detection Network, which alerts subscribers when dangerous lightning is within the region.	All Severe Weather	Low	Hancock County Emergency Management Agency	Local funds	2024	Completed/Ongoing
ES-22	Program emergency warning system to warn for lightning.	All Severe Weather	Low	Hancock County Emergency Management Agency; E-911	FEMA-HMGP	2028	Ongoing
ES-23	Spread sand on bridges that may ice during cold weather storms.	Extreme Cold, Winter Weather	Low	Road Department	Local funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-24	Post signs on all bridges in the county which state "may ice in cold weather."	Extreme Cold, Winter Weather	Low	Road Department	Local funds	2024	Ongoing
ES-25	Establish a sheltering plan for people without homes.	Extreme Cold, Winter Weather	Moderate	Hancock County Emergency Management Agency; Human Services	Gulf Coast Continuum of Care	2025	Ongoing still no formal plan in place
ES-26	Provide EMC training for Volunteer Fire Departments and continue to participate in exercises to sharpen emergency response skills.	All	High	Hancock County Emergency Management Agency	Local funds	2024	Ongoing Annually
ES-27	Establish a fuel reserve for emergency situations.	All	Moderate	Hancock County Emergency Management Agency	Local funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-28	Continue badging program to ensure that essential county personnel can respond within disaster area to contain damages quickly.	All	High	Hancock County Emergency Management Agency	Local funds	2028	(Action 2006-13.8 in previous plan) A badging program has been established but there is a need for consistently updating badged personnel to ensure they are well-trained and prepared in an emergency.
Public Education and Awareness							
PEA-1	Support mitigation library in the Hancock County Library branches that provides materials on flood proofing and retrofitting and direct county residents to use these resources.	Hurricane, Flooding, Tornado	High	Building and Zoning Department	Local funds	2028	Ongoing
PEA-2	Establish training and outreach programs to prepare local businesses to be competitive in the disaster recovery and rebuilding economics.	All	Moderate	Chamber of Commerce; Pearl River Community College	MDA	2028	Ongoing
PEA-3	Publicize evacuation routes and locations of regional shelters.	Hurricane, Flooding, Tornado, Earthquake	Moderate	Hancock County Emergency Management Agency, American Red Cross	Local funds	2028	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-4	Promote the development of personal protection plans.	All	Moderate	Hancock County Emergency Management Agency; American Red Cross	Local funds, private donations, foundation funding	2028	Ongoing
PEA-5	Establish continuity training workshops for businesses.	All	Low	Hancock County Chamber of Commerce	Local funds, foundations	2028	Ongoing contingent upon available funding
PEA-6	Mail out a brochure to owners of property located in Special Flood Hazard Areas, suggesting methods for floodproofing.	Hurricane, Flooding, Dam Failure	High	Hancock County Building Official and Diamondhead Building Official	Local funds	2028	Partially completed/Ongoing
PEA-7	The Fire Coordinator and partners will provide homeowner education about protecting homes from wildfires.	Wildfire	High	Mississippi Forestry Commission	State-MFC	2025	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-8	Seek partners to educate residents and business owners about invasive species that may contribute to the loss of wetlands	Climate Change, Erosion	Low	MDMR, Land Trust for MS Coastal Plain	EPA Five Star Program, USFWS Focus Funds, CIAP, Tidelands	2028	Ongoing
PEA-9	Maintain a partnership with the American Red Cross to provide mitigation and prevention education in Hancock County.	All	High	Hancock County Emergency Management Agency; American Red Cross	Local	2028	Ongoing
PEA-10	Promote public information of prevention actions that can be taken by families and individuals.	All	High	Hancock County Emergency Management Agency	Local	2028	Ongoing

City of Bay St. Louis Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Apply to Insurance Services Office (ISO) to further lower the NFIP Flood Insurance Rating.	Flooding	High	CRS Administrator; Floodplain Insurance Administrator	Local funds	2025	Ongoing
P-2	Develop a Repetitive Loss Plan for the recently annexed area of the city.	Flooding	High	City of Bay St. Louis Flood Insurance Administrator; City Council, CRS Coordinator	MEMA Planning funds, local funds	2027	Ongoing
P-3	As development occurs in the annexed area, require that green space be set aside.	Flooding	High	City Council	FEMA, local funds	2028	Completed/Ongoing with additional annexation
P-4	Participate in the development of the District/County Hazard Mitigation Plan.	Hurricane, Flooding, Wind	High	Bay St. Louis Building Department; Public Safety Departments	Local funds	2028	Ongoing annual review and five year update cycle

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-5	Continue to maintain FEMA elevation certificates on each building in Bay St. Louis.	Flooding	High	Building Official; CRS Coordinator	Local funds	2028	Completed/Ongoing
P-6	Continue to enforce City Ordinance No. 285 to protect natural drainage from development.	Flooding	High	Building Official	Local funds	2028	Completed/Ongoing
P-7	Continue to enforce City Ordinance No. 285 to include erosion and sediment control Best Management Practices (BMP's) as required by NPDES Phase II Program.	Flooding	High	Building Official	Local funds	2028	Completed/Ongoing
P-8	Continue to enforce the city's Subdivision Regulations to require that streets in subdivisions are located above flood elevation to prevent isolation.	Flooding	High	Building Official	Local funds	2028	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Continue to implement the city's Substantial Damage Rule.	Flooding, Hurricane and Tropical Storm	High	Building Official	Local funds	2028	Completed/Ongoing
P-10	Continue to implement Drainage Standard Operating Procedure (SOP).	Flooding	High	Public Works Director	Local funds	2028	Ongoing
P-11	Continue to enforce the Stream Dumping Ordinance to prohibit depositing of debris in the drainage system.	Flooding	High	Public Works Director	Local funds	2025	Ongoing
P-12	Continue to enforce standards for hurricane resistant construction.	Hurricane, Tornado, Severe Thunderstorm / High Wind	High	Building Official	Local funds	2028	Ongoing
P-13	Continue to enforce the city's TreeOrdinance.	Flooding, Storm Surge, Hurricane	High	City Tree Officer	Local funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-14	Digitize property maps to include base flood elevations and flood hazard information.	Flooding	High	Hancock County Tax Assessor	Local funds	2026	Partillay Completed/Ongoing
P-15	Partner with NASA's Commercial Remote Sensing Department for additional map based information.	All	Moderate	Planning Department	Local funds	2026	Completed/Ongoing
P-16	Develop a five year capital improvement program and continue to upgrade drainage facilities throughout the city to protect private and public property.	Flooding	High	City Council	Local funds, grant funds for implementation	2028	Completed/Ongoing review and updates
P-17	Coordinate with adjacent communities to assure that actions taken within one community will not contribute to a great impact by hazards within the floodplain and neighboring communities.	Flooding	High	City Council	Staff time	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Seek funding to assist homeowners located in the Special Flood Hazard Areas to mitigate their homes from flooding through elevation and acquisition.	Flooding	High	City Council	FEMA HMGP, FMA, SRL funding, CDBG, and other programs as available	2022	Ongoing contingent upon available funding
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Emergency Services							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Public Education and Awareness							
PEA-1	Establish a program to offer CEUs to real estate and insurance professionals on hazard mitigation.	Flooding, Severe Thunderstorm / High Wind	High	Building Official	MEMA, local funds	2020	(Action 2005-40 in previous plan) The city has worked with real estate and insurance professionals to improve their understanding of mitigation but there is still room to improve this understanding further so this action will remain in

							place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	The Building Office should continue to offer site specific information to property owners and update the data available as it is made available by the Tax Assessor, FEMA, and MEMA.	Flooding, Hurricane	High	Building Official	Local funds	2028	Completed/Ongoing
PEA-3	Market the Hazard Mitigation Loan Program to home and business owners.	All	Low	Hancock County Board of Supervisors	FEMA Disaster Resistant Community Funds	2028	Completed/Ongoing
PEA-4	Continue to mail out a brochure to owners of property located in Special Flood Hazard Areas which suggests methods for flood proofing properties.	Flooding, Hurricane and Tropical Storm, Tornado, Sever Thunderstorm / High Wind	High	Building Official; CRS Coordinator	Local funds	2028	Ongoing

PEA-5	Post awareness posters in city offices.	Hurricane, Flooding, Tornado, High Wind, Severe Thunderstorm, Lightning, Heat	High	Building Official	Local funds	2028	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-6	Continue an internet website to make hazard mitigation information and programs and requirements in Bay St. Louis available to the public.	All	High	Building Official	Local funds	2028	Ongoing updates
PEA-7	Participate in Hurricane Awareness Week by adopting a proclamation.	Hurricane	Moderate	Community Development Director	Local funds	2025, Annually	Ongoing Annually
PEA-8	Participate in the Annual Mississippi Homebuilders Association Fair and Exposition, providing hazard mitigation information and related city programs and regulations.	All	Moderate	Building Official; CRS Coordinator; Fire Department	Local funds	2028	Ongoing Annually
PEA-9	Continue hurricane and storm safety curriculum in the Bay St. Louis High School.	Hurricane	Moderate	Bay St. Louis Fire and Police Department	Local funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-10	Implement flood awareness/storm surge markers in Special Flood Hazard Areas.	Flooding	Moderate	Building Official	Staff time	2026	Completed/Ongoing as needed
PEA-11	Continue to update floodproofing, retrofitting, and construction technology resources in the Hancock County Library located in Bay St. Louis.	Flooding	High	CRS Coordinator	FEMA, staff time	2028	Ongoing with updated materials

City of Diamondhead Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Continue to implement a Floodplain Management Ordinance which includes substantial damage and cumulative impact requirements.	Hurricane, Flooding	High	City Building Official	Local funds	2028	Ongoing
P-2	Develop a Master Stormwater Plan for the City of Diamondhead and implement the recommendations included in the plan.	Hurricane and Flooding	High	City Council and Diamondhead Property Owners Association	USDA-NRCS, USACOE, MDEQ, FEMA-HMGP	2021	Comprehensive plan completed 2021, “Envision Diamondhead 2040”
P-3	Establish natural gas supply in Diamondhead.	All	Low	City Council	CDBG, FEMA-HMGP	2025	Deferred due to lack of funding
P-4	Establish and maintain fire breaks through Diamondhead.	Wildfire	Low	City Council, Fire Dept.	FEMA-HMGP, MFC	2026	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-5	Establish a dam maintenance program and emergency operations plan for dam failure.	Dam Failure	Low	Public Works Office, Diamondhead Property Owners Association	Local funds	2026	Ongoing
Property Protection							
PP-1	Reconstruct and elevate Kapalama Drive and the bridge north of Diamondhead to provide an adequate evacuation route.	Hurricane and Flooding	Moderate	City Council	FHWA, FEMA-HMGP	2025	Ongoing contingent upon funding
PP-2	Place power lines underground along city roadways.	All	Moderate	Coast Electric Power Association	CEPA	2026	Partially completed/Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-3	Mitigate City Hall and Public Safety Building for hurricanes.	Hurricane	High	City Council	FEMA-HMGP	2026	Ongoing contingent upon funding
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	Construct berm or levee and floodgate with pump to protect a Diamondhead neighborhood from flooding due to an existing drainage outlet that drains to St. Louis Bay.	Hurricane, Flooding	Moderate	City Council	USACOE, FEMA-HMGP, MDOT	2025	Ongoing contingent upon funding
Emergency Services							
ES-1	Secure and utilize effective outreach methods to communicate with residents before a hazardous event.	All	Moderate	City Council; Fire Protection District	FEMA-HMGP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-2	Establish an audible and an electronic warning system for areas susceptible due to flash flooding.	Dam Failure, Flooding	High	City Council; Diamondhead Property Owners Association	Local funds	2026	Ongoing
ES-3	Establish warning signage and/or barriers for roads in Diamondhead that are susceptible to flash flooding.	Dam Failure, Flooding	Moderate	City Council; Diamondhead Property Owners Association	FWHA, FEMA-HMGP, Local funds	2028	Ongoing
Public Education and Awareness							
PEA-1	Establish a public information program to alert residents of mitigation actions to reduce damage from natural disasters.	All	Moderate	City Building Office	Local Funds	2028	Ongoing

City of Waveland Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Designate an offsite storage facility for public records north of Interstate 10 or implement a system to protect all public records from flood or hurricanes.	Hurricane and Flooding	High	CRS Coordinator	FEMA grant funds	2026	Ongoing
P-2	Update the City of Waveland Master Drainage Plan and implement new drainage improvement projects.	Flood	Moderate	Public Works Director	HMGP, CDBG, PA, MDOT, etc. grant funds	2028	Partially completed/Ongoing
P-3	Use the eight acres the city has located on Waveland Avenue to develop football fields and create green space which will help reduce flooding within the surrounding area.	Flood	Moderate	Mayor's Office; CRS Coordinator; Public Works Director	BP settlement funds, FEMA grant funds	2026	Completed/Ongoing
P-4	Develop and implement an automated database/GIS system for elevation certificates.	Flood	Moderate	CRS Coordinator	FEMA funding	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-5	Establish programs to cleanout drainage canals throughout the city on an annual basis.	Erosion	High	Public Works Director	FEMA grant program	2024, Annually	Ongoing/Annually
P-6	Continue to control construction site runoff through requirement of clearing and grading permits erosion and sediment control regulations.	Flooding, Erosion	High	Planning/Code Office	To be determined	2026	Ongoing
P-7	Continue to control post-construction site runoff so it does not exceed pre- development site runoff through enforcement of best management practices.	Flooding, Erosion	High	Planning	To be determined	2026	Completed/Ongoing
P-8	Continue to strengthen floodplain regulations as appropriate.	Flooding	High	Floodplain Manager	Existing budget	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Work with flood insurance agents and lending institutions to ensure that mandatory flood insurance requirements are being met in area annexed in 2006 and throughout Waveland when new maps are adopted.	Flooding	High	Floodplain Manager	State, HMGP, FEMA	2026	Ongoing
P-10	Promote business continuity planning for small business and government.	All	Moderate	Civil Defense Director/Fire Chief	Local	2028	Ongoing
P-11	Continue to update information about hazardous materials facilities in Waveland upon receiving Tier II Forms from the facilities.	Hazardous Materials	Moderate	Fire; Civil Defense	Local	2028	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Protect external A/C equipment in the Central Fire Station and install underground storage tanks.	All	High	Fire Department (Chief)	HMGP	2026	Ongoing contingent upon funding
PP-2	Elevate residential structures on existing property located in the flood zones to comply with the current flood ordinance.	Flood	High	Fire Chief; Civil Defense; CRS Coordinator	HMGP, FMA	2028	Partially completed/Ongoing
PP-3	Acquisition and demolition of repetitive loss and severe repetitive loss properties.	Flood	Moderate	CRS Coordinator	HMGP and FMA grant funds	2028	Partially completed/Ongoing
PP-4	Reconstruction and floodproofing of structure following hurricanes and/or other disasters.	Hurricane, Flooding	Moderate	CRS Coordinator	HMGP or FMA grant programs	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Retrofit city-owned facilities and privately-owned residential structures to help protect these structures from damage during hurricanes and other natural disasters.	Hurricane, Flooding	Moderate	CRS Coordinator	HMGP, CDBG, PA, or FMA grant programs	2028	Partially completed/Ongoing contingent upon funding
PP-6	Update list of city's repetitive flood loss properties to include properties in area annexed in 2006, and encourage owners of repetitive and severe repetitive loss properties citywide to participate in mitigation activities such as floodproofing, elevation, or buyout programs.	Flooding	High	Floodplain Manager; Planning; CRS Coordinator; Building Official	HMGP, FMA, RFC, SRL	2028	Partially completed/ Ongoing contingent upon funding
PP-7	Acquire or otherwise remove repetitive and severe repetitive loss properties from the floodplain.	Flooding	High	CRS Coordinator	HMGP, FMA	2028	Partially completed/ Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-8	Encourage business owners to protect vulnerable structures through floodproofing, elevation, shutters, and other mitigation activities.	Hurricane, Flooding	Moderate	Building Official, Planning, Mayor's Office, Floodplain Manager	HMGP	2023	Ongoing
Natural Resource Protection							
NRP-1	Evaluate and implement the best option for beach front erosion protection. Alternatives include fences, concrete barriers, create dune/vegetative areas.	Erosion	High	Harrison County Sand Beach Authority	Harrison County Beach Authority	2026	Ongoing
NRP-2	Develop and implement a plan in an effort to protect and maintain the natural marshes and other barriers.	Erosion	High	Public Works Director	Local, Regional	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
NRP-3	Dredge Jackson Marsh to restore wetlands and help reduce flooding.	Erosion	High	Public Works Director	FEMA grant programs	2022	Completed/Ongoing
Structural Projects							
SP-1	Build access road from Sarah Lane north to Adams Lane to allow citizens on Sarah Lane to evacuate during storms.	Hurricane	High	Civil Defense	HMGP, CDBG	2026	Ongoing contingent upon funding
SP-2	Install barrier (check valve) in culvert under Highway 603 to prevent storm surge from entering the city and flooding homes.	Flood	High	CRS Coordinator; Civil Defense	HMGP, FMA, CDBG	2026	Ongoing contingent upon funding
SP-3	Install barrier (check valve) in culvert under railroad track on South Street to prevent storm surge from entering the city and flooding homes.	Flood	High	CRS Coordinator; Civil Defense	HMGP, FMA, CDBG	2026	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-4	Coordinate with and support the US Army Corps of Engineering on projects in the MsCIP relating to the City of Waveland.	Hurricane, Flooding, Storm Surge, Sea Level Rise	High	All City Departments; Board of Alderman	To be determined	Corps of Engineers to determine schedule	Ongoing contingent upon funding
SP-5	Extend stormwater drainage pipes into gulf to help eliminate sand from filling drainage pipes during storm events.	Erosion	Moderate	Public Works Director	Grant funds	2028	Ongoing contingent upon funding
SP-6	Install bypass valves at all City of Waveland sewer lift station pumps to reduce or eliminate the loss of sewer service and cost of vacuum trucks.	Hurricane, Flooding	High	Public Works Director	FEMA grant funds	2028	Ongoing contingent upon funding
Emergency Services							
ES-1	Install two warning sirens in the north and northeast areas of the city at a public park and a community center.	All	High	Fire Chief; Civil Defense	HMGP	2026	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-2	Review current evacuation plan and access to evacuation routes throughout the city.	All	High	CRS Coordinator	FEMA grant programs	2028	Completed/Ongoing
ES-3	Develop a communication system utilizing LED boards along high traffic areas to warn citizens about the threat of potential hazards affecting the City of Waveland.	All	High	Fire Chief	FEMA grants	2028	Complete/Ongoing
ES-4	Consider establishing a program to train and verify neighborhoods in first response actions after hazards.	All	Moderate	Civil Defense Director	To be determined	2028	Ongoing.
ES-5	Establish a facility north of Interstate 10 that can be used as a command center in the event of a major hurricane that can also serve as a shelter for essential city personnel and equipment and house a critical records vault.	All	Moderate	Board of Alderman; Mayor's Office	HMGP, CDBG	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-6	Develop a generator plan for all critical facilities.	All	Moderate	Fire Chief; Civil Defense Coordinator	HMGP, CDBG	2028	Ongoing
ES-7	Use the Reverse 911 system to issue evacuation warning and advisories, especially for special needs residents.	All	Moderate	Fire Chief	Local	2028	Completed/Ongoing
ES-8	Use existing data from the monitoring and warning gauges on waterways to predict hazardous situations. Use Hurrevac and other existing computer programs and data to predict hazardous situations.	Flooding	Moderate	Fire Department	USGS, Local	2028	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-9	Maintain NOAA StormReady Designation.	All	Low	Fire Chief; Civil Defense Director	NOAA, Local	2028	Ongoing
ES-10	Enhance the communications system in a coordinated fashion between appropriate departments in the county, city, and the state.	All	Moderate	Civil Defense Coordinator; Fire Chief; Police Chief	Local, State	2023	Partially completed/Ongoing
ES-11	The City of Waveland will continue to train its personnel in weapons of mass destruction and hazardous materials response through education programs such as HazMat Level I and II and incident response to terrorist bombing.	Hazardous Materials	Low	Police; Fire; Civil Defense	Local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-12	Continue to update CAMEO, MARPLT, and ALOHA software where available and install in all response vehicles.	All	Moderate	Fire; Civil Defense	Local	2028	Ongoing
ES-13	Continue to update the Pre-plan Emergency Response Books for hazardous materials locations within Waveland.	Hazardous Materials	Moderate	Fire; Civil Defense	Local	2028	Ongoing
ES-14	Continue to seek grant funding through FEMA Fire Act Grants and Homeland Security Grants for terrorist and HAZMAT equipment to enable its emergency response personnel to prepare and respond to acts of terrorism and hazardous materials incidents.	Hazardous Materials	Moderate	Police; Fire; Civil Defense	Local	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Public Education and Awareness							
PEA-1	Educate citizens of Waveland about preparedness for all hazards affecting the city.	All	High	CRS Coordinator	City funds	2028	Ongoing
PEA-2	Educate homeowners regarding structural upgrades that can be made to residential homes for added protection against damage during hurricanes and flooding and can also help save citizens money on their annual homeowners insurance premiums.	Hurricane and Flooding	Moderate	CRS Coordinator; Planning Department	FEMA grant funds	2028	Ongoing/Annually
PEA-3	Enhance the usability and functionality of the city's website with an updated section to notify citizens about emergency services and hazards threatening the City of Waveland as well as emergency procedures for different types of hazards and evacuation routes.	All	Moderate	CRS Coordinator	City funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-4	Develop a plan to educate and promote flood insurance to the citizens of Waveland.	Flood	High	CRS Coordinator	Local	2028	Ongoing
PEA-5	Continue to publicize evacuation routes and approximate travel times to evacuate the area.	Flooding, Hurricane	High	Floodplain Manager; CRS Coordinator	Local	2028	Ongoing
PEA-6	Continue to mail flood safety information, including evacuation zones and routes, to every address in Waveland every year.	Flooding	High	Floodplain Manager; Civil Defense Coordinator	Local	2028	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-7	Continue to publicize how families can prepare and plan for disaster.	All	High	Civil Defense Coordinator; American Red Cross	Local	2023	Ongoing
PEA-8	Publicize information about the special needs registry maintained by the Hancock County Emergency Management Agency and how residents with special needs can register themselves.	All	Moderate	Civil Defense Director	Local	2023	Ongoing
PEA-9	Provide information on model construction techniques, such as storm shutters, in public places so people can learn about these mitigation techniques and adopt them for their own homes.	Severe Thunderstorm / High Wind, Hurricane, Flooding	Moderate	Building Official; CRS Coordinator	Local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-10	Encourage residents to acquire and monitor NOAA weather radios.	All	Moderate	Civil Defense Coordinator	Local	2028	Ongoing
PEA-11	Provide an annual pre-hurricane season workshop and exercise for elected officials and emergency operations staff.	Hurricane	High	Civil Defense	Local	2028	Ongoing contingent upon funding

Annex C: HARRISON COUNTY

This annex includes jurisdiction-specific information for Harrison County and its participating municipalities. It consists of the following five subsections:

C.1 Harrison County Community Profile
C.2 Harrison County Risk Assessment
C.3 Harrison County Vulnerability Assessment
C.4 Harrison County Capability Assessment
C.5 Harrison County Mitigation Strategy

HARRISON COUNTY COMMUNITY PROFILE

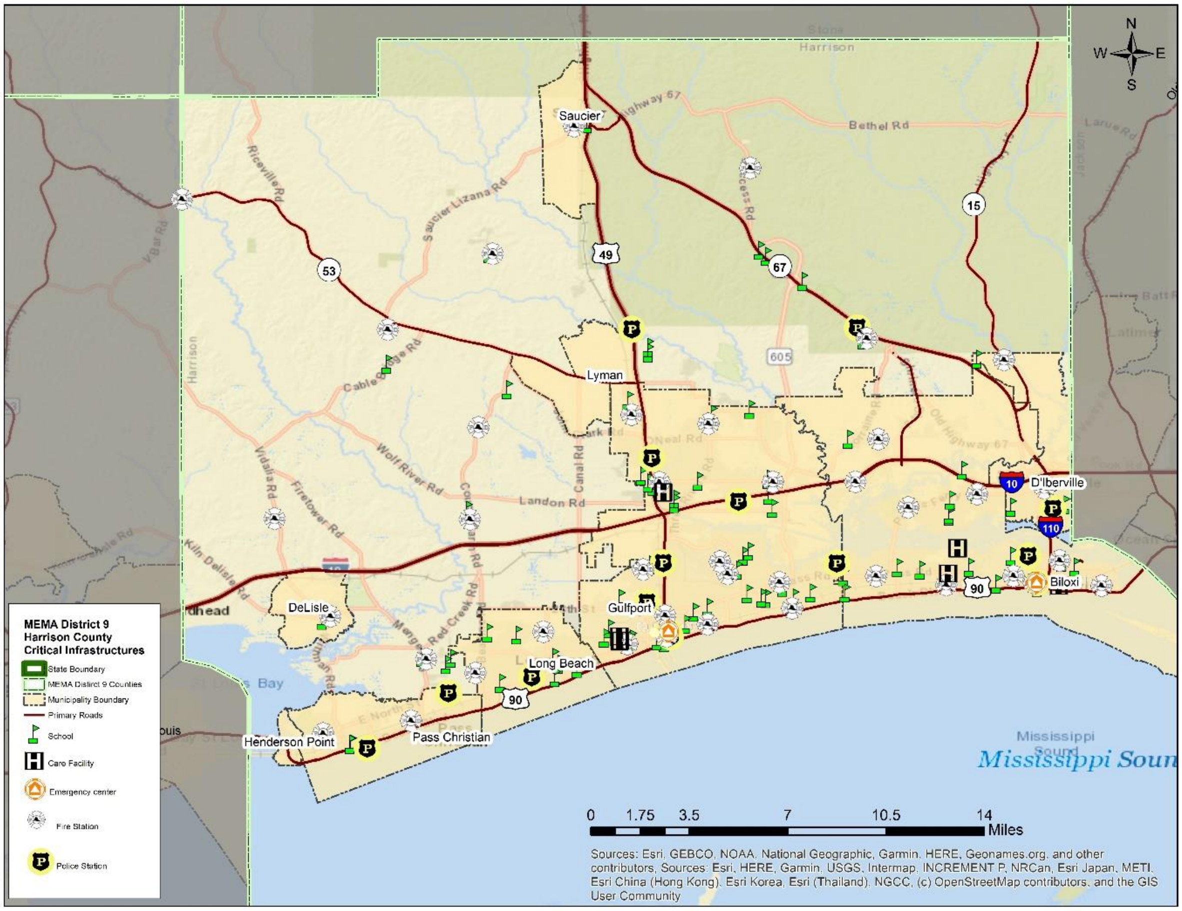
Geography and the Environment

Harrison County is located on the Mississippi coast. It comprises five cities, Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, as well as many small unincorporated communities. An orientation map is provided as Figure C.1.

Harrison County is situated in the East Gulf Coastal Plain. It is made up of the gently rolling Pine Belt, also known as the "Piney Woods," and the coastal area called the Coastal Meadows or Terrace. The region has generally low topographic elevations and extensive tracts of marshy land. There are many rivers, creeks, bayous, and other natural drainage networks in the region which empty into the Gulf of Mexico. The total area of the county is 976 square miles, 402 square miles of which is water area.

Harrison County enjoys four distinct seasons but the climate in the region is generally hot and humid compared to the rest of the United States given its latitude and location along the Gulf Coast. Precipitation is generally highest in winter months when the temperatures are moderately lower, but the likelihood of precipitation remains relatively constant throughout the year. Snowfall is rare but does occur. Summers in the region can become fairly hot with average highs in the nineties and lows in the seventies. The region is also often susceptible to turbulent weather when warm, wet air from the Gulf of Mexico is pushed up into the region to mix with cooler air coming down from across the continent which can result in severe weather conditions. This is particularly true in the spring when seasons are changing and diverse weather patterns interact. The region is also subject to hurricanes and tropical storms from June to October.

FIGURE C.1: HARRISON COUNTY ORIENTATION MAP



Population and Demographics

Population counts from the U.S. Census Bureau for 1990, 2000,2010, and 2020 for the county and participating jurisdictions are presented in Table C.1.

TABLE C.1: POPULATION COUNTS FOR HARRISON COUNTY

Jurisdiction	2000 Census Population	2010 Census Population	2020 Census Population	% Change 2010-2020
Harrison County	189,601	187,105	208,621	11.5%
Biloxi	50,644	44,054	49,449	12.2%
D’Iberville	7,608	9,486	12,721	34.1%
Gulfport	71,127	67,793	72,926	7.6%
Long Beach	17,320	14,792	16,780	-13.4%
Pass Christian	6,579	4,613	5,686	23.3%

Source: United States Census Bureau, 1990, 2000, 2010, 2020 Census

The racial characteristics of the county are presented in Table C.2.

TABLE C.2: DEMOGRAPHICS OF HARRISON COUNTY

Jurisdiction	White, Percent (2020)	Black or African American, Percent (2020)	American Indian or Alaska Native, Percent (2020)	Asian, Percent (2020)	Native Hawaiian or Other Pacific Islander, Percent (2020)	Two or More Races, percent (2020)	Persons of Hispanic Origin, Percent (2020)*
Harrison County	67.3%	26.3%	0.5%	2.9%	0.1%	2.9%	5.7%
Biloxi	65.6%	20.9%	0.4%	4.7%	0.1%	6.6%	9.0%
D'Iberville	63.6%	19.6%	0.0%	9.5%	0.0%	6.7%	5.5%
Gulfport	52.7%	39.2%	0.2%	1.3%	0.1%	5.1%	5.4%
Long Beach	88.5%	6.2%	0.0%	1.9%	0.0%	3.3%	4.8%
Pass Christian	71.9%	19.4%	0.8%	1.1%	0.0%	6.8%	4.8%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau, 2020 Census/2017-2021 ACS

Housing

Housing information for the county and five municipalities is presented in Table C.3.

TABLE C.3: HOUSING CHARACTERISTICS OF HARRISON COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Housing Units (2010)	Median Home Value (2017-2021)
Harrison County	79,636	85,181	94,568	$162,400
Biloxi	22,115	21,278	X	$168,600
D'Iberville	3,088	4,298	X	$161,800
Gulfport	29,559	31,602	X	$138,200
Long Beach	7,203	6,695	X	$165,600
Pass Christian	3,351	2,494	X	$212,000

Source: United States Census Bureau, 2000,2010, and 2020 Census, 2017-2021 American Community Survey 5-Year Estimates

Infrastructure

TRANSPORTATION

In Harrison County, Interstate 10 and U.S. Highway 90 run east to west allowing transportation in southern half of the county. Interstate 110/Mississippi Highway 67 and U.S. Highway 49 run north-south through Harrison County.

The Gulfport-Biloxi International Airport is located in Harrison County. This airport is served by three major airlines with direct flights to Atlanta, Charlotte, Dallas/Ft. Worth, and Houston as well as connections to hundreds of locations in the U.S. and worldwide. There are is also a military airport on Kessler Air Force Base in Biloxi.

In terms of other transportation services, Port of Gulfport operates within the county, connecting it to national and global markets. Two Class-I Major railways also serve the county.

UTILITIES

Electrical power in Harrison County is mainly provided by electric power associations. Mississippi Power Company also provides power to some parts of the county.

CenterPoint Energy Resources is the natural gas supplier that serves Harrison County.

Water and sewer service is provided by a number of different sources including several of the participating cities and the county, but unincorporated areas often rely on septic systems and wells in Harrison County.

COMMUNITY FACILITIES

There are a number of buildings and community facilities located throughout Harrison County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 4 communications facilities, 3 emergency operations centers (EOCs), 32 fire stations, 13 medical facilities, 17 police stations, 92 power/gas facilities, 29 private/non-profit facilities, 75 public facilities, 68 schools, 3 shelters, 69 special populations facilities, 26 transportation facilities, and 42 water/wastewater facilities located within the county.

There are six hospitals located in Harrison County. These include VA Gulf Coast Veterans Health Care System, Merit Health Biloxi, and U.S. Air Force Medical Center Keesler in Biloxi and Garden Park Medical Center, Memorial Hospital, and Select Specialty – Gulfport Hospital in Gulfport. There are also several additional medical care facilities located in the county as outlined in the vulnerability assessment (Section 6.4.1).

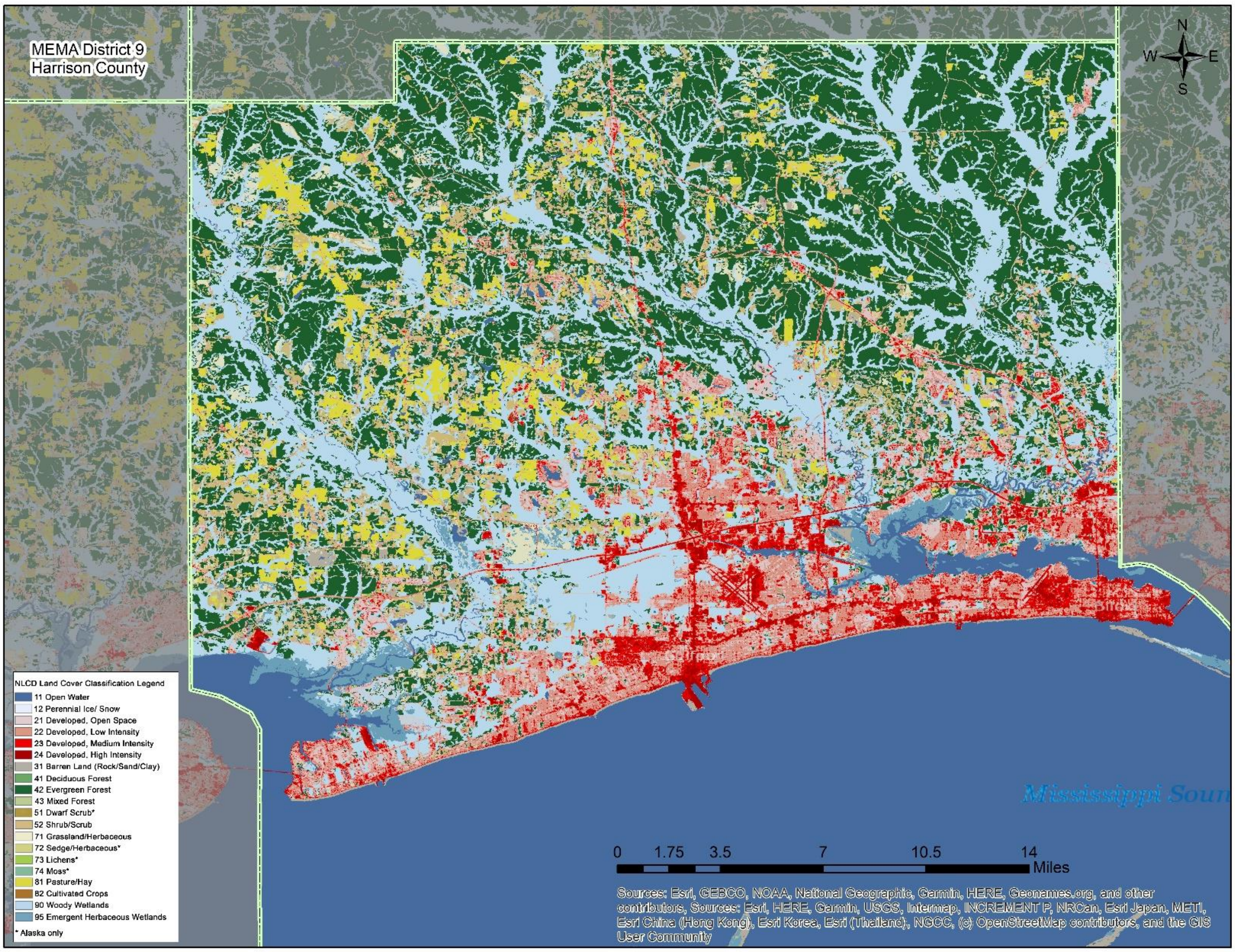
Harrison County contains numerous local, state, and national parks and recreation areas, including the Gulf Islands National Seashore, Mississippi Gulf Coast National Heritage Area, and DeSoto National Forest. Golf courses and resorts, recreational and sports fishing, gamming and casinos, and sand beaches are abundant in the county.

Land Use

Many areas of Harrison County are undeveloped or sparsely developed. There are several incorporated municipalities located along the coast. Coastal land use patterns radiate from city centers and commercial land uses are located in central business districts and highway strips, with surrounding housing that becomes progressively large in lot size and floor area with distance from the central business districts. Residential and non-residential densities are generally low, and concentrated mix of uses are infrequent, creating an auto-oriented land use pattern along the coast. Upland land use patterns differ markedly from the coastal plain. There are only a few municipalities and unincorporated rural centers. There is a mix of protected lands, such as the DeSoto National Forest. Private lands are used for exurban housing, agriculture, and forestry. Consistent with its rural character, densities are very low and uses are not mixed, making motor vehicles the only viable mode for virtually all travel.

Local land use and associated regulations are further discussed in Section 7: Capability Assessment.

Figure C.2: Land Classification



Employment and Industry

According to the 2019 American Community Survey (ACS), Harrison County had an average annual employment of 100,196 workers and an average unemployment rate of 5.5 percent (compared to 4.2 percent for the state). In 2019, the average annual median household income in Harrison County was $47,894 compared to $45,081 in the state of Mississippi.

SECTION 16 HARRISON COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: Hazard Identification as they pertain to Harrison County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: Hazard Profiles.

National Risk Index Scores:
The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather. Because not all hazards apply to the County, only those with a defined risk to the County are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability and Community Resilience, to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions but cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision-makers as they develop risk reduction strategies.

Social Vulnerability:
Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Per the FEMA National Risk Index, Harrison County has a Social Vulnerability Rating of **"Very High"** and a Social Vulnerability Score of **"92.2"** (FEMA, 2023).

The "Social Vulnerability Score" and "Rating" represent the relative level of a community's social vulnerability compared to all other communities at the same level. A community's Social Vulnerability Score is also proportional to a community's risk. A higher Social Vulnerability Score results in a higher Risk Index Score (FEMA, 2023).

Social vulnerability is also one of five components included in the formulation of the "National Risk Index Score" in addition to community resilience, estimated annual loss (EAL) based on exposure, annualized frequency, and historic Loss Ratio (HLR) factors (FEMA, 2023).

Table *C.4: Social Vulnerability FEMA NRI Score*

HARRISON COUNTY, MS FEMA NRI SOCIAL VULNERABILITY SCORE	
Social Vulnerability Score	**Social Vulnerability Rating**
92.2	Very High

Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).
Source: hazards.fema.gov/nri/social-vulnerability

Community Resilience:
Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Table C.5: Community Resilience FEMA NRI Score

HARRISON COUNTY, MS FEMA NRI COMMUNITY RESILIENCE SCORE	
Community Resilience Score	Community Resilience Rating
67.4	Relatively High
Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).	
Source: hazards.fema.gov/nri/community-resilience	

Expected Annual Loss:

Table C.6:. Expected Annual Loss FEMA NRI Score (All Natural Hazards)

EXPECTED ANNUAL LOSS FOR HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS SCORE	
Expected Annual Loss Score	Expected Annual Loss Rating
96.9	Relatively High
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio).	
Source: hazards.fema.gov/nri/expected-annual-loss	

FEMA National Risk Index Score:

Table C.7: Overall FEMA NRI Score

FEMA OVERALL NRI SCORE FOR HARRISON COUNTY,MS FEMA OVERALL NRI SCORE	
FEMA Overall NRI Score	FEMA Overall NRI Rating
97.2	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience. (Expected Annual Loss X Social Vulnerability / Community Resilience = Risk Index).	
Source: hazards.fema.gov/nri/determining-risk	

Harrison County Overall Risk Scores:
The following tables represent the new overall risk scores for Harrison County based on the described methodology above. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores. FEMA NRI Scores were used as appropriate and applicable to inform the analysis.

Table C.8:. 2023 Hazard Risk Scores Harrison County

Hazard Event	Probability	Consequence				Total Risk Score (Probability x Consequence)
	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Factors	Sum of Weighted Impact Factors	Consequence Score	

Dam and Levee Failure	1	1	4	15	20	13
Erosion	2	6	10	23	39	43
Flood	3	12	12	32	56	84
Storm Surge	2	12	15	32	59	62
Drought	2	8	9	18	35	39
Lightning	3	1	9	22	32	52
Wildfire	2	6	6	24	36	40
Earthquake	1	0	4	12	16	11
Extreme Cold	2	1	3	19	23	27
Extreme Heat/Heat Wave	3	12	8	27	47	72
Hailstorm	3	1	4	13	18	31
Hurricane Tropical Storm	2	12	17	39	68	70
Severe Thunderstorm/High Wind	3	7	14	32	53	80
Tornado	3	5	13	34	52	78
Winter Weather	2	0	3	26	29	33
Climate Change/Sea Level Rise	1	5	4	22	31	19
HAZMAT/Train Derailment	1	4	6	17	27	17
Infectious Disease	1	8	10	27	45	27

For a full listing of rankings and methodologies please click the below link:

HarrisonCounty_RankingSpreadsheet.xlsx

Table C.9:. Hazard Risk Scores Legend

Probability Factor		Sum of Weighted Extent Factors		Sum of Weighted Vulnerability Factors		Sum of Weighted Impact Factors		Consequence Score		Total Risk Score	
1	Low (L)	0–6	Low (L)	0–6	Low (L)	0–12	Low (L)	0–25	Low (L)	0–24	Low (L)
2	Medium (M)	7–12	Medium (M)	7–12	Medium (M)	13–26	Medium (M)	26–50	Medium (M)	25–59	Medium (M)
3	High (H)	13–18	High (H)	13–18	High (H)	27–39	High (H)	51–75	High (H)	60–100	High (H)

** The **Legend** – specifically the assignment of low, medium, and high—provides an additional means to qualitatively assess the probability factor, sum of weighted factors, and the total risk scores for each hazard.*

*The **Consequence Score** represents the sum of the Extent, Vulnerability, and Impact Factors.*

*The **Total Risk Score** is a measure of Probability and Consequence.*

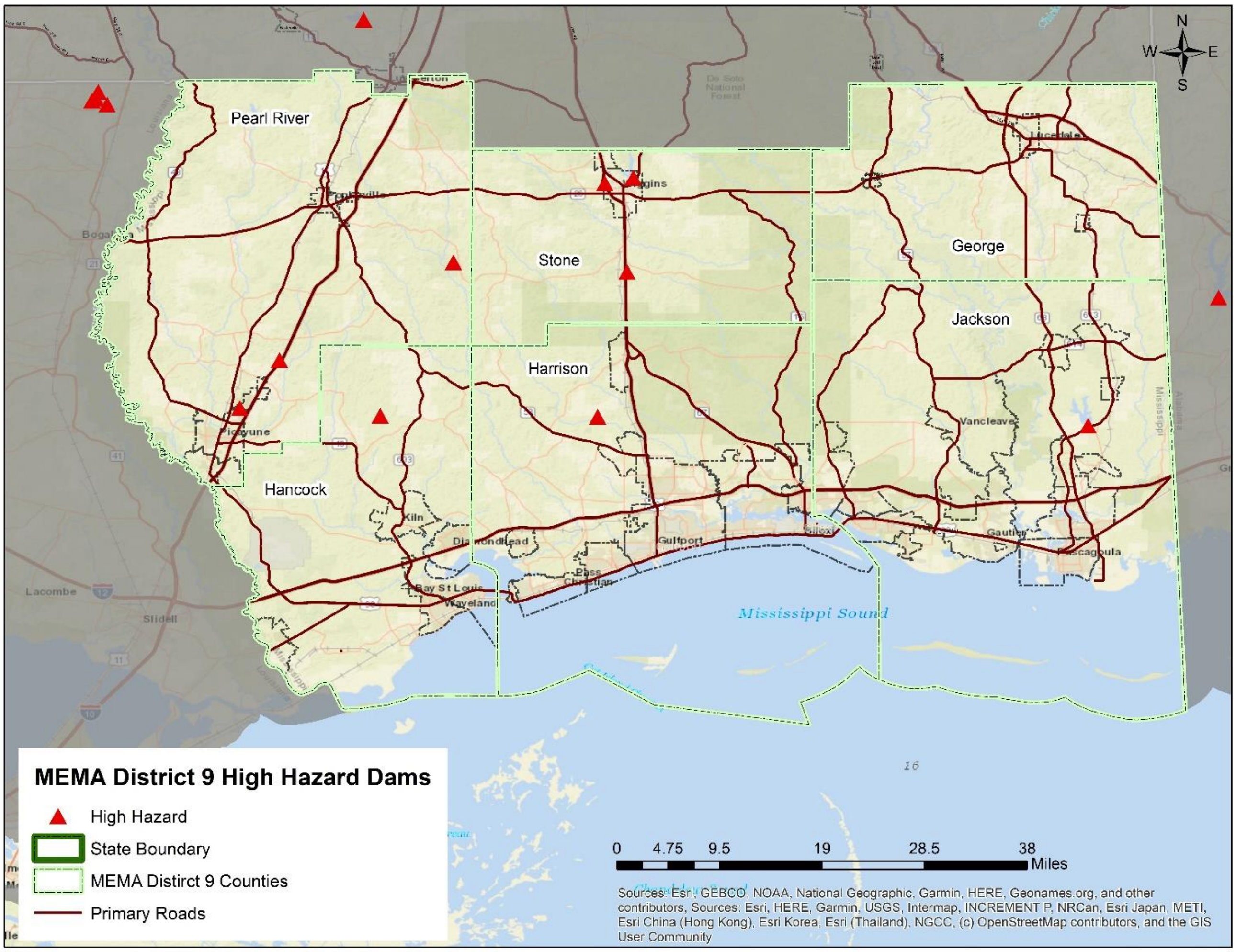
FLOOD-RELATED HAZARDS

DAM AND LEVEE FAILURE

LOCATION AND SPATIAL EXTENT

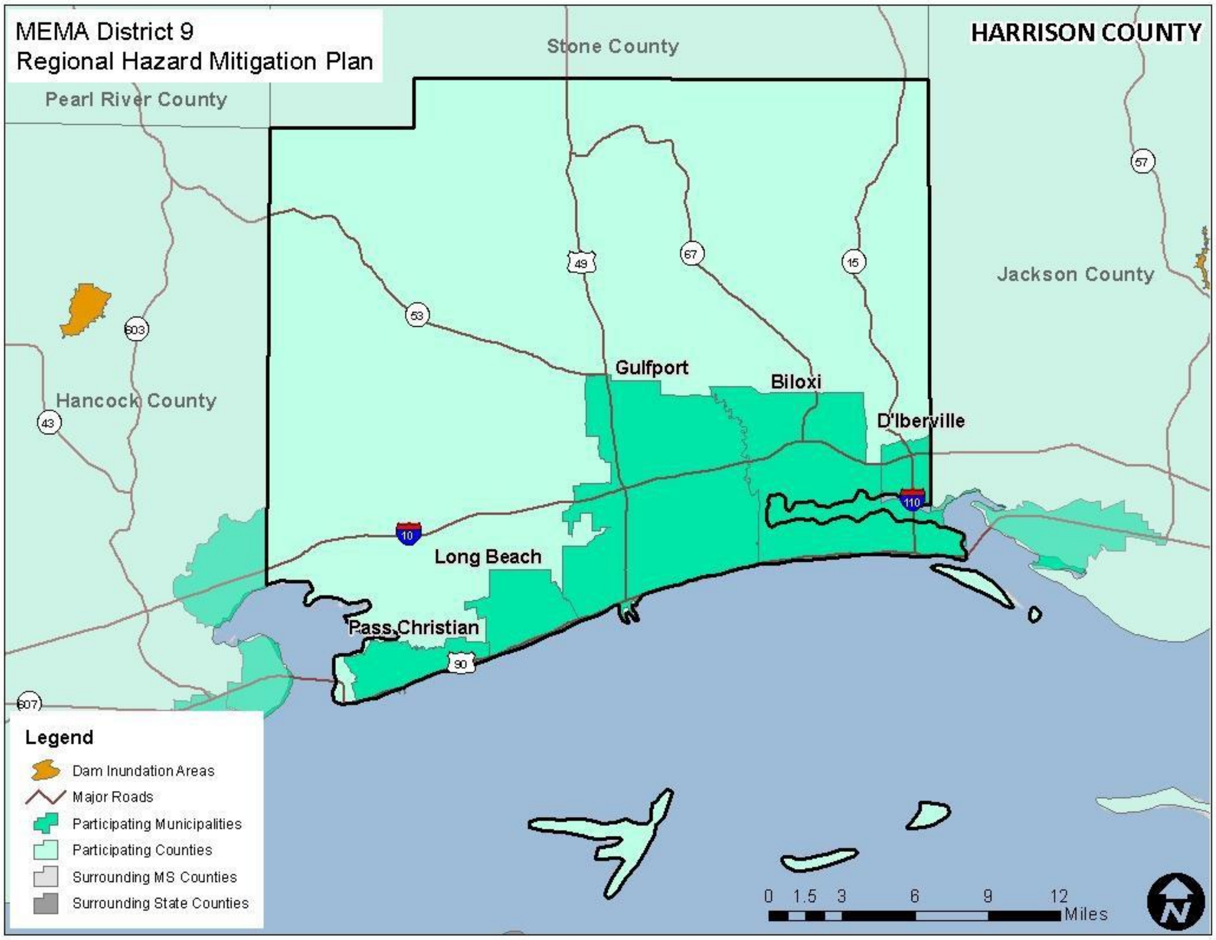
According to the Mississippi Department of Environmental Quality, there is one high hazard dam in Harrison County. Figure C.3 and Figure C.4 show the location of this high hazard dam as well as mapped dam inundation areas, and Table C.10 lists it by name.

FIGURE C.3: HARRISON COUNTY HIGH HAZARD DAM LOCATIONS



Source: Mississippi Department of Environmental Quality

FIGURE C.4: HARRISON COUNTY DAM INUNDATION AREAS



Source: Mississippi Department of Environmental Quality

TABLE C.10: HARRISON COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential
Harrison County	
LAKE A TWIN LAKES SUBDIVISION DAM	High

Source: Mississippi Department of Environmental Quality

HISTORICAL OCCURRENCES

According to the Mississippi State Hazard Mitigation Plan, there has been one dam failure reported in Harrison County. Although no damage was reported with this event, several breach scenarios in the region could be catastrophic.

Table C.11 below provides a brief description of the one reported dam failure.

TABLE C.11: HARRISON COUNTY DAM FAILURES (1982-2022)

Date	County	Structure Name	Cause of Failure
October 2002	Harrison	Windy Hills Lake	Piping along primary spillway conduit

Source: Mississippi State Hazard Mitigation Plan

PROBABILITY OF FUTURE OCCURRENCES

Given the current dam inventory and historic data, a dam breach is possible (between 1 and 10 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess high-hazard dams and levees.

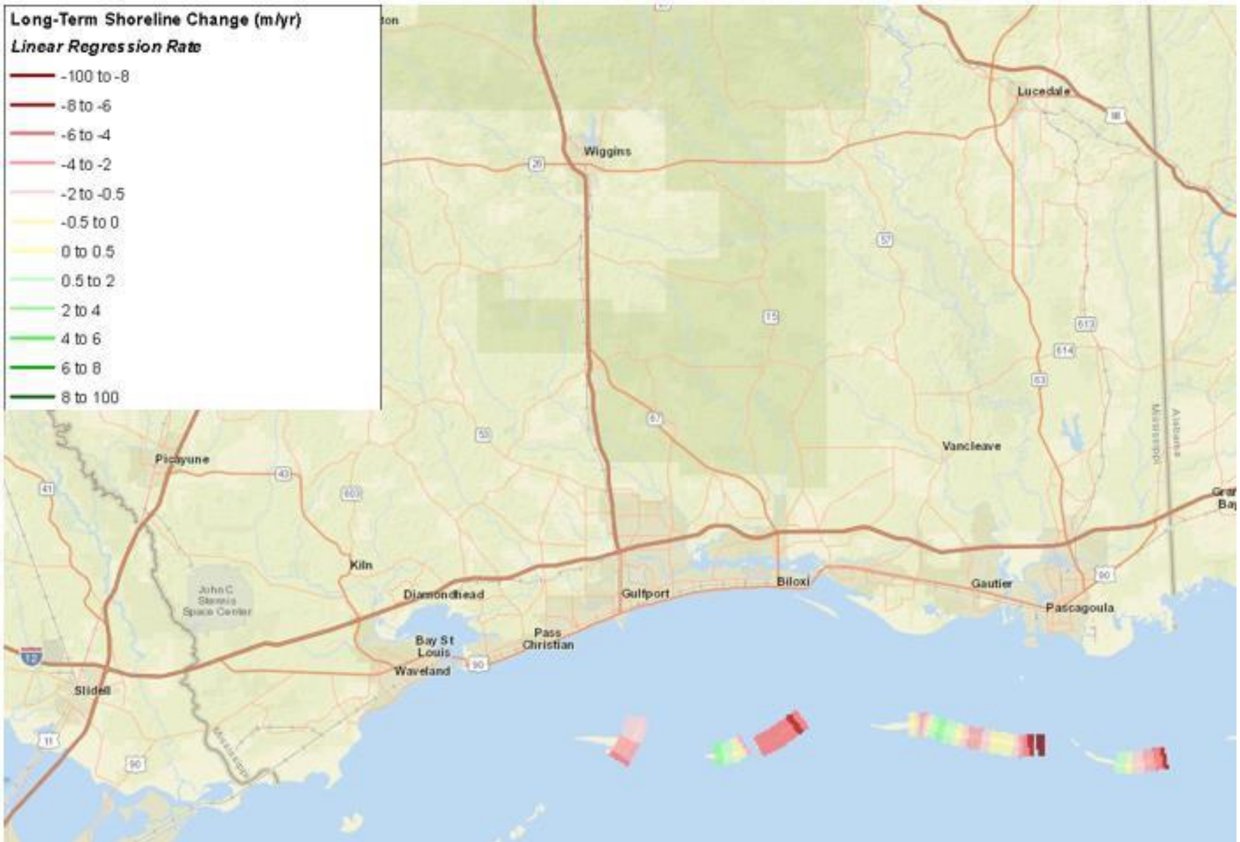
EROSION

LOCATION AND SPATIAL EXTENT

For the most part, major erosion in Harrison County is typically caused by coastal tides, ocean currents, and storm events. Although the county also experiences riverine erosion in many of its inland areas, these are of somewhat less concern than coastal erosion areas which historically have had larger impacts. Unlike inland areas, where the soil has greater organic matter content, coastal soils are mainly composed of fine grained particles such as sand. This makes coastal soils much more susceptible to erosion. Although some areas of the Harrison County coast are protected and natural erosion processes are allowed to take place for the most part, many areas near where development has occurred are especially susceptible.

At this time, there is limited data available on localized areas of erosion. Most of the information collected by the United States Geological Survey (USGS) is focused on the barrier islands that are just off the coast of the mainland. The long-term shoreline change for the barrier islands as calculated by the USGS can be found in Figure C.5 It should be noted that many areas of the coast are protected through the use of structural techniques. Also, a great deal of renourishment activities are carried out along the mainland coastal communities.

FIGURE C.5: LONG-TERM SHORELINE CHANGE (M/YR) IN THE MEMA DISTRICT 9 REGION



Source: United States Geological Survey

HISTORICAL OCCURRENCES

Several sources were vetted to identify areas of erosion in Harrison County. This includes searching local newspapers, interviewing local officials, and reviewing previous hazard mitigation plans. Because dramatic, short-term erosion tends to take place after major storm events such as hurricanes, flooding, or storm surge, the erosion events often correspond directly with those events. Conversely, with long- term erosion, it is difficult to identify a specific historic occurrence because these events are by nature occurring at all times over a long period at a very gradual rate. Therefore, long-term historic erosion events cannot be confined to a specific timeframe or occurrence.

PROBABILITY OF FUTURE OCCURRENCES

Erosion remains a natural, dynamic, and continuous process for Harrison County, and it will continue to occur. The annual probability level assigned for erosion is likely (between 10 and 100 percent annually).

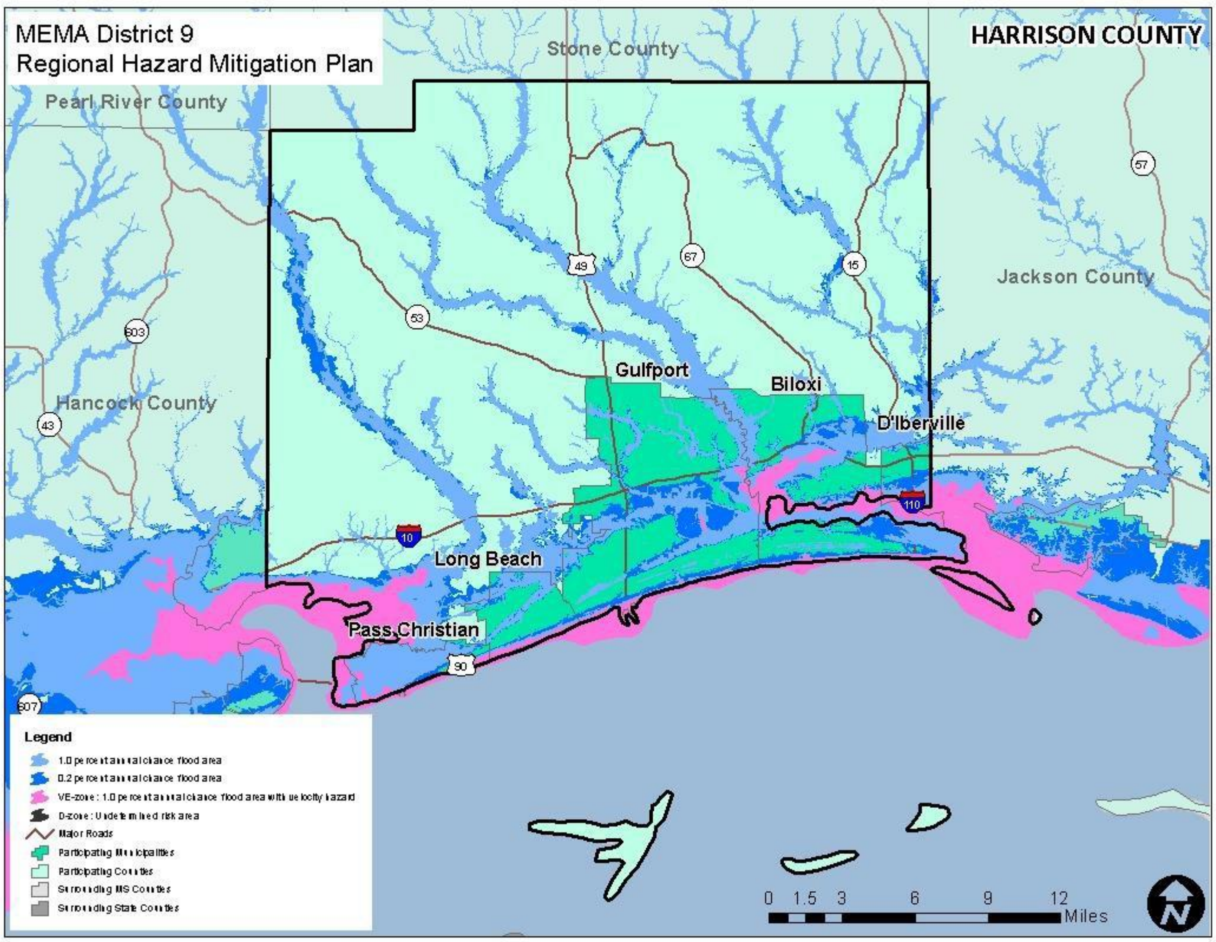
FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess erosion events.

FLOOD

LOCATION AND SPATIAL EXTENT

There are areas in Harrison County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM). This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevations), Zone VE (1-percent annual chance floodplain with additional hazards due to storm-induced velocity wave action), Zone X500 (0.2-percent annual chance floodplain), and Zone D (undetermined risk area). Figure C.6 illustrates the location and extent of currently mapped special flood hazard areas for the county based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

FIGURE C.6: SPECIAL FLOOD HAZARD AREAS IN HARRISON COUNTY



Source: Federal Emergency Management Agency

Figure C.7: National Flood Hazard Layer (No Facilities)

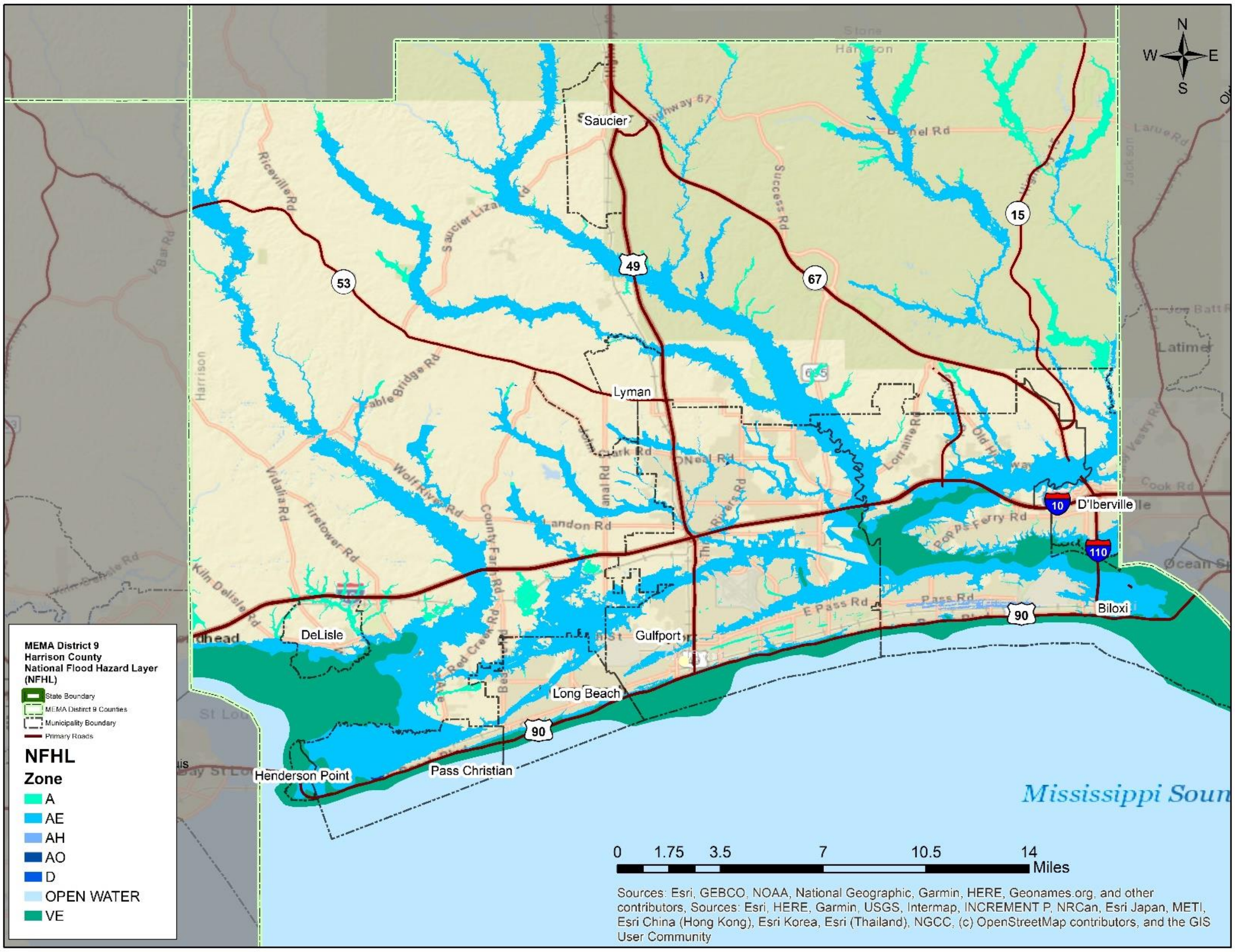
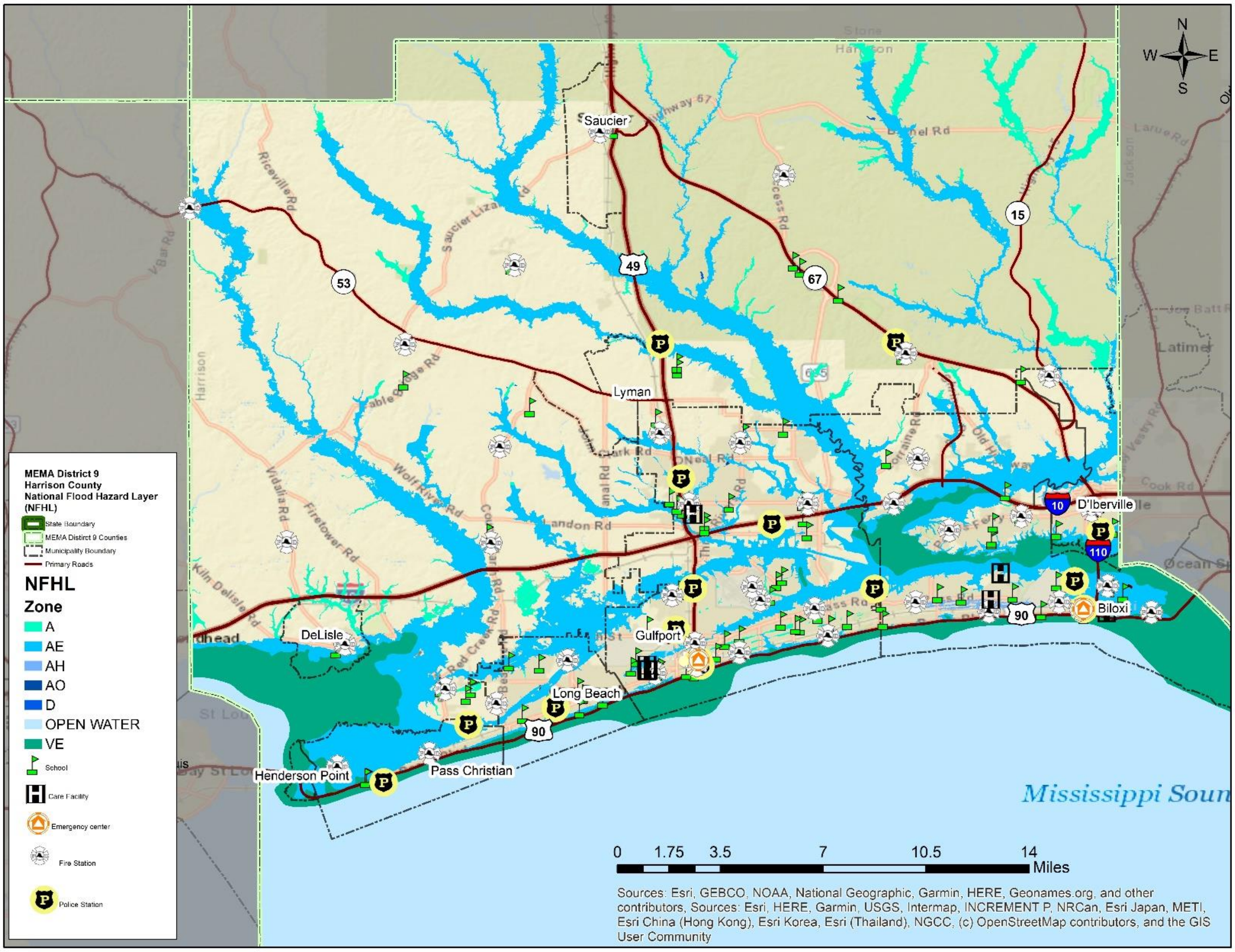


Figure C.8: National Flood Hazard Layer (Facilities)



HAZUS 100-year Flood Analysis

Hazus estimates that there are 77,322 buildings in the region which have an aggregate total replacement value of 21,192 million dollars.

Table C-12: 100-year Flooding Building Exposure by Occupancy Type for the Scenario

Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,724,526	81.7%
Commercial	403,885	12.1%
Industrial	103,623	3.1%
Agricultural	7,584	0.2%
Religion	54,910	1.6%
Government	8,181	0.2%
Education	33,583	1.0%
Total	**3,336,292**	**100%**

Pie Chart 1: 100-year Flooding Building Exposure by Occupancy Type for the Scenario

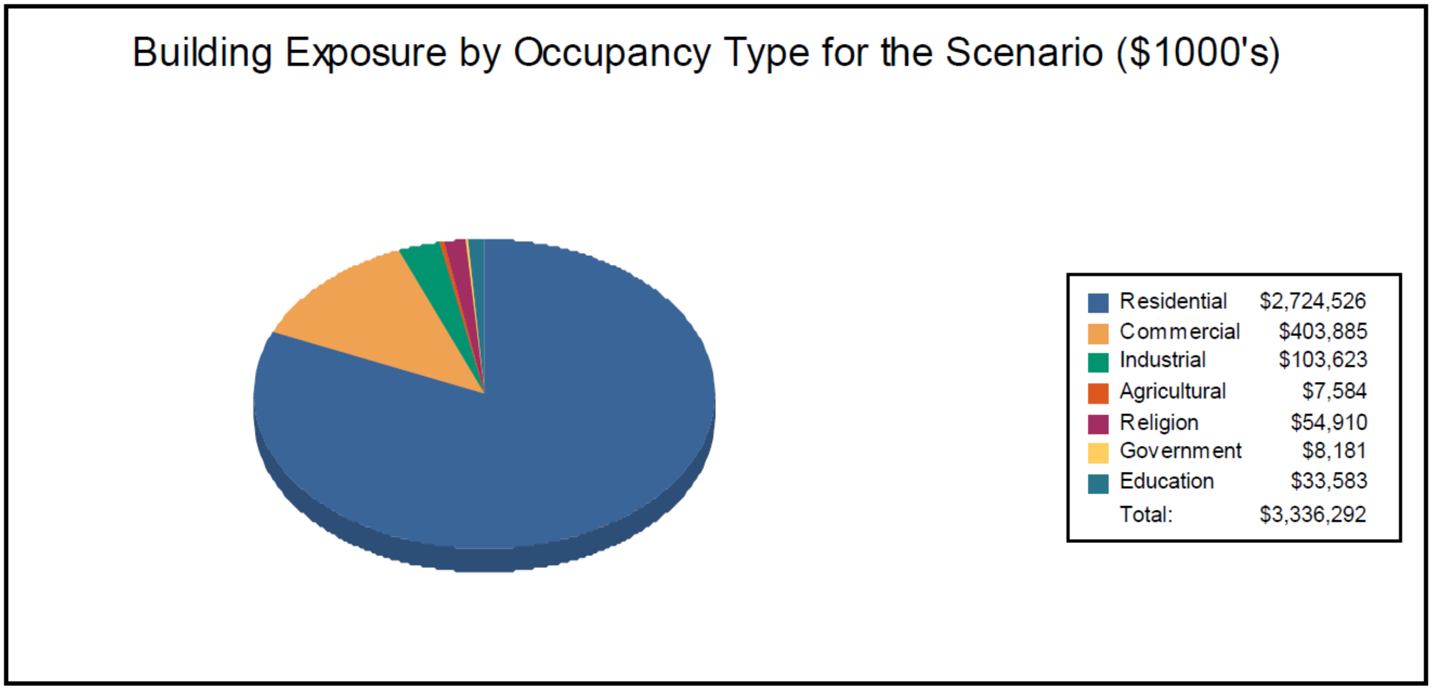


Figure C.9: HAZUS 100-Year Scenario (No Facilities)

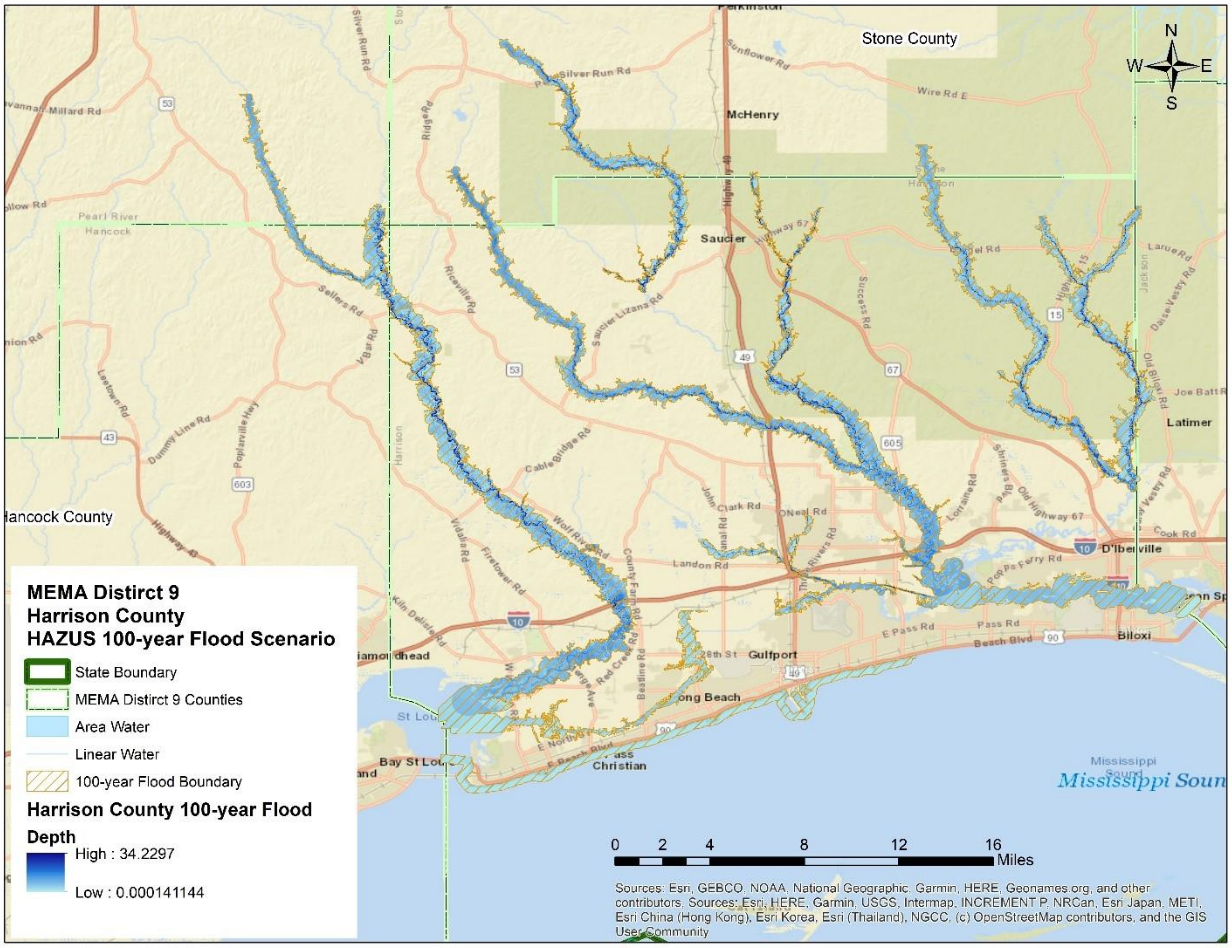
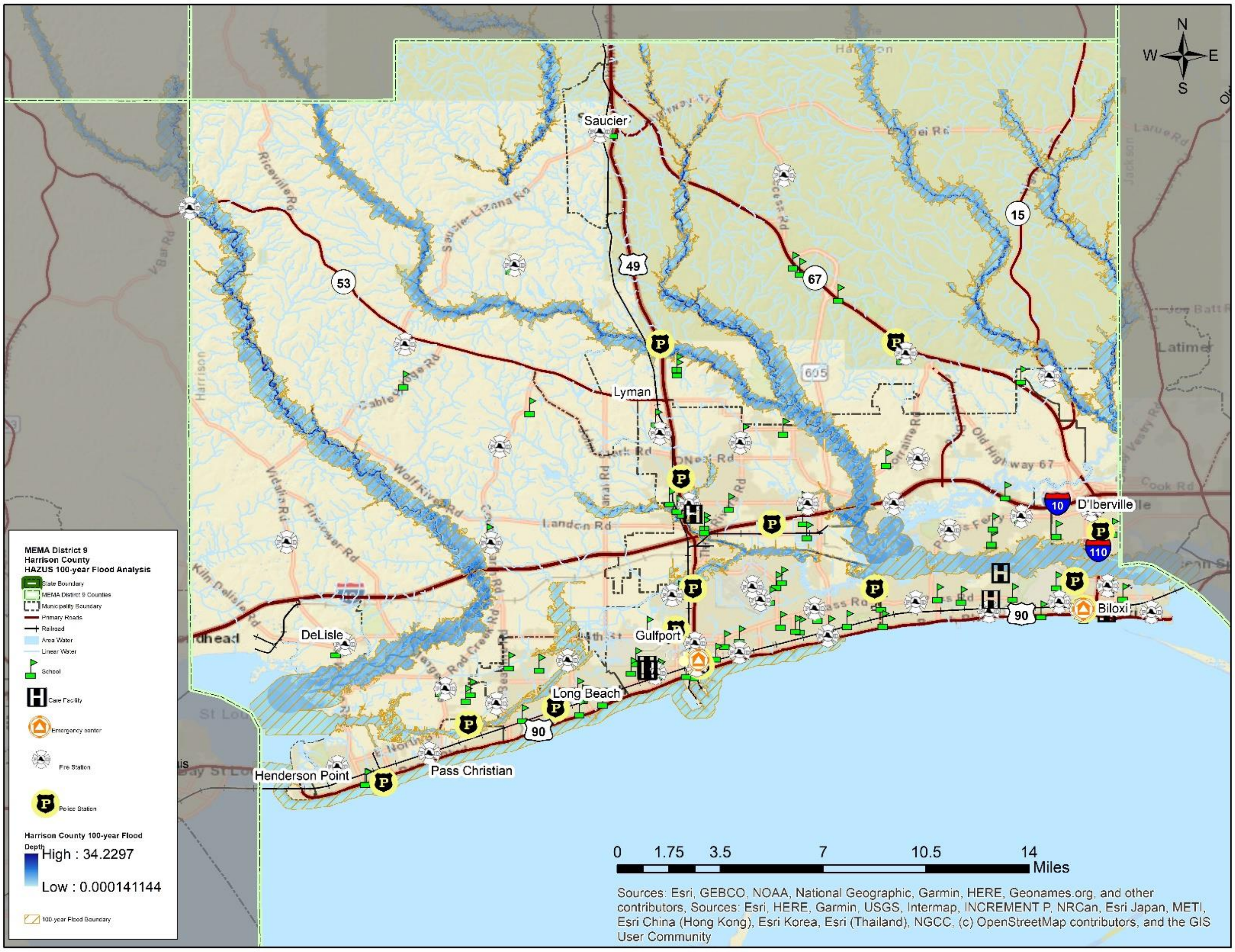


Figure C.10: HAZUS 100-Year Scenario (Facilities)



HAZUS General Building Stock

Hazus estimates that about 284 buildings will be at least moderately damaged. This is over 49% of the total number of buildings in the scenario. There are an estimated 34 buildings that will be destroyed.

HAZUS Economic Loss

The total economic loss estimated for the flood is 218.32 million dollars, which represents 6.54 % of the total replacement value of the scenario buildings.

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

105.36 105.36 105.3605.36

The total building-related losses were 121.77 million dollars. 44% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.26% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

HISTORICAL OCCURRENCES

Floods were at least partially responsible for six disaster declarations in Harrison County in 1974, 1980, 1990, twice in 1991, and 1995. Information from the National Center for Environmental Information was used to ascertain additional historical flood events. The National Center for Environmental Information reported a total of 45 events in Harrison County since 1996. These events accounted for over $3.1 million in property damage and one fatality in the county. Based on recorded historic events, Harrison County has experienced up to 20'' of rainfall over a two-day period from a single event which caused widespread flash and riverine flooding throughout the county. No specific water depths were provided; however, based on narrative reports via NCEI data records water levels ranged from a few inches to several feet along floodways through the county. A summary of these events is presented in Table C.13. Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in Table C.14.

TABLE C.13: SUMMARY OF FLOOD OCCURRENCES IN HARRISON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Biloxi	11	0/0	$155,389	$5,977
D'Iberville	4	0/0	$30,339	$1,167
Gulfport	7	0/0	$0	$0
Long Beach	9	1/0	$1,366,517	$52,558
Pass Christian	3	0/0	$0	$0
Unincorporated Area	40	0/0	$2,041,219	$78,508
HARRISON COUNTY TOTAL	74	1/0	$3,593,464	$138,210

Source: National Center for Environmental Information

TABLE C.14: HISTORICAL FLOOD EVENTS IN HARRISON COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Biloxi				
BILOXI	5/28/1996	Flood	0/0	$0
BILOXI	8/25/2002	Flood	0/0	$0
(BIX)KEESLER AFB BIL	12/12/2009	Flash Flood	0/0	$0
BILOXI	8/18/2013	Flash Flood	0/0	$103,389
BILOXI	4/12/2015	Flash Flood	0/0	$0
BILOXI	4/12/2015	Flash Flood	0/0	$0
(BIX)KEESLER AFB BIL	4/14/2015	Flash Flood	0/0	$0
BILOXI	4/28/2016	Flash Flood	0/0	$0
BILOXI	6/21/2021	Flash Flood	0/0	$0
(BIX)KEESLER AFB BIL	9/17/2021	Flash Flood	0/0	$0
BILOXI	10/04/2021	Flash Flood	0/00	$25,000
D'Iberville				
D IBERVILLE	7/6/2013	Flash Flood	0/0	$10,339
D IBERVILLE	6/2/2017	Flood	0/0	$0
D IBERVILLE	6/21/2021	Flash Flood	0/0	$0
D IBERVILLE	9/17/2021	Flash Flood	0/0	$20,000
Gulfport				
GULFPORT	4/15/1996	Flood	0/0	$0
GULFPORT	7/26/1997	Flood	0/0	$0

GULFPORT	9/19/2001	Flood	0/0	$0
GULFPORT	7/17/2003	Heavy Rain	0/0	$0
GULFPORT	4/5/2008	Heavy Rain	0/0	$0
GULFPORT	2/25/2013	Flash Flood	0/0	$0
(GPT)GULFPORT RGNL A	4/15/2015	Flash Flood	0/0	$0

Location	Date	Type	Deaths/Injuries	Property Damage*
Long Beach				
LONG BEACH	3/28/2009	Flash Flood	1/0	$841,998
LONG BEACH	7/18/2011	Flash Flood	0/0	$0
LONG BEACH	8/29/2012	Flash Flood	0/0	$524,519
LONG BEACH	4/29/2014	Flash Flood	0/0	$0
LONG BEACH	4/29/2014	Flash Flood	0/0	$0
LONG BEACH	4/15/2015	Flash Flood	0/0	$0
LONG BEACH	6/29/2017	Flash Flood	0/0	$0
LONG BEACH	10/22/2017	Flash Flood	0/0	$0
LONG BEACH	4/14/2018	Flash Flood	0/0	$0
Pass Christian				
PASS CHRISTIAN	5/19/1997	Flood	0/0	$0
PASS CHRISTIAN	3/21/2012	Flash Flood	0/0	$0
PASS CHRISTIAN	3/22/2012	Flash Flood	0/0	$0
Unincorporated Area				
SOUTH PORTION	7/8/1996	Flood	0/0	$153,507
COUNTYWIDE	1/7/1998	Flood	0/0	$0
COUNTYWIDE	3/7/1998	Flash Flood	0/0	$0
HARRISON (ZONE)	3/8/1998	Flood	0/0	$0
COUNTYWIDE	6/11/2001	Flash Flood	0/0	$1,019,987
COUNTYWIDE	9/26/2002	Flash Flood	0/0	$0
HARRISON (ZONE)	7/1/2003	Flood	0/0	$196,348
COUNTYWIDE	3/31/2005	Heavy Rain	0/0	$0
COUNTYWIDE	4/1/2005	Flash Flood	0/0	$61,662
HARRISON (ZONE)	4/1/2005	Flood	0/0	$123,325
WOOL MARKET	5/1/2013	Flash Flood	0/0	$103,389
SAUCIER	5/9/2014	Heavy Rain	0/0	$0
LANDON	5/9/2014	Flash Flood	0/0	$0
HENDERSON PT	5/14/2014	Flash Flood	0/0	$0
LYMAN	5/16/2015	Heavy Rain	0/0	$0
WORTHAM	5/16/2015	Flash Flood	0/0	$0
HARRISON (ZONE)	10/25/2015	Coastal Flood	0/0	$0
RICEVILLE	5/17/2016	Heavy Rain	0/0	$0
SAUCIER	5/17/2016	Heavy Rain	0/0	$0
LYMAN	5/17/2016	Flash Flood	0/0	$0
WOOL MARKET	8/11/2016	Flash Flood	0/0	$270,000
LORRAINE	6/21/2017	Flood	0/0	$0
LANDON	6/29/2017	Flash Flood	0/0	$0
HOWISON	8/06/2017	Flash Flood	0/0	$0
ORANGE GROVE	4/14/2018	Flood	0/0	$0
HENDERSON PT	4/14/2018	Flash Flood	0/0	$0
LYMAN	4/14/2018	Flash Flood	0/0	$0
HOWISON	4/14/2018	Flash Flood	0/0	$0
ORANGE GROVE	7/16/2018	Flash Flood	0/0	$0
RICEBILLE	5/12/2019	Flood	0/0	$0
LYMAN	4/15/2021	Flash Flood	0/0	$0

MISSISSIPPI CITY	6/21/2021	Flash Flood	0/0	$5,000
BEAUVOIR	7/06/2021	Flood	0/0	$45,000
NORTH GULFPORT	7/06/2021	Flash Flood	0/0	$0
ORANGE GROVE	7/06/2021	Flash Flood	0/0	$33,000
NUGET	7/06/2021	Flash Flood	0/0	$30,000
HANDSBORO	9/15/2021	Flash Flood	0/0	$0
LYMAN	6/30/2022	Flash Flood	0/0	$0
WORTHAM	6/30/2022	Flash Flood	0/0	$0
BEAUVOIR	8/25/2022	Flash Flood	0/0	$0

Source: National Center for Environmental Information

HISTORICAL SUMMARY OF INSURED FLOOD LOSSES

According to FEMA flood insurance policy records as of October 2016, there have been 12,677 flood losses reported in Harrison County through the National Flood Insurance Program (NFIP) since 1978, totaling almost $1.3 billion in claims payments. A summary of these figures for the county is provided in Table C.15. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Harrison County were either uninsured, denied claims payment, or not reported.

TABLE C.15: SUMMARY OF INSURED FLOOD LOSSES IN HARRISON COUNTY

Location	Number of Policies	Flood Losses	Claims Payments
Biloxi	5,206	2,293	$253,008,756
D'Iberville	515	27	$1,939,357
Gulfport	5,267	3,078	$285,499,409
Long Beach	2,640	1,505	$152,511,425
Pass Christian	2,093	2,550	$323,619,220
Unincorporated Area	2,640	3,224	$261,560,972
HARRISON COUNTY TOTAL	18,361	12,677	$1,278,139,139

Source: National Flood Insurance Program

REPETITIVE LOSS PROPERTIES

According to the Mississippi Emergency Management Agency, there are 1,300 non-mitigated repetitive loss properties located in Harrison County, which accounted for 3,932 losses and almost $195.5 million in claims payments under the NFIP. The average claim amount for these properties is $49,710. Of the 1,300 properties, 1,109 are single family, 28 are 2-4 family, 30 are assumed condominium, 13 are other residential, 95 are non-residential, and 25 are unknown. Without mitigation, these properties will likely continue to experience flood losses. Table C.16 presents detailed information on repetitive loss properties and NFIP claims and policies for Harrison County.

During the 2022 HMP update process updated NFIP/Repetitive Loss data was requested; however, no new data was made available. The 2016 data is considered the best available data for the plan update. With a lack of data provided via FEMA the National Resource Defense Council (NRDC) was utilized to provide unofficial NFIP/SRL data. Based on data available via the (NRDC), Harrison County has experienced a total of 15,268 NFIP claims totaling $1,257,933,379 in payments. The total number of SRL Properties are 325 with 65,306,183 payments.
[Losing Ground: Severe Repetitive Flooding in the United States (nrdc.org)]

TABLE C.16: REPETITIVE LOSS PROPERTIES IN HARRISON COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Biloxi	239	197 single family; 8 2-4 family; 6 assumed condo; 3 other residential; 25 non residential	663	$27,856,539	$11,012,285	$38,868,824	$58,626
D'Iberville*	25	20 single family; 3 other residential; 2 non-residential	--	--	--	--	--

Gulfport	493	405 single family; 12 2-4 family; 14 assumed condo; 6 other residential; 56 other non-residential	1,554	$51,897,852	$17,554,404	$69,452,256	$44,693

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Long Beach	142	134 single family; 3 2-4 family; 2 assumed condo; 3 non-residential	540	$11,802,135	$4,166,690	$15,968,825	$29,572
Pass Christian	175	162 single family; 2 2-4 family; 2 assumed condo; 4 other residential; 5 other non-residential	493	$25,114,472	$7,796,198	$32,910,670	$66,756
Unincorporated Area	226	211 single family; 3 2-4 family; 6 assumed condo; and 6 non-residential	682	$29,049,809	$9,211,082	$38,260,891	$56,101
HARRISON COUNTY TOTAL	1,300		3,932	$145,720,807	$49,740,659	$195,461,466	$49,710

*The information provided by D'Iberville did not include specific building types, number of losses, building payments, or content payments information. Therefore, the number of losses, building payments, contents payments, and total payments for the city are not included in the county total. Building types were determine by searching the addresses online.

Source: Federal Emergency Management Agency, National Flood Insurance Program

PROBABILITY OF FUTURE OCCURRENCES

Flood events will remain a threat in Harrison County, and the probability of future occurrences will remain highly likely (100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figure above, which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain). Further, as described in other hazard profiles, it is highly likely that Harrison County will continue to experience inland flooding associated with large tropical storms and hurricanes.

It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county. For example, the coastal area of the county has more floodplain and thus a higher risk of flood than the rest of the county. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

It should also be noted that anticipated sea level rise will increase the probability and intensity of future tidal flooding events in years to come. Rising sea level over time will shorten the return period (increasing the frequency) of significant flood events. This hazard is discussed elsewhere in this section.

FEMA NRI Expected Annual Loss Estimates

Table C.17: Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR FLOODING EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1.8 events/year	0.04	$476,298	$261,476	$581	$738,356	64.4	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table C.18. Harrison County Hazard Specific Risk Index Table

HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX –FLOODING

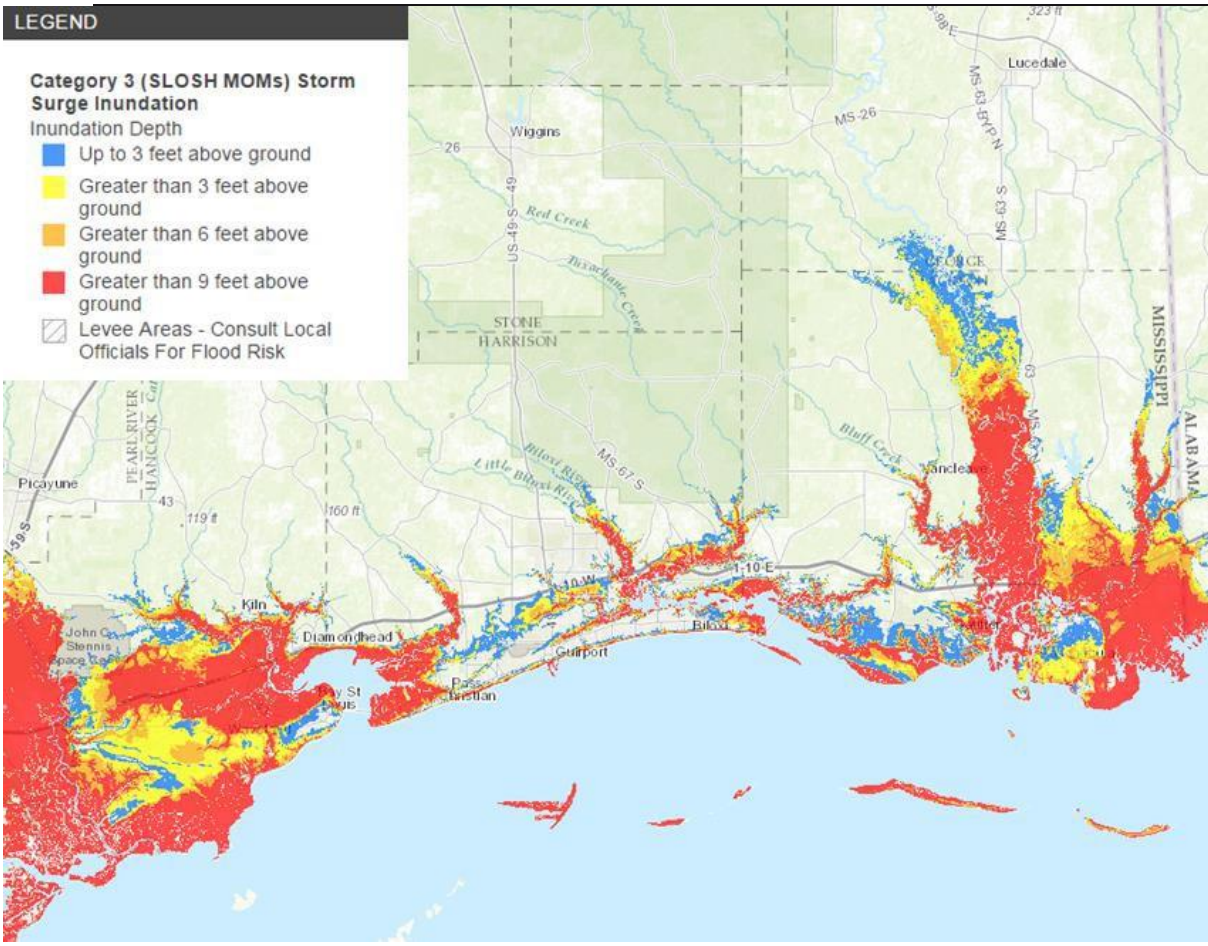
Risk Index Score	Risk Index Rating
64.6/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

STORM SURGE

LOCATION AND SPATIAL EXTENT

There are many areas in Harrison County that are subject to potential storm surge inundation as modeled and mapped by the National Oceanic and Atmospheric Administration (NOAA). Figure C.11 illustrates hurricane storm surge inundation zones based on a Category 3 storm. The illustration is derived from geo- referenced SLOSH (Sea, Lake, and Overland Surge from Hurricanes) data produced by the USACE in coordination with NOAA. SLOSH is a modeling tool used to estimate storm surge for coastal areas resulting from historical, hypothetical, or predicted hurricanes taking into account maximum expected levels for pressure, size, forward speed, track, and winds. Therefore, the SLOSH data is best used for defining the potential maximum surge associated with various storm intensities for any particular location. As shown in the figure, the entire coast of Harrison County is at high risk to storm surge inundation. Inland areas may also experience substantial flooding during a storm event.

FIGURE C.11: STORM SURGE RISK AREAS IN THE MEMA DISTRICT 9 REGION


LEGEND
Category 3 (SLOSH MOMs) Storm Surge Inundation
Inundation Depth
Up to 3 feet above ground
Greater than 3 feet above ground
Greater than 6 feet above ground
Greater than 9 feet above ground
Levee Areas - Consult Local Officials For Flood Risk
Lucedale
Wiggins
STONE
HARRISON
Picayune
Kiln
Diamondhead
Gulfport
Biloxi
Vancleave
MISSISSIPPI
ALABAMA
Source: NOAA

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, 10 storm surge events have been reported for Harrison County since 1998. These events accounted for over $6.9 billion (2016 dollars) in property damage. A summary of these events is presented in Table C.19. Detailed information on the recorded storm surge events can be found in Table C.20.

TABLE C.19: SUMMARY OF STORM SURGE EVENTS IN HARRISON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Biloxi	0	0/0	$0	$0
D'Iberville	0	0/0	$0	$0
Gulfport	0	0/0	$0	$0
Long Beach	0	0/0	$0	$0
Pass Christian	1	0/0	$369,406	$15,392
Unincorporated Area	18	0/0	$6,957,655,650	$289,902,319
HARRISON COUNTY TOTAL	19	0/0	$6,958,025,056	$289,917,711

Source: National Center for Environmental Information

TABLE C.20: HISTORICAL STORM SURGE EVENTS IN HARRISON COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Biloxi				
None reported	--	--	--	--
D'Iberville				
None reported	--	--	--	--
Gulfport				
None reported	--	--	--	--
Long Beach				
None reported	--	--	--	--
Pass Christian				
PASS CHRISTIAN	2/15/1998	2-4 feet above normal	0/0	$369,406
Unincorporated Area				
HARRISON (ZONE)	6/30/2003	--	0/0	$369,406
HARRISON (ZONE)	9/15/2004	3-5 feet above normal	0/0	$327,246
HARRISON (ZONE)	10/9/2004	2-4 feet above normal	0/0	$510,012
HARRISON (ZONE)	7/5/2005	3-5 feet above normal	0/0	$19,125
HARRISON (ZONE)	8/29/2005	19-25 feet	0/0	$369,974
HARRISON (ZONE)	9/1/2008	6-8 feet	0/0	$6,943,176,601
HARRISON (ZONE)	9/11/2008	3-5 feet above normal	0/0	$839,002
HARRISON (ZONE)	9/2/2011	2-4 feet above	0/0	$0

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
		normal		
HARRISON (ZONE)	8/28/2012	5-10 feet	0/0	$10,707
HARRISON (ZONE)	10/25/2015	1-3 feet above normal	0/0	$0
HARRISON (ZONE)	6/20/2017	2-4 feet above normal	0/0	$0
HARRISON (ZONE)	10/07/2017	4-6 feet above normal	0/0	$0
HARRISON (ZONE)	7/11/2019	3-5 feet above normal	0/0	$0
HARRISON (ZONE)	9/15/2020	3-4 feet above normal (JACKSON)	0/0	$0
HARRISON (ZONE)	10/10/2020	2-3 feet above normal	0/0	$200,000
HARRISON (ZONE)	10/28/2020	At least 10 feet above normal	1/0	$10,000,000
HARRISON (ZONE)	6/19/2021	2-4 feet above normal (HANCOCK)	0/0	$0
HARRISON (ZONE)	8/28/2021	2-4 feet above normal	0/0	$0

*Property damage is reported in 2022 dollars; all damage may not have been reported.
Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

It is highly likely (100 percent annual probability) that Harrison County will continue to experience storm surge associated with large tropical storms, hurricanes, and squalls combined with high tides. As noted in the preceding section (under Flood), anticipated sea level rise will increase the probability and intensity of future storm surge events in years to come. This rise in sea level will not only increase the probability and intensity of tidal flooding events, but will also contribute to the loss of coastal wetlands and erosion of sand beaches that act as protective buffers against storm surge events.

FEMA NRI Expected Annual Loss Estimates

Table C.21: Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR COASTAL FLOODING/STORM SURGE							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
6.5 events/year	0.01	$120,624	$4,759,213	n/a	$4,879,837	93.0	Relatively Moderate

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table C.22: Harrison County Hazard Specific Risk Index Table

HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX –COASTAL FLOODING/STORM SURGE	
Risk Index Score	Risk Index Rating
93.2/100	Relatively Moderate
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

FIRE-RELATED HAZARDS

DROUGHT

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that Harrison County would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment but may exacerbate wildfire conditions.

HISTORICAL OCCURRENCES

According to the U.S. Drought Monitor, Harrison County had drought levels of Severe or worse in 6 of the last 22 years (January 2000-October 2022). Table C.23 shows the most severe drought classification for each year, according to U.S. Drought Monitor classifications. It should be noted that the U.S. Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

TABLE C.23: HISTORICAL DROUGHT OCCURRENCES IN HARRISON COUNTY

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

	Harrison County
2000	EXCEPTIONAL
2001	MODERATE

2002	SEVERE
2003	ABNORMAL
2004	MODERATE
2005	ABNORMAL
2006	EXTREME
2007	MODERATE

	Harrison County
2008	ABNORMAL
2009	MODERATE
2010	MODERATE
2011	EXCEPTIONAL
2012	SEVERE
2013	MODERATE
2014	SEVERE
2015	MODERATE
2016	ABNORMAL
2017	NONE
2018	NONE
2019	NONE
2020	NONE
2021	NONE
2022	NONE

Source: United States Drought Monitor

No anecdotal information was available from the National Center for Environmental Information on droughts in Harrison County.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that Harrison County has a probability level of likely (between 10 and 100 percent annual probability) for future drought events. However, the extent (or magnitude) of drought and the amount of geographic area covered by drought, varies with each year. Historic information indicates that there is a much lower probability for extreme, long-lasting drought conditions.

FEMA NRI Expected Annual Loss Estimates

Table C.24. Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR DROUGHT EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
10.3 events/year	n/a	n/a	n/a	$35,383	$35,383	56	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table C.25. Harrison County Hazard Specific Risk Index Table

HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – DROUGHT	
Risk Index Score	**Risk Index Rating**
53.3/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

LIGHTNING

LOCATION AND SPATIAL EXTENT

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Harrison County is uniformly exposed to lightning.

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, there have been 15 recorded lightning events in Harrison County since 1996. These events resulted in more than $382,000 (2016 dollars) in damages. Furthermore, lightning has caused two fatalities and one injury in the county. A summary of these events is presented in Table C.26. Detailed information on historical lightning events can be found in Table C.27.

It is certain that more than 15 events have impacted the county. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE C.26: SUMMARY OF LIGHTNING OCCURRENCES IN HARRISON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2022)	Annualized Property Losses
Biloxi	4	0/0	$81,754	$3,114
D'Iberville	1	1/0	$0	$0
Gulfport	6	1/0	$119,966	$4,614
Long Beach	2	0/0	$13,000	$500
Pass Christian	2	0/1	$31,471	$1,210
Unincorporated Area	3	0/0	$154,196	$5,931
HARRISON COUNTY TOTAL	15	2/1	$400,387	$15,400

Source: National Center for Environmental Information

TABLE C.27: HISTORICAL LIGHTNING OCCURRENCES IN HARRISON COUNTY

Location	Date	Deaths/ Injuries	Property Damage*	Details
Biloxi				
BILOXI	5/28/1996	0/0	$0	Lightning struck a city police communications tower damaging the departments radio and computer system.
BILOXI	8/3/1996	0/0	$76,754	Lightning damaged the emergency 911 telephone system, started a fire that destroyed a house. A door was blown in when lightning struck a nearby tree.
BILOXI	6/6/2005	0/0	$0	A pine tree struck by lightning fell on the roof of a house causing a fire that resulted in extensive damage to the home.
(BIX) KEESLER AFB BIL	7/01/2020	0/0	$5,000	**Home on fire due to lightning strike in the Magnolia Springs Subdivision off Canal Road near I-10.**
D'Iberville				
D IBERVILLE	8/25/1999	1/0	$0	A 37 year old man was fatally injured by a lightning strike. The man was standing behind a waste collection truck when lightning struck a nearby tree and the charge moved through the tree to the man standing near the truck.
Gulfport				
GULFPORT	7/16/1998	0/0	$0	A lightning strike caused a fire that damaged four condominiums.
				Lightning started a fire at a house on Pine Forest Road that caused damage to two bedrooms and a hallway. Smoke damage

GULFPORT	7/26/1999	0/0	$14,457	occurred throughout the home.
GULFPORT	6/7/2001	1/0	$0	A lightning strike killed a 25 year old women in Gulfport shortly after lightning injured a 53 year old man in the nearby community of Pass Christian. Lightning also started a fire at a business in Oceans Springs which resulted in $60,000 damage.
GULFPORT	2/2/2006	0/0	$0	Lightning struck a home causing a fire that destroyed the roof, attic and second floor of the house.
GULFPORT	5/15/2008	0/0	$27,967	Lightning struck a house causing a fire in the attic.
GULFPORT	4/19/2013	0/0	$77,542	Lightning struck a Gulfport home during the early morning hours. One home was destroyed by the

Location	Date	Deaths/ Injuries	Property Damage*	Details
				ensuing fire and a second home suffered minor damage to vinyl siding.
Long Beach				
LONG BEACH	7/02/2020	0/0	$3,000	**Smoke in a home due to a lightning strike in Pass Christian near Menge avenue and Fahrion Drive.**
LONG BEACH	4/10/2021	0/0	$10,000	**WLOX reported a house fire started by lightning on Laura Street in Long Beach.**
Pass Christian				
PASS CHRISTIAN	6/7/2001	0/1	$0	A lightning strike killed a 25 year old women in Gulfport shortly after lightning injured a 53 year old man in the nearby community of Pass Christian. Lightning also started a fire at a business in Oceans Springs which resulted in $60,000 damage.
PASS CHRISTIAN	3/21/2012	0/0	$31,471	Numerous fires reported, including an apartment complex, at least one home, and several power poles.
Unincorporated Area				
ORANGE GROVE	7/22/2000	0/0	$4,196	Three homes in the Orange Grove area were struck by lightning with one home receiving damage to its roof and attic.
SAUCIER	7/5/2006	0/0		A lightning strike started a fire in a mobile home.

LANDON	5/17/2016	0/0	$150,000	Lightning started fires that damaged homes on River Bend Drive and Lake Vista Drive between Lyman and Gulfport. Time of the event was estimated.

*Property damage is reported in 2022 dollars; All damage may not have been reported.
Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

Although there was not a high number of historical lightning events reported in Harrison County via NCDC data, it is a regular occurrence accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN), Harrison County is located in an area of the country that experienced an average of 4 to 12 and up lightning flashes per square kilometer per year between 2005 and 2014. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table C.28: Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR LIGHTNING EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
173.7 Events/year	0.12	$1,434,132	$36,099	n/a	$1,470, 231	97.2	Relatively High
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table C.29: Harrison County Hazard Specific Risk Index Table

HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – LIGHTNING	
Risk Index Score	Risk Index Rating
97.5/100	Relatively High

FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*
Source: FEMA National Risk Index (2023)

WILDFIRE

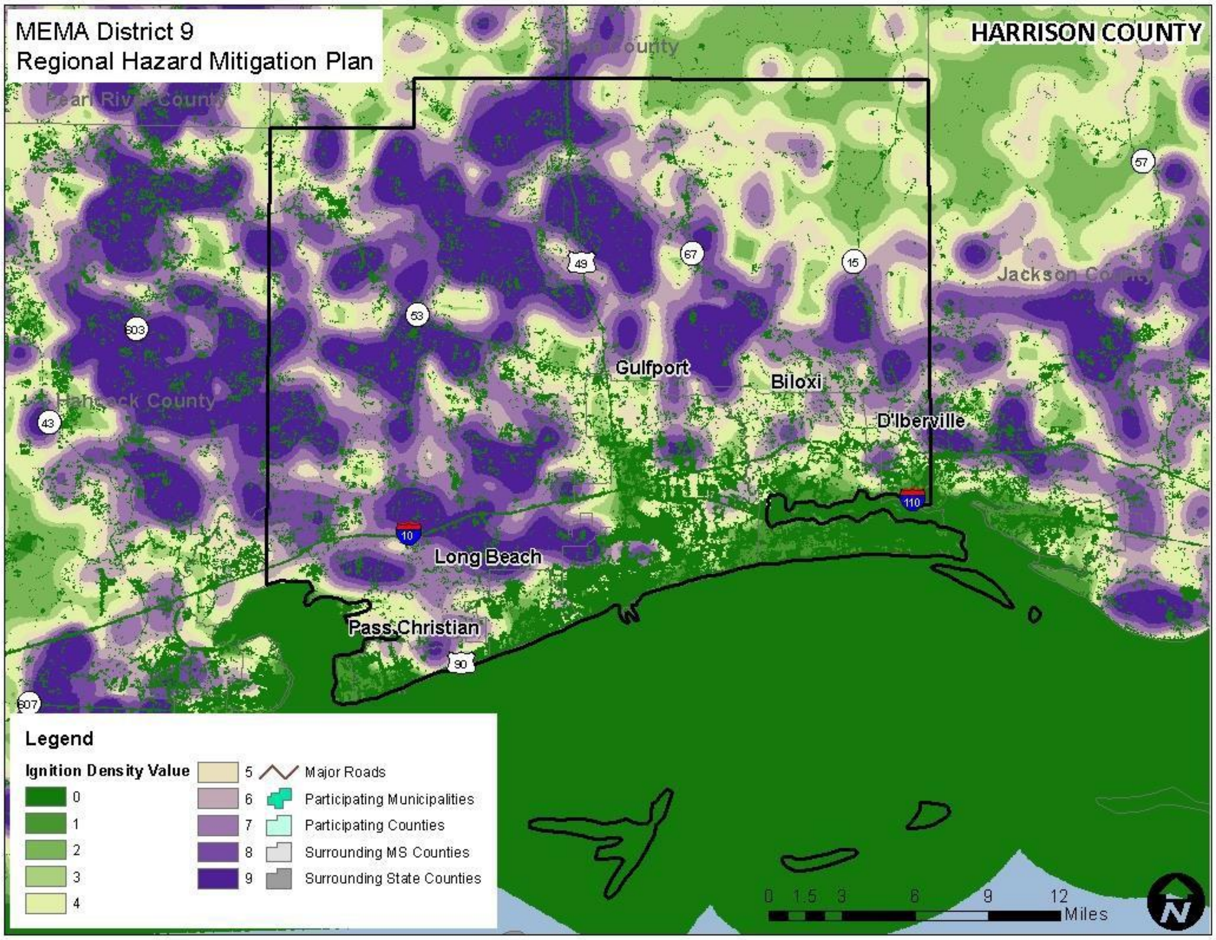
LOCATION AND SPATIAL EXTENT

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban- wildland interface are particularly susceptible to fire hazard as populations about formerly undeveloped areas. The Wildfire Ignition Density data shown in the figure below give an indication of historic location.

HISTORICAL OCCURRENCES

Figure C.7 shows the Wildfire Ignition Density in Harrison County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.

FIGURE C.12: WILDFIRE IGNITION DENSITY IN HARRISON COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the Mississippi Forestry Commission from 2007 to 2022, Harrison County experiences an average of 88 wildfires annually which burn a combined 1,585 acres, on average per year. The data indicates that most of these fires are small, averaging 18 acres per fire. Table C.30 provides a summary of wildfire occurrences in Harrison County and Table C.31 lists the number of reported wildfire occurrences in the county between the years 2007 and 2016.

TABLE C.30: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2007 -2022)*

	Harrison County
Average Number of Fires per year	67.4
Average Number of Acres Burned per year	1,397
Average Number of Acres Burned per fire	22.4

*These values reflect averages since 2007.
Source: Mississippi Forestry Commission

TABLE C.31: HISTORICAL WILDFIRE OCCURRENCES IN HARRISON COUNTY

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Harrison County																
Number of Fires	87	86	114	71	185	72	69	51	77	63	30	15	40	47	21	51
Number of Acres Burned	2,469	1,027	1,877	1,052	4,744	906	802	695	1,460	818	1,059	108	382	2,983	1,347	620

Source: Mississippi Forestry Commission

PROBABILITY OF FUTURE OCCURRENCES

Wildfire events will be an ongoing occurrence in Harrison County. Figure C.13 shows that there is some probability a wildfire will occur throughout the county. However, the likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Harrison County for future wildfire events is highly likely (100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table C.32: Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WILDFIRE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.440% chance/year	0.05	$561,383	$4,759,212	$25	$5,320,620	96.4	Relatively Moderate

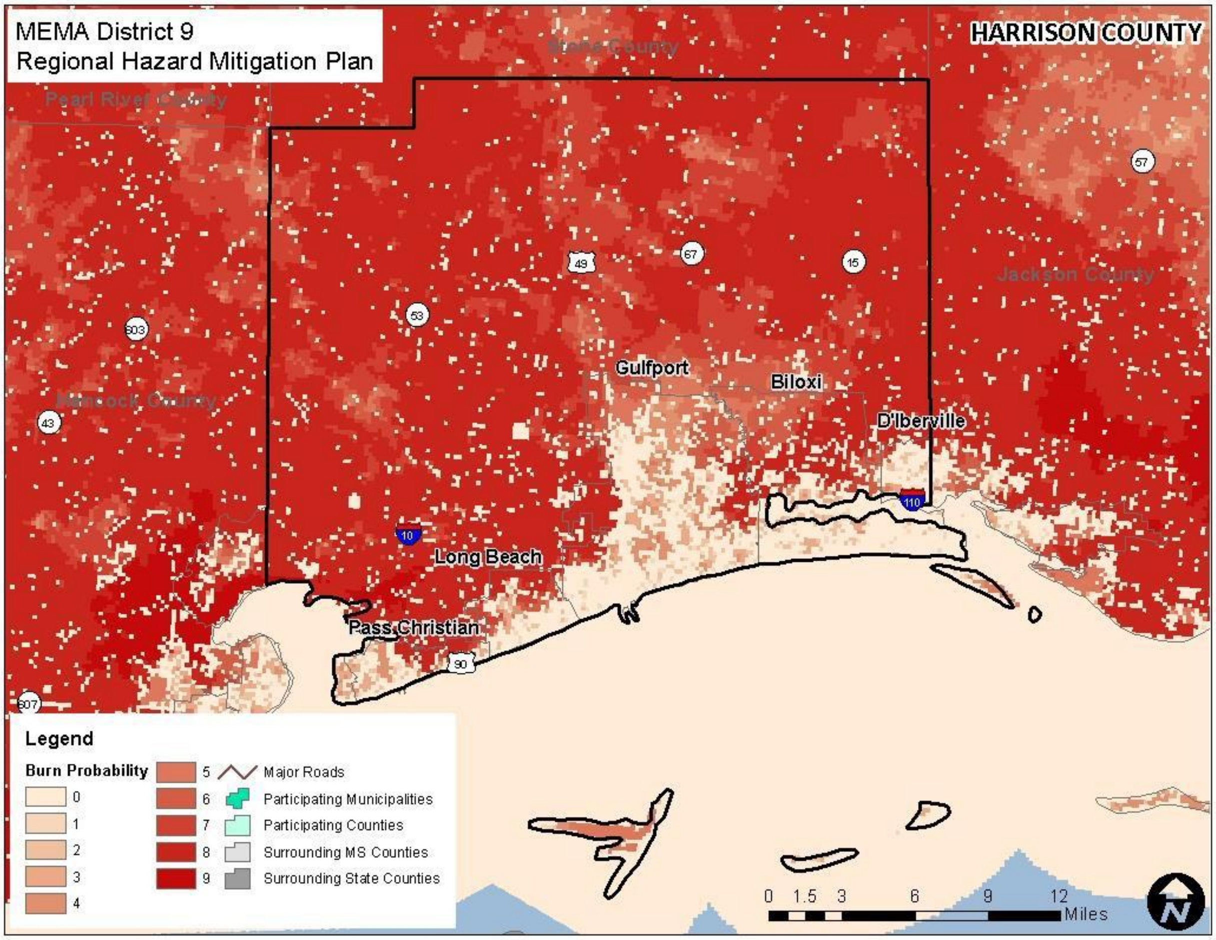
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table C.33: Harrison County Hazard Specific Risk Index Table

HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WILDFIRE	
Risk Index Score	**Risk Index Rating**
96.3/100	Relatively Moderate
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

FIGURE C.13: BURN PROBABILITY IN HARRISON COUNTY



Source: Southern Wildfire Risk Assessment

Figure C.14: Wildfire Hazard Potential

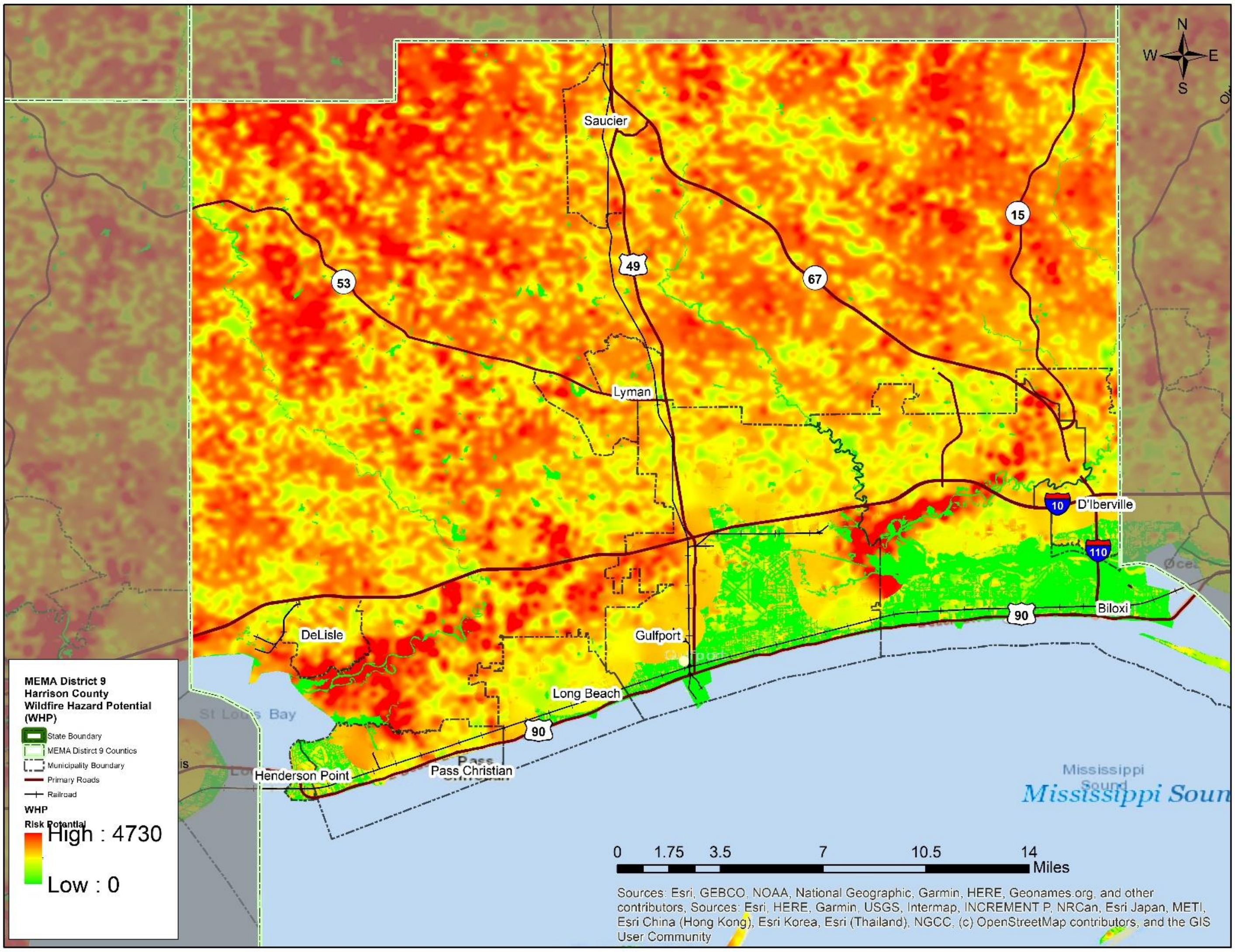
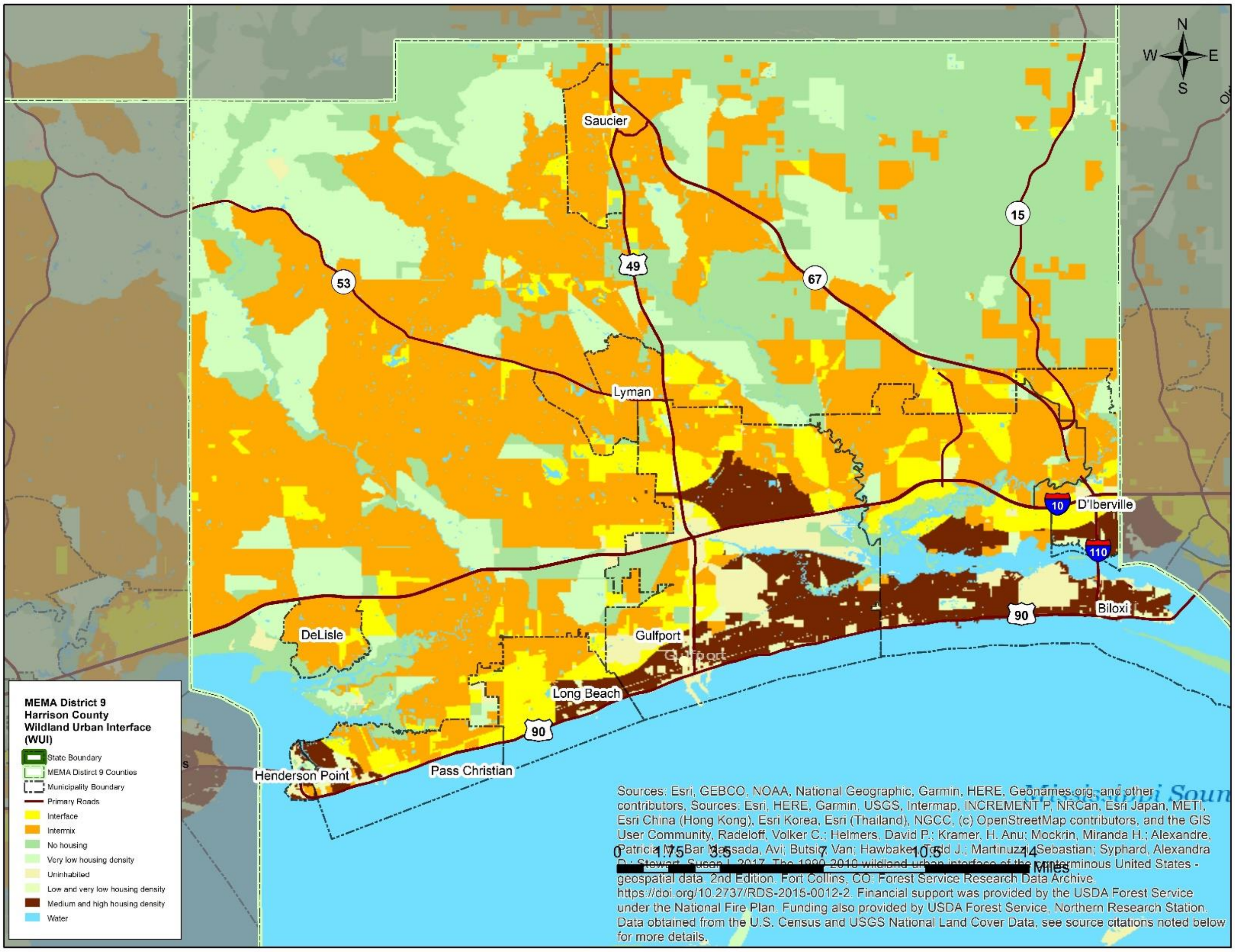


Figure C.15: Wildland Urban Interface



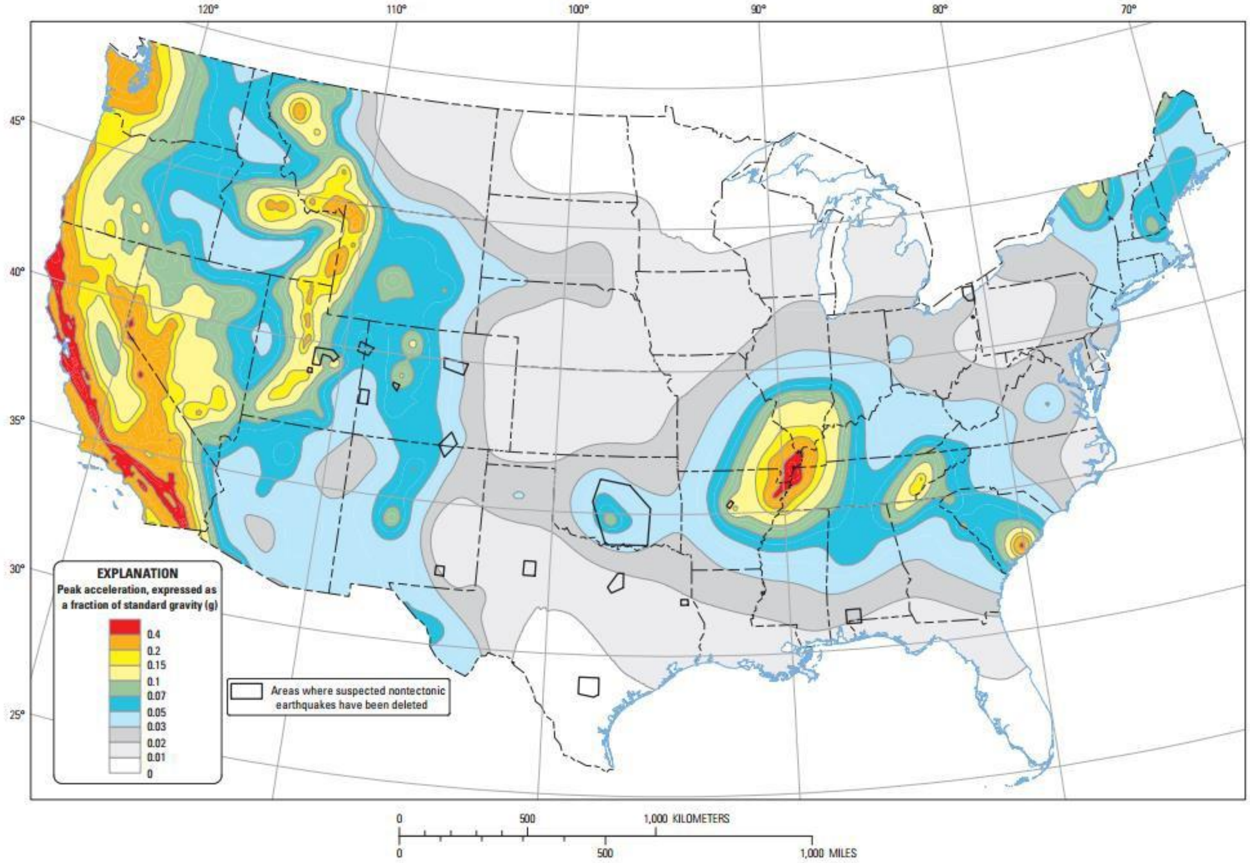
GEOLOGIC HAZARDS

EARTHQUAKE

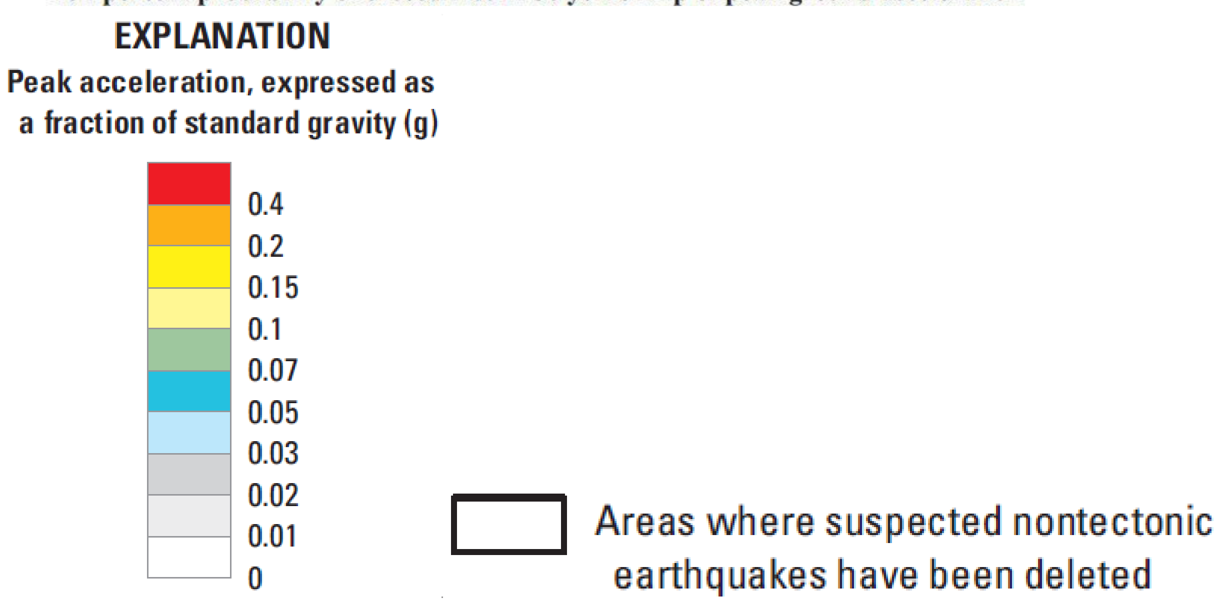
LOCATION AND SPATIAL EXTENT

Figure C.9 shows the intensity level associated with Harrison County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Harrison County lies within an approximate zone of level “1” to “2” ground acceleration. This indicates that the county exists within an area of low seismic risk.

FIGURE C.16: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



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



Source: United States Geological Survey, 2014

The primary source of potential damage to Harrison County from an earthquake is the New Madrid Seismic Zone (NMSZ). Historically, a series of earthquakes in 1811 and 1812 demonstrated that this fault zone can produce high magnitude seismic events, sometimes on the scale of a 7.5-8.0 on the Richter scale. The biggest challenge with earthquakes that occur in this area of seismic activity is predicting the recurrence of earthquakes emanating from this zone. Although the magnitude of earthquakes from the NMSZ can be large, they occur very irregularly and fairly infrequently. This makes it extremely difficult to project when they will occur.

It should also be noted that the State of Mississippi Hazard Mitigation Plan identifies certain areas of concern for liquefaction and lists the counties and corresponding zones within those counties that have the highest liquefaction potential. Harrison County does not have any identified liquefaction potential risk.

HISTORICAL OCCURRENCES

At least four earthquakes are known to have affected Harrison County since 1955. Table C.34 provides a summary of earthquake events reported by the National Centers for Environmental Information (formerly National Geophysical Data Center) between 1638 and 1985, and Figure C.17 presents a map showing earthquakes whose epicenters have occurred near the county between 1985 and 2022 (no earthquakes occurred within the county boundaries during this period). A detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known) can be found in Table C.35.

TABLE C.34: SUMMARY OF SEISMIC ACTIVITY IN HARRISON COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Biloxi	1	IV	< 4.8
D'Iberville	0	--	--
Gulfport	1	V	< 4.8
Long Beach	0	--	--
Pass Christian	1	IV	< 4.8
Unincorporated Area	1	IV	< 4.8
HARRISON COUNTY TOTAL	4	V	< 4.8

Source: National Geophysical Data Center

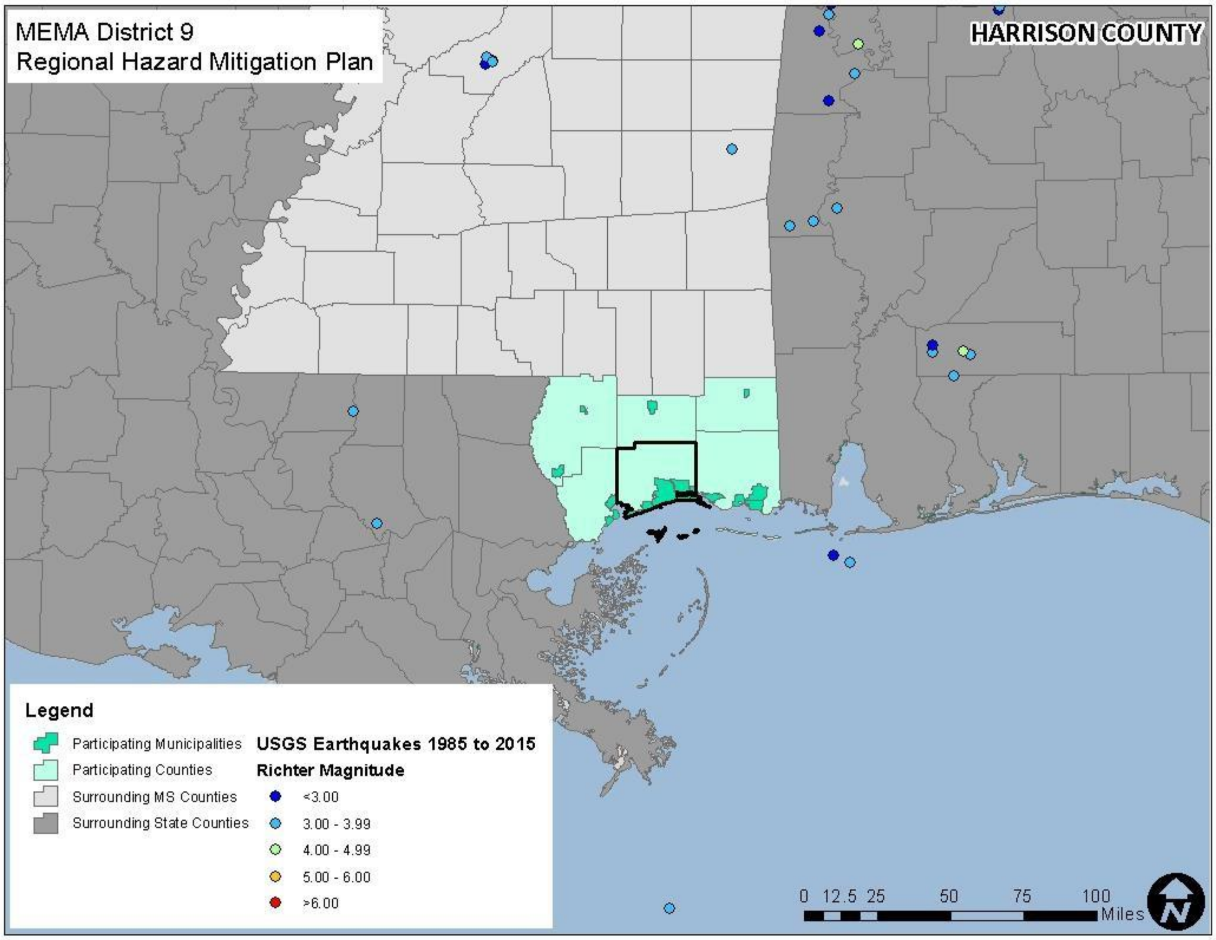
TABLE C.35: SIGNIFICANT SEISMIC EVENTS IN HARRISON COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Biloxi				
BILOXI	2/1/1955	12.0 km	Unknown	IV
D'Iberville				
None reported	--	--	--	--
Gulfport				
GULFPORT	2/1/955	2.0 km	Unknown	V

Location	Date	Epicentral Distance	Magnitude	MMI
Long Beach				
None reported	--	--	--	--
Pass Christian				
PASS CHRISTIAN	2/1/1955	16.0 km	Unknown	IV
Unincorporated Area				
MISSISSIPPI CITY	2/1/1955	5.0 km	Unknown	IV

Source: National Geophysical Data Center

FIGURE C.17: HISTORIC EARTHQUAKES WITH EPICENTERS NEAR HARRISON COUNTY (1985-2022)



Source: United States Geological Survey

PROBABILITY OF FUTURE OCCURRENCES

The probability of significant, damaging earthquake events affecting Harrison County is unlikely. However, it is possible that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated to be between 1 and 10 percent (possible).

FEMA NRI Expected Annual Loss Estimates

Table C.36: Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR EARTHQUAKE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.045% chance/year	0.01	$102,702	$390,631	n/a	$493,333	71.3	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table C.37: Harrison County Hazard Specific Risk Index Table

HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – EARTHQUAKE	
Risk Index Score	Risk Index Rating
73.5/100	Relatively Low

FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.*

FEMA Hazard-Type ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*

Source: FEMA National Risk Index (2023)

WIND-RELATED HAZARDS

EXTREME COLD

Extreme cold typically impacts a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme cold conditions.

HISTORICAL OCCURRENCES

Data from the National Center for Environmental Information was used to determine historical extreme cold events in Harrison County. Two events were reported:

February 2, 1996 – Cold/Wind Chill – An arctic airmass overspread much of south Mississippi bringing the longest extended period of cold weather since 1989. In Amite County, 4SW Gillsburg, a 67 year old man died from hypothermia on the 4th after the fire in a wood burning heater went out. Considerable property damage resulted from broken pipes due to the extended period of subfreezing temperatures. In Jackson County, Moss Point and Gautier had broken pipes in 100 and 147 houses, respectively.

December 18, 1996 – Cold/Wind Chill – An arctic airmass overspread south Mississippi resulting in three consecutive nights with subfreezing minimum temperatures. Temperatures lowered into the mid-teens over the southwest section of the state and near 20 degrees along the Gulf Coast.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of Harrison County has a probability level of possible (between 1 and 10 percent annual probability) for future extreme cold events to impact the county.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not anticipate any losses due to Extreme Cold/Cold Wave

EXTREME HEAT

Heat waves typically impact a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme heat conditions.

HISTORICAL OCCURRENCES

The National Center for Environmental Information was used to determine historical heat wave occurrences in the county.

July 2010 – Several days of temperatures near 100 degrees contributed to two deaths from heat stroke in the Gulfport area. The Harrison County Coroner stated that two deaths in a mobile home on Smith Road near Canal Road were caused by heat stroke. High temperatures at Gulfport Airport, approximately 3 miles away, were between 98 and 102 degrees from July 29 through August 2. Bodies were discovered on August 4, but deaths occurred several days prior to that. Date of deaths was estimated.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of Harrison County has a probability level of highly likely (100 percent annual probability) for future heat wave events.

FEMA NRI Expected Annual Loss Estimates

Table C.38: Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR EXTREME HEAT EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1.5 events/year	0.10	$1,164,595	$185	$33	$1,164,813	92	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table C.39: Harrison County Hazard Specific Risk Index Table

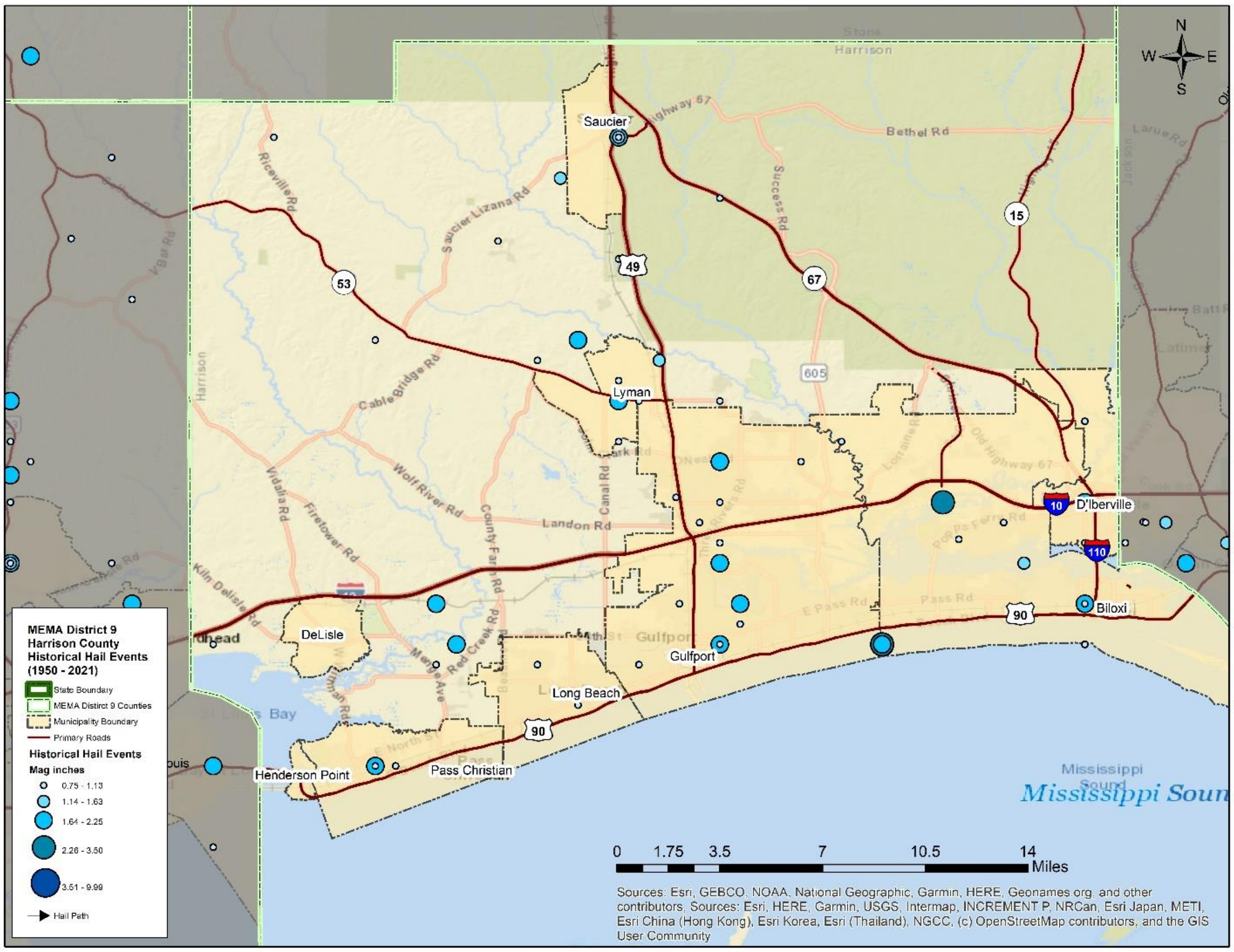
HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – EXTREME HEAT	
Risk Index Score	Risk Index Rating
92.0/100	Relatively Moderate
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

HAILSTORM

LOCATION AND SPATIAL EXTENT

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that Harrison County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms. With that in mind, Figure C.18 shows the location of hail events that have impacted the county between 1955 and 2015.

FIGURE C.18: HAILSTORM TRACKS IN HARRISON COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, 73 recorded hailstorm events have affected Harrison County since 1969. In all, hail occurrences did not result in any property damages. Hail ranged in diameter from 0.75 inches to 2.75 inches. Table C.40 provides a summary of the hail events in Harrison County. Detailed information about each event that occurred in the county is provided in Table C.41.

It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Center for Environmental Information. Therefore, it is likely that damages are greater than the reported value.

TABLE C.40: SUMMARY OF HAIL OCCURRENCES IN HARRISON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2022)	Annualized Property Losses
Biloxi	9	0/0	$0	$0
D'Iberville	4	0/0	$0	$0
Gulfport	13	0/0	$0	$0
Long Beach	4	0/0	$0	$0
Pass Christian	4	0/0	$0	$0
Unincorporated Area	42	0/0	$0	$0
HARRISON COUNTY TOTAL	76	0/0	$0	$0

Source: National Center for Environmental Information

TABLE C.41: HISTORICAL HAIL OCCURRENCES IN HARRISON COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Biloxi				
Biloxi	3/1/1994	0.88 in.	0/0	$0
BILOXI	1/24/1997	2.75 in.	0/0	$0
BILOXI	6/23/1997	1.00 in.	0/0	$0
BILOXI	7/21/2000	1.00 in.	0/0	$0
BILOXI	4/26/2005	0.75 in.	0/0	$0
BILOXI	6/12/2007	0.75 in.	0/0	$0
(BIX)KEESLER AFB BIL	4/28/2016	0.88 in.	0/0	$0
(BIX) KEESLER AFB BIL	4/28/2016	0.88 in.	0/0	$0
(BIX) KEESLER AFB BIL	6/15/2017	1.50 in.	0/0	$0
D'Iberville				
D'Iberville	7/9/1995	0.75 in.	0/0	$0
D IBERVILLE	7/14/2000	0.75 in.	0/0	$0
D IBERVILLE	7/4/2009	1.00 in.	0/0	$0
D IBERVILLE	5/25/2010	1.00 in.	0/0	$0
Gulfport				
Gulfport	3/1/1994	1.75 in.	0/0	$0

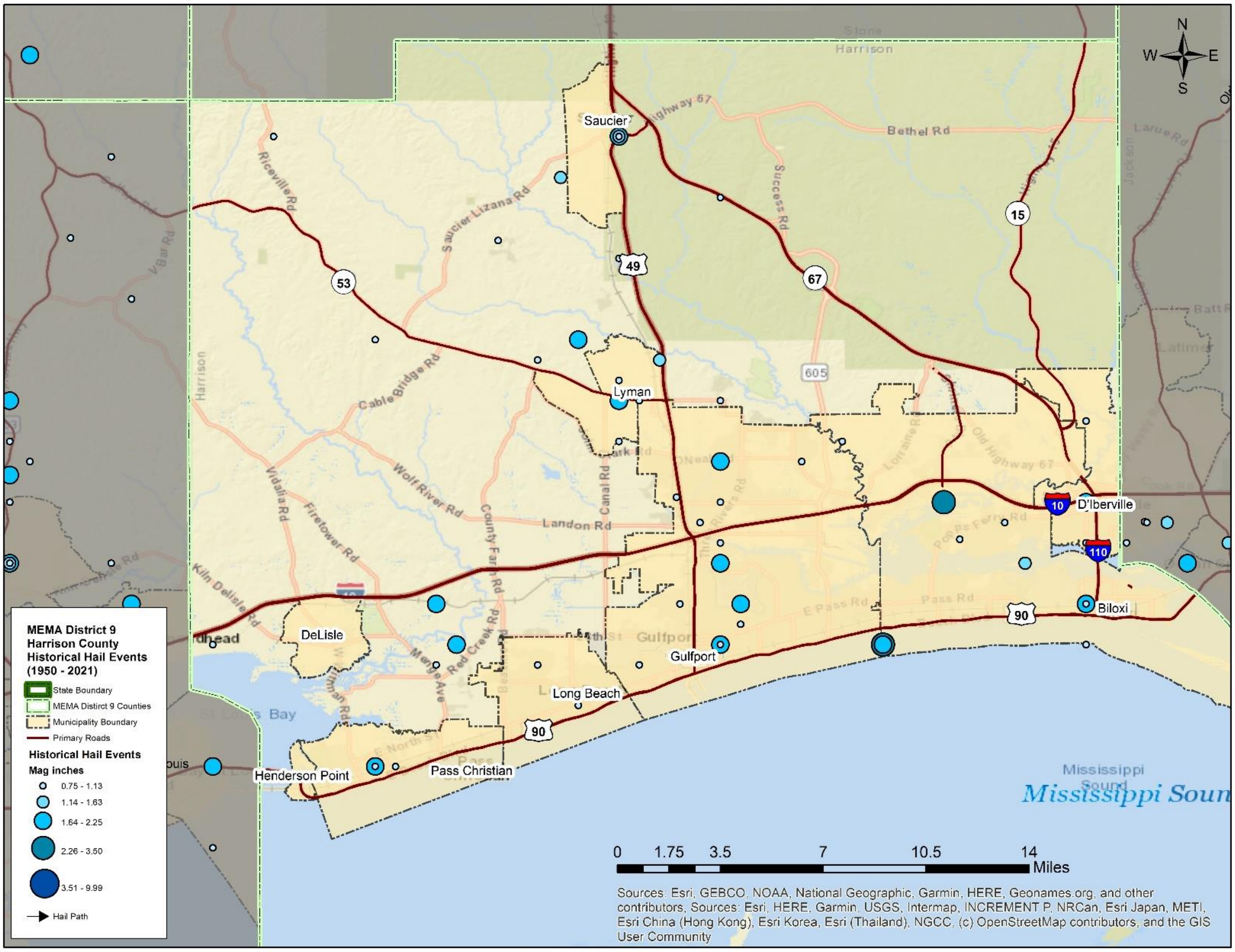
Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Gulfport	9/9/1994	0.75 in.	0/0	$0
GULFPORT	2/19/1996	0.75 in.	0/0	$0
GULFPORT	6/3/1996	0.88 in.	0/0	$0
GULFPORT	1/24/1997	1.75 in.	0/0	$0
GULFPORT	3/13/2003	0.88 in.	0/0	$0
GULFPORT	7/17/2003	0.75 in.	0/0	$0
GULFPORT	5/31/2004	0.75 in.	0/0	$0
GULFPORT	2/13/2007	1.00 in.	0/0	$0
GULFPORT	5/11/2007	1.75 in.	0/0	$0
GULFPORT	4/2/2009	0.88 in.	0/0	$0
GULFPORT	4/2/2009	0.75 in.	0/0	$0
(GPT)GULFPORT RGNL A	2/23/2016	1.00 in.	0/0	$0
Long Beach				
LONG BEACH	2/19/1996	0.75 in.	0/0	$0
LONG BEACH	3/7/1998	1.75 in.	0/0	$0
LONG BEACH	4/13/2000	1.75 in.	0/0	$0
LONG BEACH	4/10/2021	1.00 in.	0/0	$0
Pass Christian				
PASS CHRISTIAN	3/30/1996	1.75 in.	0/0	$0
PASS CHRISTIAN	3/7/1998	1.75 in.	0/0	$0
PASS CHRISTIAN	8/4/2006	0.88 in.	0/0	$0
PASS CHRISTIAN	2/23/2016	1.00 in.	0/0	$0
Unincorporated Area				
HARRISON CO.	4/23/1969	0.75 in.	0/0	$0
HARRISON CO.	5/8/1975	0.75 in.	0/0	$0
HARRISON CO.	6/26/1980	1.75 in.	0/0	$0
HARRISON CO.	3/22/1981	1.75 in.	0/0	$0
HARRISON CO.	5/8/1983	1.75 in.	0/0	$0
HARRISON CO.	4/26/1984	0.75 in.	0/0	$0
HARRISON CO.	8/25/1986	1.75 in.	0/0	$0
HARRISON CO.	8/25/1986	1.75 in.	0/0	$0
HARRISON CO.	1/18/1988	1.00 in.	0/0	$0
HARRISON CO.	5/10/1988	1.75 in.	0/0	$0
HARRISON CO.	11/15/1989	1.75 in.	0/0	$0
HARRISON CO.	3/15/1990	0.75 in.	0/0	$0
HARRISON CO.	4/22/1990	1.75 in.	0/0	$0
HARRISON CO.	1/30/1991	1.00 in.	0/0	$0
HARRISON CO.	4/10/1991	1.00 in.	0/0	$0
HARRISON CO.	6/4/1991	0.80 in.	0/0	$0
HARRISON CO.	8/10/1992	1.00 in.	0/0	$0
SAUCIER	1/24/1997	1.75 in.	0/0	$0
SAUCIER	5/3/1997	1.75 in.	0/0	$0
LIZANA	5/3/1998	0.75 in.	0/0	$0
ORANGE GROVE	7/26/1999	0.75 in.	0/0	$0
SAUCIER	6/25/2000	1.75 in.	0/0	$0

CUEVAS	7/21/2000	0.75 in.	0/0	$0
WOOL MARKET	7/21/2000	0.75 in.	0/0	$0

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
SAUCIER	8/30/2000	1.00 in.	0/0	$0
LYMAN	8/30/2000	1.00 in.	0/0	$0
LYMAN	8/30/2000	1.00 in.	0/0	$0
WORTHAM	8/30/2004	1.00 in.	0/0	$0
LYMAN	7/20/2006	0.75 in.	0/0	$0
LYMAN	6/13/2007	0.88 in.	0/0	$0
SAUCIER	2/17/2008	1.00 in.	0/0	$0
SAUCIER	3/4/2008	1.75 in.	0/0	$0
SAUCIER	8/3/2008	1.25 in.	0/0	$0
SAUCIER	5/26/2011	1.00 in.	0/0	$0
LYMAN	6/6/2011	1.25 in.	0/0	$0
LYMAN	6/6/2011	1.00 in.	0/0	$0
LYMAN	6/6/2011	1.00 in.	0/0	$0
BEAUVOIR	4/4/2012	1.00 in.	0/0	$0
SAUCIER	9/5/2015	1.50 in.	0/0	$0
LYMAN	2/23/2016	1.75 in.	0/0	$0
LANDON	4/28/2016	1.00 in.	0/0	$0
LANDON	4/28/2016	0.75 in.	0/0	$0

*Property damage is reported in 2022 dollars; All damage may not have been reported.
Source: National Center for Environmental Information

Figure C.19: Historical Hail Events (1950-2021)



PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard, it is assumed that Harrison County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table C.42: Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HAIL EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
2.1 events/year	0.01	$153,920	$626,353	$1	$780,275	87.6	Relatively Moderate

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table C.43: Harrison County Hazard Specific Risk Index Table

HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HAIL	
Risk Index Score	**Risk Index Rating**
87.9/100	Relatively Moderate
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

HURRICANE AND TROPICAL STORM

LOCATION AND SPATIAL EXTENT

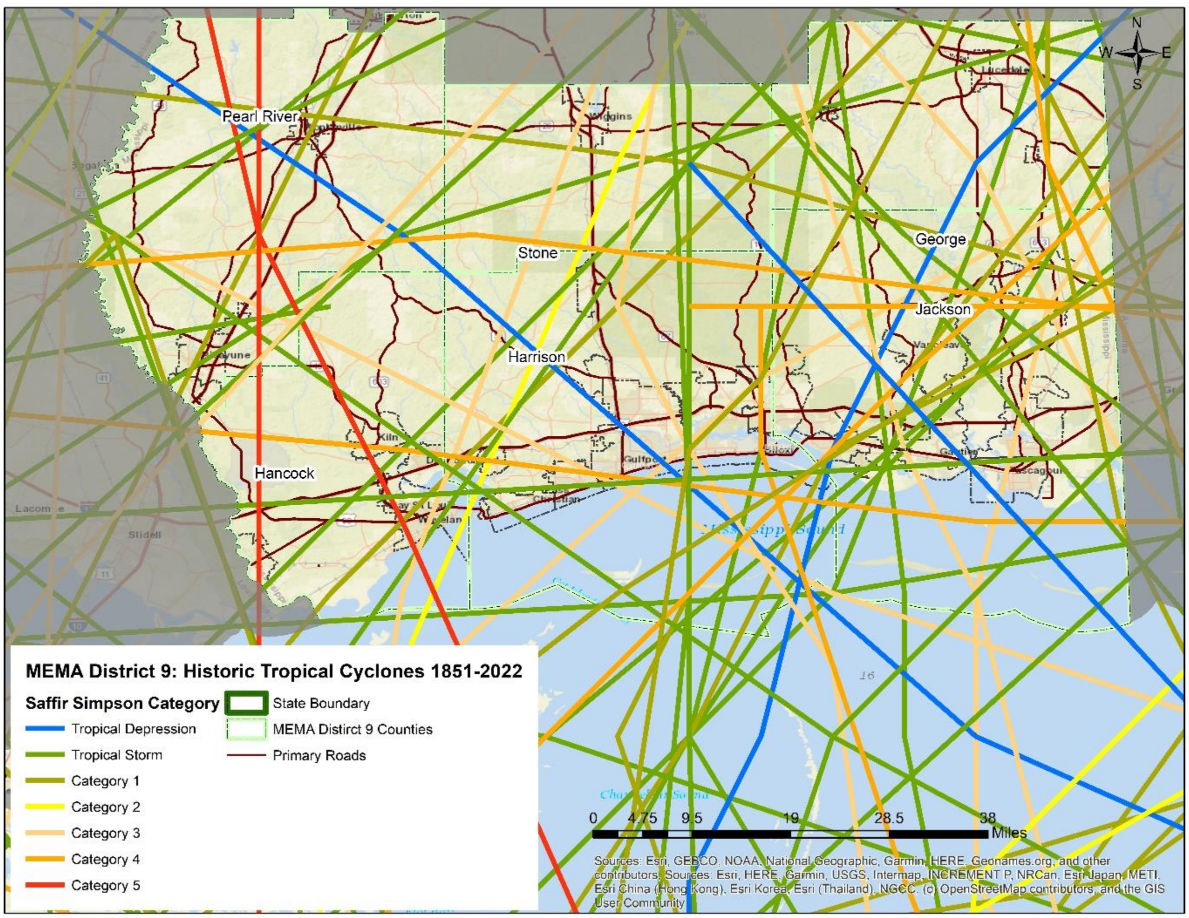
Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States, and while coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland. Harrison County is located in a region of the country that is susceptible to all of the hazards wrought by hurricanes and tropical storms. All areas throughout Harrison County are susceptible to the accompanying hazard effects of extreme wind, flooding, and tornadoes, and coastal areas are also extremely susceptible to the added effects of storm surge, wave action, coastal erosion, and tidal flooding.

HISTORICAL OCCURRENCES

According to the National Hurricane Center's historical storm track records, 119 hurricane or tropical storm/depression tracks have passed within 100 miles of the MEMA District 9 Region since 1855. This includes: 4 Category 3 hurricanes, 15 Category 2 hurricanes, 28 Category 1 hurricanes, 29 tropical storms, and 43 tropical depressions. Additionally, four other major storms had large-scale impacts on the region and are not included in these totals. These storms are listed below and range in Category from 1 to 4.

Of the recorded storm events, 58 hurricane or tropical storm/depression events traversed directly through the region as shown in Figure C.20. Notable storms include Hurricane Camille (1969), Hurricane Frederic (1979), and Hurricane Katrina (2005). Table C.44 provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 100 miles of the MEMA District 9 Region) and category of the storm based on the Saffir-Simpson Scale.

FIGURE C.20: HISTORICAL HURRICANE STORM TRACKS WITHIN 100 MILES OF THE MEMA DISTRICT 9 REGION



Source: National Oceanic and Atmospheric Administration, National Hurricane Center

TABLE C.44: HISTORICAL STORM TRACKS WITHIN 100 MILES OF THE MEMA 9 DISTRICT REGION (1842–2022)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/25/1852	UNNAMED	93	Category 2
8/3/1855	NOT NAMED	--	Tropical Depression
9/16/1855	UNNAMED	96	Category 2
6/24/1857	NOT NAMED	--	Tropical Depression
9/15/1859	UNNAMED	79	Category 1
8/11/1860	UNNAMED	96	Category 2
9/15/1860	UNNAMED	89	Category 2
8/17/1861	NOT NAMED	--	Tropical Depression
11/1/1861	NOT NAMED	--	Tropical Depression
9/15/1862	NOT NAMED	--	Tropical Depression
9/16/1862	NOT NAMED	--	Tropical Depression
10/1/1863	UNNAMED	43	Tropical Storm
6/3/1866	NOT NAMED	--	Tropical Depression
9/16/1867	NOT NAMED	--	Tropical Depression
10/5/1867	UNNAMED	89	Category 2
10/3/1868	NOT NAMED	--	Tropical Depression
9/5/1869	UNNAMED	79	Category 1
7/30/1870	NOT NAMED	--	Tropical Depression
7/11/1872	UNNAMED	59	Tropical Storm
9/18/1875	UNNAMED	18	Tropical Depression
9/18/1877	UNNAMED	79	Category 1
9/1/1879	UNNAMED	89	Category 2
10/7/1879	UNNAMED	59	Tropical Storm
8/31/1880	UNNAMED	70	Category 1
8/2/1881	NOT NAMED	--	Tropical Depression
8/3/1881	UNNAMED	59	Tropical Storm
8/30/1885	UNNAMED	59	Tropical Storm
9/26/1885	UNNAMED	70	Category 1
6/15/1886	UNNAMED	50	Tropical Storm
6/14/1887	UNNAMED	33	Tropical Depression
10/19/1887	UNNAMED	82	Category 1
6/27/1888	NOT NAMED	--	Tropical Depression
9/23/1889	UNNAMED	79	Category 1
8/27/1890	UNNAMED	43	Tropical Storm
9/21/1891	NOT NAMED	--	Tropical Depression
9/12/1892	UNNAMED	59	Tropical Storm
9/7/1893	UNNAMED	79	Category 1
10/2/1893	UNNAMED	97	Category 3
8/7/1894	UNNAMED	59	Tropical Storm
8/15/1895	UNNAMED	59	Tropical Storm
9/13/1900	UNNAMED	43	Tropical Storm
8/14/1901	UNNAMED	82	Category 1
10/9/1905	UNNAMED	43	Tropical Storm
9/27/1906	UNNAMED	93	Category 2

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/21/1907	UNNAMED	43	Tropical Storm
8/11/1911	UNNAMED	79	Category 1
6/13/1912	UNNAMED	59	Tropical Storm
7/17/1912	UNNAMED	5	Tropical Depression
9/13/1912	UNNAMED	82	Category 1
9/18/1914	UNNAMED	33	Tropical Depression
9/29/1915	UNNAMED	96	Category 2
7/5/1916	UNNAMED	95	Category 2
10/17/1922	UNNAMED	18	Tropical Depression
6/26/1923	UNNAMED	43	Tropical Storm
10/17/1923	UNNAMED	59	Tropical Storm
9/20/1926	UNNAMED	93	Category 2
9/1/1932	UNNAMED	82	Category 1
10/15/1932	UNNAMED	59	Tropical Storm
7/27/1936	UNNAMED	43	Tropical Storm
8/22/1936	UNNAMED	5	Tropical Depression
6/16/1939	UNNAMED	59	Tropical Storm
9/26/1939	UNNAMED	50	Tropical Storm
9/24/1940	UNNAMED	18	Tropical Depression
9/10/1944	UNNAMED	64	Category 1
9/5/1945	UNNAMED	18	Tropical Depression
9/19/1947	UNNAMED	92	Category 2
9/4/1948	UNNAMED	79	Category 1
9/4/1949	UNNAMED	43	Tropical Storm
8/31/1950	BAKER	82	Category 1
8/1/1955	BRENDA	70	Category 1
8/27/1955	UNNAMED	50	Tropical Storm
9/24/1956	FLOSSY	82	Category 1
9/18/1957	ESTHER	64	Category 1
10/8/1959	IRENE	43	Tropical Storm
9/15/1960	ETHEL	85	Category 2
9/26/1960	FLORENCE	1	Tropical Depression
10/4/1964	HILDA	70	Category 1
9/10/1965	BETSY*	117	Category 4
9/29/1965	DEBBIE	33	Tropical Depression
8/18/1969	CAMILLE	100	Category 3
8/8/1971	UNNAMED	5	Tropical Depression
9/4/1971	FERN	5	Tropical Depression
9/16/1971	EDITH	70	Category 1
7/29/1975	UNNAMED	18	Tropical Depression
10/17/1975	UNNAMED	5	Tropical Depression
9/24/1976	UNNAMED	5	Tropical Depression
7/19/1977	UNNAMED	18	Tropical Depression
9/6/1977	BABE	18	Tropical Depression
10/25/1977	UNNAMED	18	Tropical Depression

8/10/1978	UNNAMED	5	Tropical Depression

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
7/11/1979	BOB	74	Category 1
9/12/1979	FREDERIC	97	Category 3
7/20/1980	UNNAMED	5	Tropical Depression
10/27/1984	UNNAMED	18	Tropical Depression
9/2/1985	ELENA	95	Category 2
10/31/1985	JUAN	64	Category 1
8/12/1987	UNNAMED	5	Tropical Depression
8/8/1988	BERYL	5	Tropical Depression
8/9/1988	BERYL	50	Tropical Storm
9/10/1988	FLORENCE	79	Category 1
8/3/1995	ERIN	82	Category 1
7/19/1997	DANNY	79	Category 1
9/27/1998	GEORGES	92	Category 2
9/20/1998	HERMINE	33	Tropical Depression
6/11/2001	ALLISON	43	Tropical Storm
8/5/2002	BERTHA	33	Tropical Depression
9/14/2002	HANNA	59	Tropical Storm
9/26/2002	ISIDORE	64	Category 1
6/30/2003	BILL	59	Tropical Storm
7/1/2003	BILL	18	Tropical Depression
9/16/2004	IVAN	96	Category 2
6/11/2005	ARLENE	59	Tropical Storm
7/6/2005	CINDY	74	Category 1
7/10/2005	DENNIS*	100	Category 3
8/29/2005	KATRINA	98	Category 3
9/22/2007	TEN	5	Tropical Depression
8/24/2008	FAY	18	Tropical Depression
9/1/2008	GUSTAV*	87	Category 2
11/10/2009	IDA	70	Category 1
7/25/2010	BONNIE	5	Tropical Depression
8/12/2010	FIVE	5	Tropical Depression
9/5/2011	LEE	43	Tropical Storm
8/28/2012	ISAAC*	70	Category 1
10/28/2020	ZETA	90	Category 2
8/29/2021	IDA	130	Category 4

*It should be noted that the track of several major hurricanes that impacted the region fell outside of the 100-mile buffer. These storms were included in the table due to their significant impact (Betsy, 1965; Dennis, 2005; Gustav, 2008; and Isaac, 2012), but it should be noted that wind speed and storm category are estimated based on anecdotal information.

Source: National Hurricane Center

Federal records indicate that 12 disaster declarations were made in 1965 (Hurricane Betsy), 1969 (Hurricane Camille), 1979 (Hurricane Frederic), 1985 (Hurricane Elena), 1998 (Hurricane Georges), 2001 (Tropical Storm Allison), 2002 (Tropical Storm Isidore), 2004 (Hurricane Ivan), 2005 (Hurricane Dennis and Hurricane Katrina), 2008 (Hurricane Gustav), and 2012 (Hurricane Isaac). Hurricane and tropical storm events can cause substantial damage in the area due to high winds and flooding.

Flooding and high winds from hurricanes and tropical storms can cause damage throughout the county. Anecdotes are available from NCDC for the major storms that have impacted the county as found below:

Hurricane Georges – September 25-29, 1998

Hurricane Georges, a strong Category 2 hurricane moved slowly northwest across the Gulf of Mexico toward southeast Louisiana and coastal Mississippi on the September 25 and September 26. As the hurricane approached the mouth of the Mississippi River on September 27, it slowly turned toward the north making landfall along the Mississippi Coast just to the east of Biloxi, MS at 0400 CST on September 28. The hurricane moved only slowly north during the morning hours, at times becoming nearly stationary. The hurricane finally was downgraded to a tropical storm at 1500CST on September 28 when it was located north of Biloxi. The tropical storm then moved very slowly eastward into southern Alabama on September 29.

The greatest affect from the hurricane occurred over Jackson County which experienced the intense eastern portion of the hurricanes eyewall and highest storm surge.

Due to the slow forward speed of the hurricane very heavy rainfall occurred over eastern Harrison County and Jackson County leading to record flooding on streams and rivers. The barrier islands in the Mississippi Sound were also heavily damaged by wind and storm surge. A new three quarter mile cut developed in the east portion of Ship Island. Total insured property damage in Mississippi was estimated at near 310 million dollars by insurance industry sources. When uninsured losses and public property damage considered, total damages in Mississippi will likely approach $620 million.

Harrison County - Moderate wind damage occurred throughout the parish. Many commercial signs were damaged or destroyed, large trees limbs and trees downed, and wind damaged roofs or houses and businesses. At the Gulfport Harbor, a wind gage recorded a maximum gust of 80 mph at 0415CST on September 28. At approximately the same time period, a gust to 117 mph was recorded in Gulfport, one mile north of the beach. Storm surge flooding was generally 6 to 7 feet above normal across the coast. Storm surge flooding crossed US Highway 90 in several locations, but storm surge flooding to property was not considered major. A maximum stage of 8.1 feet was recorded at the Gulfport Harbor.

Due to the slow movement of the hurricane, heavy rain occurred over the east portion of the county and adjacent areas. Significant river flooding occurred on the Biloxi and Tchoutacabouffa Rivers on the September 28 and September 29. Wortham, on the Biloxi River reached its second highest stage of record with a reading of 25.47 feet on September 29.

Many county residents evacuated low lying areas in advance of the hurricane with approximately 3700 seeking refuge in public evacuation shelters within the county.

Hurricane Katrina – August 24-30, 2005

Hurricane Katrina was one of the strongest and most destructive hurricanes on record to impact the coast of the United States. It will likely be recorded as one the worst natural disaster in the history of the United States to date resulting in catastrophic damage and numerous casualties in southeast Louisiana and along the Mississippi coast. Damage and casualties resulting from Hurricane Katrina extended as far east as Alabama and the panhandle of Florida. Katrina developed from a tropical depression southeast of the Bahamas on August 24th. After moving through the Bahamas as a tropical storm, Katrina strengthened to a category 1 hurricane prior to landfall in south Florida around the Miami area on the 25th of August. Katrina crossed south Florida and entered the Gulf of Mexico and began to strengthen. Hurricane Katrina strengthened to a category 5 storm on August 28th about 250 miles south southeast of the mouth of the Mississippi River with winds reaching their peak intensity of 175 mph and a central pressure of 902 mb. Post event analysis by the National Hurricane Center indicates that Katrina weakened slightly before making landfall as a strong category 3 storm in initial landfall in lower Plaquemines Parish. Maximum sustained winds were estimated at 110 knots or 127 mph and a central pressure of 920 mb around 610 AM CDT on August 29th in southeast Louisiana just south of Buras in Plaquemines Parish. The storm continued on a north northeast track with the center passing about 40 miles southeast of New Orleans with a second landfall occurring near the Louisiana and Mississippi border around 945 AM CDT as a category 3 storm with maximum sustained winds estimated around 105 knots or 121 mph. Katrina continued to weaken as it moved north northeast across Mississippi during the day, but remained at hurricane strength 100 miles inland near Laurel, Mississippi. Katrina weakened to a tropical depression near Clarksville, Tennessee on August 30th.

Damage across coastal Mississippi was catastrophic. The storm surge associated with Hurricane Katrina approached or exceeded the surge associated with Hurricane Camille and impacted a much more extensive area. Almost total destruction was observed along the immediate coast in Hancock and Harrison Counties with storm surge damage extending north along bays and bayous to Interstate 10. Thousands of homes and businesses were destroyed by the storm surge. Hurricane force winds also caused damage to roofs, power lines, signage, downed trees, and some windows were broken by wind and wind driven debris in areas away from storm surge flooding, wind damage was widespread with fallen trees taking a heavy toll on houses and power lines. Damage was less extensive in southwest Mississippi. Excluding losses covered by the Federal Flood Insurance Program, insured property losses in Mississippi were estimated at 9.8 billion dollars. Uninsured and insured losses combined were estimated to exceed 100 billion dollars across the Gulf Coast.

As of late October, the following fatality figures were reported in the Mississippi coastal counties; Hancock- 52, Harrison - 83, Jackson - 17. Additional details on fatalities will be given in later updates to storm data.

Due to the failure of power and equipment prior to the peak of the storm, data for wind, storm surge, pressure, and rainfall are incomplete. The lowest pressure on the Mississippi coast was estimated to be 928 mb where the hurricane made landfall near the Louisiana Mississippi border. A pressure of 976 mb was recorded at 0951 CDT by a university weather station deployed in Pascagoula, well east of the landfall location. At approximately the same time, the pressure at the NWS office in Slidell, just to the west of landfall location, recorded a pressure of 934.1 mb at 0938 AM CDT.

The highest wind gusts recorded in Mississippi and the adjacent coastal waters were 117 knots (134 mph) at the Pearl River County EOC office in Poplarville and 102 knots (118 mph) at 1000AM CDT by a university wind tower deployed at the Stennis Space Center in Hancock County. Maximum sustained winds in Mississippi were estimated around 105 knots (121 mph) near the storm's second landfall along the Mississippi and Louisiana border. Unofficial wind observations before the gage failed included a wind gust of 106 kt, (122 mph) at 0615 CDT by an amateur radio operator in Long Beach and a wind gust of 108 kt (124 mph) at the EOC in Pascagoula.

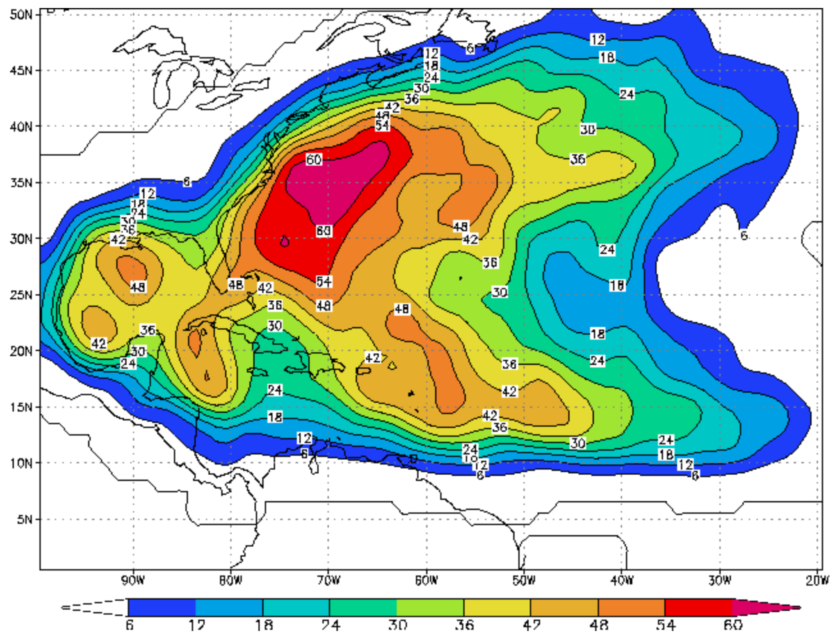
Most tide gages were destroyed by the storm surge so storm surge was determined primarily by post storm high water mark surveys conducted by FEMA. An estimated storm surge of approximately 23.0 feet occurred at the Hancock County EOC operations area in Waveland, and the high water mark measured on the Jackson County EOC building in Pascagoula was 16.1 feet. Preliminary estimates of storm surge along the Mississippi Coast include Hancock County 19-25 feet, Harrison County 19-25 feet, Jackson County 17- 21 ft. All storm surge heights are still water elevations referenced to NAVD88 datum.

Storm total rainfall amounts generally ranged from 10 to 16 inches across coastal and south Mississippi with much lower amounts observed over southwest Mississippi. The highest observed storm total rainfall was 11 inches at Stennis Space Center and near Picayune.

PROBABILITY OF FUTURE OCCURRENCES

According to NOAA statistical data, the region is located in an area with an annual probability of a named storm between 30 and 42 percent as presented in Figure C.21. This illustration was created by the National Oceanic and Atmospheric Administration's Hurricane Research Division using data from 1944 to 1999 and counting hits when a storm or hurricane was within approximately 100 miles (165 km) of each location. As a reference point, the tip of Florida's outline can be found near the 25N, 80W intersection, and the MEMA District 9 Region is near the 30N, 90W intersection. This empirical probability is fairly consistent with other scientific studies and observed historical data made available through a variety of federal, state, and local sources.

FIGURE C.21: EMPIRICAL PROBABILITY OF A NAMED HURRICANE OR TROPICAL STORM



Source: National Oceanic and Atmospheric Administration

The probability of storm occurrences will vary significantly based on the return interval for different categories of magnitude. The probability of less intense storms (lower return periods) is higher than more intense storms (higher return periods). Table C.45 profiles the potential peak gust wind speeds that can be expected in the MEMA District 9 Region during a hurricane event for various return periods according to FEMA's HAZUS-MH®.

TABLE C.45: POTENTIAL PEAK GUST WIND SPEEDS PER RETURN PERIOD

50-Year	100-Year	500-Year	1,000-Year
119.4 mph	133.9 mph	160.3 mph	170.0

Source: Federal Emergency Management Agency (Hazus-MH 3.2)

Overall, the probability level of future hurricane and tropical storm occurrence for Harrison County is highly likely (100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table C.46: Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HURRICANE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.3 events/year	0.48	$5,621,595	$111,925,521	$43,902	$117,591,018	98.2	Relatively High
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table C.47: Harrison County Hazard Specific Risk Index Table

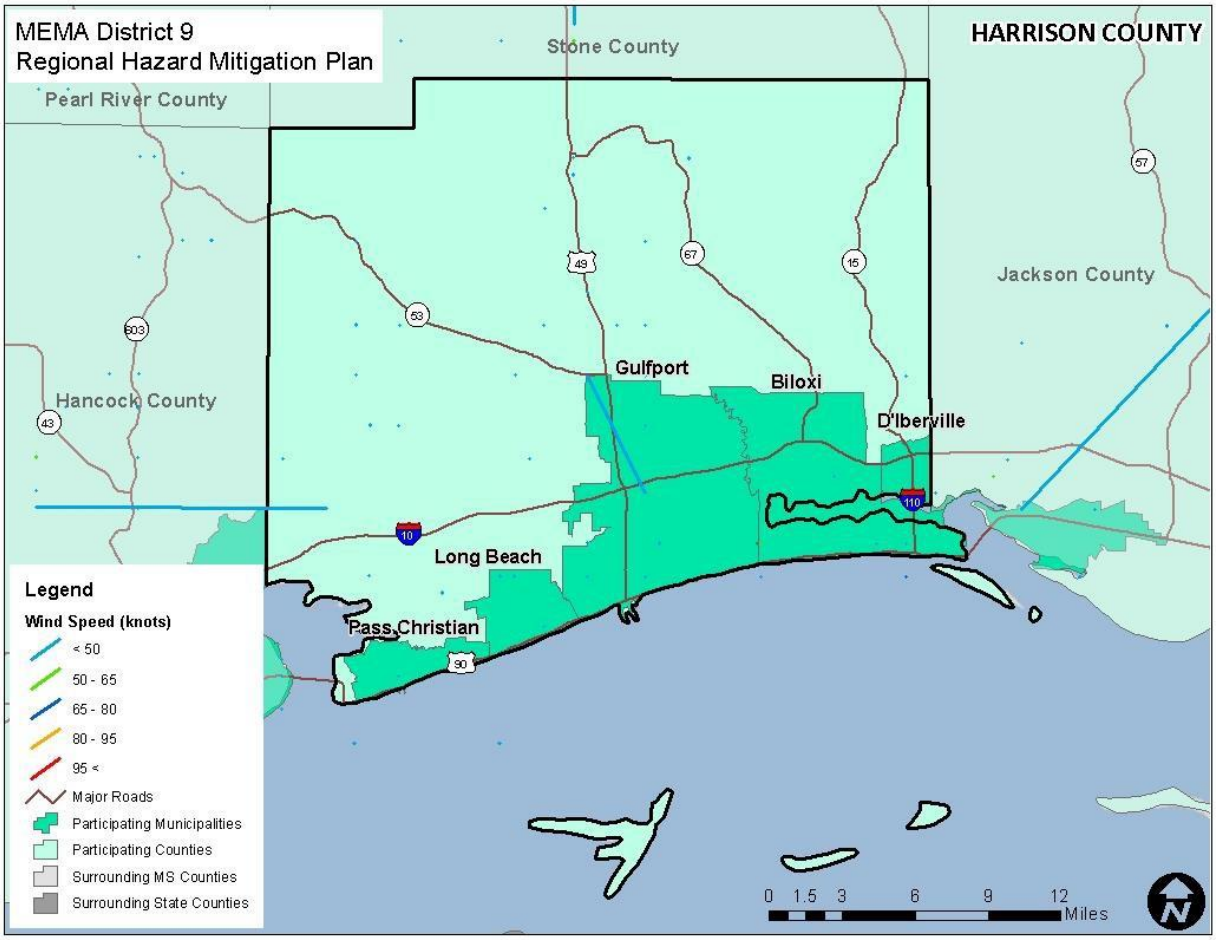
HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HURRICANE	
Risk Index Score	Risk Index Rating
98.3/100	Relatively High
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

SEVERE THUNDERSTORM/HIGH WIND

LOCATION AND SPATIAL EXTENT

A thunderstorm event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. It is assumed that Harrison County has uniform exposure to an event and the spatial extent of an impact could be large. With that in mind, Figure C.22 shows the location of wind events that have impacted the county between 1955 and 2015.

FIGURE C.22: SEVERE THUNDERSTORM TRACKS IN HARRISON COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Severe storms were at least partially responsible for five disaster declarations in Harrison County in 1980, 1990, twice in 1991, and 1995. According to NCDC, there have been 185 reported thunderstorm and high wind events since 1963 in Harrison County. These events caused over $1.0 million (2016 dollars) in damages. There were also reports of one fatality and eight injuries. Table C.48 summarizes this information. Detailed thunderstorm and high wind event reports including date, magnitude, and associated damages for each event are presented in Table C.49.

TABLE C.48: SUMMARY OF THUNDERSTORM/HIGH WIND OCCURRENCES IN HARRISON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2022)	Annualized Property Losses
Biloxi	22	0/0	$350,990	$5,949
D'Iberville	11	0/0	$95,625	$1,621
Gulfport	25	0/0	$243,992	$4,136
Long Beach	6	0/0	$8,684	$147
Pass Christian	8	0/0	$75,825	$1,285
Unincorporated Area	135	1/8	$338,061	$5,730
HARRISON COUNTY TOTAL	207	1/8	$1,113,177	$18,867

Source: National Center for Environmental Information

TABLE C.49: HISTORICAL THUNDERSTORM/HIGH WIND OCCURRENCES IN HARRISON COUNTY

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
Biloxi					
Biloxi	7/9/1995	Thunderstorm Wind	0 kts.	0/0	$7,902
BILOXI	1/24/1996	Thunderstorm Wind	--	0/0	$10,746
(BIX)KEESLER AFB BIL	8/2/1996	Thunderstorm Wind	--	0/0	$1,535
BILOXI	9/21/1996	Thunderstorm Wind	--	0/0	$23,026
BILOXI	4/11/1997	Thunderstorm Wind	--	0/0	$7,503
BILOXI	6/23/1997	Thunderstorm Wind	--	0/0	$12,005
BILOXI	1/7/1998	Thunderstorm Wind	--	0/0	$147,763
BILOXI	9/5/2000	Thunderstorm Wind	--	0/0	$6,993
BILOXI	6/12/2007	Thunderstorm Wind	50 kts. EG	0/0	$0
BILOXI	6/19/2007	Thunderstorm Wind	50 kts. EG	0/0	$34,849
BILOXI	9/3/2007	Thunderstorm Wind	50 kts. EG	0/0	$0
BILOXI	3/7/2008	Thunderstorm Wind	65 kts. EG	0/0	$89,494
(BIX)KEESLER AFB BIL	3/7/2008	Thunderstorm Wind	60 kts. MG	0/0	$0
(BIX)KEESLER AFB BIL	7/4/2009	Thunderstorm Wind	57 kts. MG	0/0	$0
BILOXI	7/4/2009	Thunderstorm Wind	57 kts. EG	0/0	$1,123
BILOXI	12/24/2009	Thunderstorm Wind	50 kts. EG	0/0	$2,807
BILOXI	3/22/2012	Thunderstorm Wind	55 kts. EG	0/0	$5,245
BILOXI	7/13/2013	Thunderstorm Wind	52 kts. EG	0/0	$0
(BIX)KEESLER AFB BIL	5/19/2016	Thunderstorm Wind	60 kts. EG	0/0	$0
(BIX)KEESLER AFB BIL	6/28/2017	Thunderstorm Wind	52 kts. EG	0/0	$0
(BIX)KEESLER AFB BIL	11/01/2018	Thunderstorm Wind	55 kts. EG	0/0	$0
BILOXI	5/04/2019	Thunderstorm Wind	55 kts. EG	0/0	$0
D'Iberville					

D'Iberville	8/20/1995	Thunderstorm Wind	0 kts.	0/0	$790
D IBERVILLE	10/6/2000	Thunderstorm Wind	--	0/0	$2,098
D IBERVILLE	3/7/2008	Thunderstorm Wind	65 kts. EG	0/0	$89,494
D IBERVILLE	5/25/2010	Thunderstorm Wind	52 kts. EG	0/0	$2,209
D IBERVILLE	3/9/2011	Thunderstorm Wind	60 kts. EG	0/0	$0
D IBERVILLE	8/5/2013	Thunderstorm Wind	52 kts. EG	0/0	$1,034
D IBERVILLE	4/25/2015	Thunderstorm Wind	52 kts. EG	0/0	$0
D IBERVILLE	4/1/2016	Thunderstorm Wind	60 kts. EG	0/0	$0
D IBERVILLE	5/19/2016	Thunderstorm Wind	60 kts. EG	0/0	$0
D IBERVILLE	5/19/2016	Thunderstorm Wind	60 kts. EG	0/0	$0
D IBERVILLE	3/23/2021	Thunderstorm Wind	50 kts. EG	0/0	$0

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
Gulfport					
Gulfport	4/8/1993	Thunderstorm Wind	0 kts.	0/0	$83,340
Gulfport	3/14/1995	Thunderstorm Wind	0 kts.	0/0	$0
Gulfport	7/9/1995	Thunderstorm Wind	0 kts.	0/0	$3,161
GULFPORT	1/18/1996	Thunderstorm Wind	--	0/0	$768
GULFPORT	12/29/1996	Thunderstorm Wind	45 kts.	0/0	$0
GULFPORT	7/11/1997	Thunderstorm Wind	--	0/0	$37,516
GULFPORT ARPT	7/11/1997	Thunderstorm Wind	50 kts.	0/0	$0
GULFPORT	9/1/1997	Thunderstorm Wind	--	0/0	$1,201
GULFPORT	8/14/1999	Thunderstorm Wind	--	0/0	$2,891
(GPT)GULFPORT RGNL A	8/14/1999	Thunderstorm Wind	50 kts.	0/0	$0
GULFPORT	7/24/2002	Thunderstorm Wind	--	0/0	$1,004
GULFPORT	5/1/2004	Thunderstorm Wind	50 kts. EG	0/0	$12,750
GULFPORT	6/19/2004	Thunderstorm Wind	40 kts. EG	0/0	$2,550
GULFPORT	1/5/2007	Thunderstorm Wind	50 kts. EG	0/0	$11,616
GULFPORT	7/14/2008	Thunderstorm Wind	50 kts. EG	0/0	$3,356
GULFPORT	12/24/2009	Thunderstorm Wind	50 kts. EG	0/0	$842
(GPT)GULFPORT RGNL A	4/8/2010	Thunderstorm Wind	52 kts. EG	0/0	$16,568
GULFPORT	5/18/2010	Thunderstorm Wind	52 kts. EG	0/0	$552
GULFPORT	3/9/2011	Thunderstorm Wind	70 kts. EG	0/0	$53,537
GULFPORT	4/11/2013	Thunderstorm Wind	61 kts. EG	0/0	$10,339
GULFPORT ARPT	4/14/2013	Thunderstorm Wind	52 kts. MG	0/0	$0
(GPT)GULFPORT RGNL A	4/25/2015	Thunderstorm Wind	56 kts. EG	0/0	$0
(GPT)GULFPORT RGNL	6/23/2015	Thunderstorm	58 kts. MG	0/0	$0

A		Wind			
(GPT)GULFPORT RGNL A	6/23/2015	Thunderstorm Wind	58 kts. MG	0/0	$0
GULFPORT	7/14/2020	Thunderstorm Wind	42 kts. MG	0/0	$2,000
Long Beach					
LONG BEACH	4/14/1996	Thunderstorm Wind	--	0/0	$3,070
LONG BEACH	12/23/2002	Thunderstorm Wind	--	0/0	$1,339
LONG BEACH	6/2/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,275
LONG BEACH	4/2/2009	Thunderstorm Wind	61 kts. EG	0/0	$0
LONG BEACH	5/19/2016	Thunderstorm Wind	60 kts. EG	0/0	$0
LONG BEACH	12/04/2020	Thunderstorm Wind	50 kts. EG	0/0	$3,000
Pass Christian					
Pass Christian	4/8/1993	Thunderstorm Wind	0 kts.	0/0	$833
PASS CHRISTIAN	4/14/1996	Thunderstorm Wind	--	0/0	$768
PASS CHRISTIAN	8/10/2000	Thunderstorm Wind	--	0/0	$350
PASS CHRISTIAN	6/11/2001	Thunderstorm Wind	--	0/0	$6,800
PASS CHRISTIAN	6/12/2003	Thunderstorm Wind	50 kts. EG	0/0	$3,927
PASS CHRISTIAN	3/21/2012	Thunderstorm Wind	55 kts. EG	0/0	$3,147
PASS CHRISTIAN	5/18/2018	Thunderstorm Wind	50 kts. EG	0/0	$50,000
PASS CHRISTIAN	6/13/2021	Thunderstorm Wind	50 kts. EG	0/0	$10,000
Unincorporated Area					
HARRISON CO.	7/21/1963	Thunderstorm Wind	50 kts.	0/0	$0
HARRISON CO.	4/14/1964	Thunderstorm Wind	80 kts.	0/0	$0
HARRISON CO.	4/26/1964	Thunderstorm Wind	62 kts.	0/0	$0
HARRISON CO.	5/22/1965	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	7/19/1965	Thunderstorm Wind	60 kts.	0/0	$0
HARRISON CO.	8/16/1966	Thunderstorm Wind	50 kts.	0/0	$0

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
HARRISON CO.	7/11/1968	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	7/29/1968	Thunderstorm Wind	52 kts.	0/0	$0
HARRISON CO.	7/14/1969	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	7/14/1969	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	8/10/1969	Thunderstorm Wind	70 kts.	0/0	$0
HARRISON CO.	2/1/1970	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	4/19/1970	Thunderstorm Wind	50 kts.	0/0	$0
HARRISON CO.	6/15/1970	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	10/13/1970	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	5/12/1971	Thunderstorm Wind	65 kts.	0/0	$0
HARRISON CO.	7/13/1971	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	9/16/1971	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	3/24/1973	Thunderstorm Wind	50 kts.	0/0	$0
HARRISON CO.	2/7/1974	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	2/7/1974	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	5/22/1974	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	7/23/1974	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	8/21/1974	Thunderstorm Wind	61 kts.	0/0	$0
HARRISON CO.	1/10/1975	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	5/8/1975	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	3/4/1977	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	5/3/1978	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	5/3/1978	Thunderstorm Wind	0 kts.	0/0	$0

HARRISON CO.	5/3/1978	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	6/7/1978	Thunderstorm Wind	50 kts.	0/0	$0
HARRISON CO.	5/4/1979	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	11/10/1979	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	7/15/1980	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	2/10/1981	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	4/20/1982	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	5/7/1982	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	7/5/1982	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	2/21/1983	Thunderstorm Wind	52 kts.	0/0	$0
HARRISON CO.	4/7/1983	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	10/22/1983	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	12/11/1983	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	6/22/1984	Thunderstorm Wind	50 kts.	0/0	$0
HARRISON CO.	8/11/1984	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	8/11/1984	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	8/11/1984	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	5/21/1985	Thunderstorm Wind	0 kts.	0/1	$0
HARRISON CO.	8/15/1985	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	8/15/1985	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	9/23/1985	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	9/23/1985	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	9/23/1985	Thunderstorm Wind	0 kts.	0/0	$0

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
HARRISON CO.	3/12/1986	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	6/18/1986	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	8/2/1986	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	2/15/1987	Thunderstorm Wind	0 kts.	0/2	$0
HARRISON CO.	3/17/1987	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	7/26/1987	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	5/21/1988	Thunderstorm Wind	55 kts.	0/0	$0
HARRISON CO.	5/24/1988	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	6/8/1989	Thunderstorm Wind	68 kts.	0/0	$0
HARRISON CO.	6/14/1989	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	2/22/1990	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	4/22/1990	Thunderstorm Wind	0 kts.	1/0	$0
HARRISON CO.	5/9/1990	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	5/21/1990	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	9/4/1990	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	12/3/1990	Thunderstorm Wind	0 kts.	0/5	$0
HARRISON CO.	6/6/1991	Thunderstorm Wind	0 kts.	0/0	$0
HARRISON CO.	6/30/1992	Thunderstorm Wind	54 kts.	0/0	$0
HARRISON CO.	9/10/1994	Thunderstorm Wind	0 kts.	0/0	$8,126
Saucier and Lyman	3/7/1995	Thunderstorm Wind	0 kts.	0/0	$4,741
Saucier	5/9/1995	Thunderstorm Wind	0 kts.	0/0	$0
Lyman	5/9/1995	Thunderstorm Wind	0 kts.	0/0	$0
LYMAN	1/24/1997	Thunderstorm Wind	--	0/0	$750

SAUCIER	6/21/1998	Thunderstorm Wind	--	0/0	$739
SAUCIER	8/8/1999	Thunderstorm Wind	--	0/0	$723
SAUCIER	6/25/2000	Thunderstorm Wind	--	0/0	$699
DE LISLE	7/21/2000	Thunderstorm Wind	--	0/0	$140
LYMAN	8/30/2000	Thunderstorm Wind	--	0/0	$13,987
SAUCIER	9/2/2000	Thunderstorm Wind	--	0/0	$6,993
LYMAN	9/2/2000	Thunderstorm Wind	61 kts. E	0/0	$0
LIZANA	11/24/2000	Thunderstorm Wind	--	0/0	$20,980
LYMAN	11/24/2000	Thunderstorm Wind	--	0/0	$41,960
COUNTYWIDE	3/12/2001	Thunderstorm Wind	--	0/0	$3,400
WOOL MARKET	6/11/2001	Thunderstorm Wind	--	0/0	$1,360
LYMAN	7/5/2001	Thunderstorm Wind	--	0/0	$1,360
LYMAN	8/7/2001	Thunderstorm Wind	--	0/0	$1,360
ORANGE GROVE	7/31/2003	Thunderstorm Wind	50 kts. EG	0/0	$10,472
SAUCIER	6/1/2004	Thunderstorm Wind	50 kts. EG	0/0	$638
WORTHAM	8/30/2004	Thunderstorm Wind	50 kts. EG	0/0	$2,550
LIZANA	1/13/2005	Thunderstorm Wind	50 kts. EG	0/0	$617
SAUCIER	4/11/2005	Thunderstorm Wind	50 kts. EG	0/0	$1,850
SAUCIER	4/25/2006	Thunderstorm Wind	50 kts. EG	0/0	$2,389
COUNTYWIDE	8/15/2006	Thunderstorm Wind	50 kts. EG	0/0	$1,195
LYMAN	2/13/2007	Thunderstorm Wind	50 kts. EG	0/0	$4,646
LYMAN	6/19/2007	Thunderstorm Wind	50 kts. EG	0/0	$1,742
LYMAN	5/15/2008	Thunderstorm Wind	50 kts. EG	0/0	$8,949

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
SAUCIER	8/3/2008	Thunderstorm Wind	50 kts. EG	0/0	$1,119
SAUCIER	8/12/2008	Thunderstorm Wind	50 kts. EG	0/0	$1,119
HARRISON (ZONE)	3/1/2010	Strong Wind	45 kts. EG	0/0	$5,523
LANDON	10/27/2010	Thunderstorm Wind	52 kts. EG	0/0	$5,523
WOOL MARKET	10/27/2010	Thunderstorm Wind	52 kts. EG	0/0	$5,523
LANDON	3/9/2011	Thunderstorm Wind	60 kts. EG	0/0	$21,415
LORRAINE	3/9/2011	Thunderstorm Wind	60 kts. EG	0/0	$2,142
LORRAINE	3/9/2011	Thunderstorm Wind	60 kts. EG	0/0	$0
LANDON	4/4/2011	Thunderstorm Wind	70 kts. EG	0/0	$53,537
CUEVAS	6/12/2011	Thunderstorm Wind	55 kts. EG	0/0	$1,071
LIGANA	3/21/2012	Thunderstorm Wind	55 kts. EG	0/0	$10,490
CUEVAS	3/21/2012	Thunderstorm Wind	55 kts. EG	0/0	$15,736
LIGANA	7/3/2012	Thunderstorm Wind	55 kts. EG	0/0	$5,245
DE LISLE	7/18/2012	Thunderstorm Wind	55 kts. EG	0/0	$10,490
WOOL MARKET	8/1/2012	Thunderstorm Wind	55 kts. EG	0/0	$5,245
HARRISON (ZONE)	4/3/2013	High Wind	52 kts. MG	0/0	$0
HARRISON (ZONE)	4/3/2013	High Wind	67 kts. MG	0/0	$20,678
DE LISLE	4/14/2013	Thunderstorm Wind	56 kts. EG	0/0	$10,339
LIGANA	6/24/2015	Thunderstorm Wind	55 kts. EG	0/0	$0
LIGANA	6/24/2015	Thunderstorm Wind	55 kts. EG	0/0	$0
WORTHAM	9/5/2015	Thunderstorm Wind	55 kts. EG	0/0	$0
WORTHAM	12/28/2015	Thunderstorm Wind	60 kts. EG	0/0	$0
CUEVAS	5/19/2016	Thunderstorm Wind	60 kts. EG	0/0	$0
HARRISON (ZONE)	7/27/2016	Strong Wind	45 kts. EG	0/0	$500
SAUCIER	1/02/2017	Thunderstorm	55 kts. EG	0/0	$0

		Wind			
MISSISSIPPI CITY	3/30/2017	Thunderstorm Wind	55 kts. EG	0/0	$0
MISSISSIPPI CITY	5/20/2017	Thunderstorm Wind	55 kts. EG	0/0	$0
BEAUVOIR	11/01/2018	Thunderstorm Wind	50 kts. EG	0/0	$0
LIGANA	11/01/2018	Thunderstorm Wind	55 kts. EG	0/0	$0
WORTHAM	11/01/2018	Thunderstorm Wind	50 kts. EG	0/0	$0
HARRISON (ZONE)	4/18/2019	Strong Wind	48 kts. EG	0/0	$20,000
SAUCIER	5/04/2019	Thunderstorm Wind	55 kts. EG	0/0	$0
WOOL MARKET	5/04/2019	Thunderstorm Wind	55 kts. EG	0/0	$0
ORANGE GROVE	6/27/2019	Thunderstorm Wind	50 kts. EG	0/0	$0
LIGANA	4/19/2020	Thunderstorm Wind	50 kts. EG	0/0	$0
WORTHAM	3/23/2021	Thunderstorm Wind	50 kts. EG	0/0	$0
LYMAN	4/24/2021	Thunderstorm Wind	50. kts. EG	0/0	$0

†E = estimated; EG = estimated gust; ES = estimated sustained; MG = measured gust; MS = measured sustained
Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

Given the high number of previous events, it is certain that thunderstorm events, including straight-line wind events, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for the entire county.

FEMA NRI Expected Annual Loss Estimates

Table C.50. Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HIGH WIND EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1.7 events/year	0.08	$903,865	$42,149	$10	$946,0 24	81.4	Relatively Moderate

Annalized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table C.51: Harrison County Hazard Specific Risk Index Table

HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HIGH WIND	
Risk Index Score	Risk Index Rating
82.7/100	Relatively Moderate
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

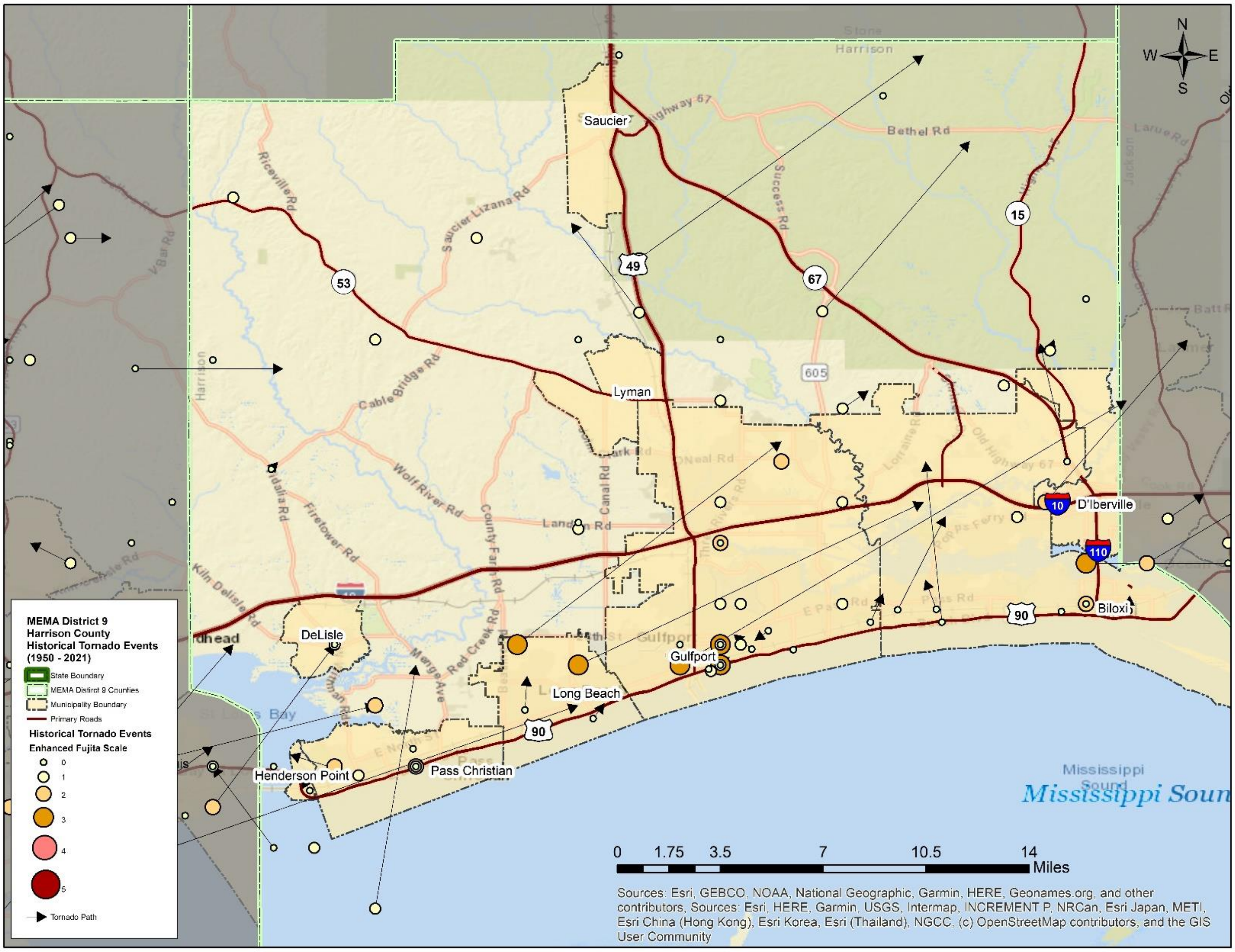
TORNADO

LOCATION AND SPATIAL EXTENT

Tornadoes occur throughout the state of Mississippi, and thus in Harrison County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Harrison County is uniformly exposed to this hazard. With that in mind, Figure C.23 shows tornado track data for many of the major tornado events that have impacted the county between 1950 and 2015. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE C.23: HISTORICAL TORNADO TRACKS IN HARRISON COUNTY

Figure C.24: Historical Tornado Tracks (1950-2021)



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Tornadoes were at least partially responsible for five disaster declarations in Harrison County in 1980, 1990, twice in 1991, and 1995. According to the National Center for Environmental Information, there have been a total of 77 recorded tornado events in Harrison County since 1953, resulting in almost $280.9 million (2016 dollars) in property damages. In addition, 6 fatalities and 81 injuries were reported. The magnitude of these tornadoes ranged from F0 to F3 and EF0 to EF1 in intensity. A summary of these events is presented in Table C.52. Detailed information on historic tornado events can be found in Table C.53.

TABLE C.52: SUMMARY OF TORNADO OCCURRENCES IN HARRISON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses

Biloxi	9	0/0	$227,157	$3,292
D'Iberville	2	0/0	$10,490	$152
Gulfport	14	0/0	$375,720	$5,445
Long Beach	4	0/0	$71,415	$1,035
Pass Christian	4	0/0	$100,000	$1,449
Unincorporated Area	63	6/81	$280,964,069	$4,071,943
HARRISON COUNTY TOTAL	887	6/81	$281,748,851	$4,084,317

Source: National Center for Environmental Information

TABLE C.53: HISTORICAL TORNADO IMPACTS IN HARRISON COUNTY

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Biloxi					
BILOXI	7/22/2000	F0	0/0	$0	A large waterspout developed just offshore the coast of Gulfport and Biloxi area.
BILOXI	10/6/2000	Funnel Cloud	0/0	$0	A funnel cloud was sighted by the public over Biloxi Bay.
BILOXI	8/10/2001	Funnel Cloud	0/0	$0	--
BILOXI	10/3/2002	F0	0/0	$20,082	Law enforcement reported a weak tornado touched down. No damage was reported.
BILOXI	7/16/2007	Funnel Cloud	0/0	$0	A funnel cloud was observed near the intersection of Highway 15 and Highway 67.
(BIX)KEESLER AFB BIL	3/9/2011	EF1		$107,075	A tornado touched down near Cedar Lake Road and Popps Ferry Road. Several mobile homes were damaged. One mobile home was rolled and destroyed with minor to moderate damage on several others. Several large tree limbs snapped as well. The tornado was rated at the upper end of EF1 scale.
(BIX) KEESLER AFB BIL	8/30/2017	EF0	0/0	$0	**A tornado touched down one block north of US Highway 90 on Fr. Ryan Street. The storm proceeded northward through Keesler Circle with minor tree damage. The last home in the back of the circle had a large hardwood tree uprooted, which damaged two homes and a vehicle, and moved to the southern edge of Keesler AFB and lifted. A small tree was blown down on the AFB. Estimated maximum wind speed 80 mph.**

(BIX) KEESLER AFB BIL	8/30/2021	EF0	0/0	$50,000	**A brief tornado touched down about one-quarter mile southwest of Keesler Air Force Base in Biloxi, MS. Several houses sustained minor wind damage along Miramar Ave and Clower St. Large branches were also snapped in this area. The tornado lifted quickly but not before producing more damage farther northwest along its path, including minor roof damage to several apartment buildings along Iberville Dr. A few hardwood trees fell in a wooded area just to the west of the apartment complex. Survey conducted remotely via high-res aerial photography.**
BILOXI	8/30/2021			$50,000	**A brief tornado tracked north for approximately a half mile in Biloxi, downing trees and snapping large branches, and causing roof damage to several homes along Howard Ave., Peyton Dr., Keller Ave., and Esters Blvd. Roof damage to a small office complex at the corner of Division St. and Keller Ave. and several nearby houses was also noted. Survey conducted remotely via high-res aerial photography.**
D'Iberville					
D IBERVILLE	7/14/2005	Funnel Cloud	0/0		A funnel cloud was reported by the Biloxi Police Department.
D IBERVILLE	3/22/2012	EF0	0/0	$10,490	NWS storm survey confirmed a tornado touched down along Highway 67 at Highway 15. Most of the damage was at the starting point with a large shed door blown in, causing roof damage and a patio roof lifted off. Most of the remainder of the damage was to shingles and fences, with an end point in Coventry Estates. The path width was 100 yards with a damage track around 4 miles long. Estimated wind speed was 85 mph.
Gulfport					
GULFPORT	4/13/1996	F0	0/0	$1,535	The public reported that a waterspout damaged several boat's sails, moved onshore

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					and traveled a short distance down a street on the west side of Gulfport.
GULFPORT	4/14/1996	F0	0/0	$0	The public reported a waterspout moved onshore and traveled a short distance down a street in Gulfport. No damage was reported.
GULFPORT	8/11/1997	Waterspout	0/0	$0	The Mississippi Highway Patrol reported a waterspout moving toward shore.
GULFPORT	6/25/1999	Waterspout	0/0	$0	A large waterspout developed just offshore the coast of Gulfport and Biloxi area.
GULFPORT	9/2/2000	F0	0/0	$41,960	A tornado caused damage in a two-block area at Pass and Courthouse Roads. Windows were blown out in a shopping center and roof damage occurred to two businesses. Several cars in a parking lot were damaged, a sign was knocked down, and a tree fell on a moving car on Pass Road.
GULFPORT	6/11/2001	F1	0/0	$135,998	A tornado touched down for a short distance and caused roof and siding damage to 10 houses.
GULFPORT	7/26/2001	Waterspout	0/0	$0	A waterspout was sighted offshore Gulfport.
GULFPORT	8/11/2001	Waterspout	0/0	$0	A waterspout was observed by park rangers near Ship Island.
GULFPORT	7/13/2005	Funnel Cloud	0/0	$0	Two funnel clouds were reported by the Gulfport Police Department over the navy base on the west side of Gulfport.
GULFPORT	2/12/2008	EF0	0/0	$0	A weak tornado was observed briefly touching down in the vicinity of Interstate 10 and Canal Boulevard causing no damage.
					The tornado moved inland and uprooted a tree after crossing Beach Boulevard. It caused significant damage to a home under construction on the corner of 15th Street and 18th Avenue. All walls of the home were shifted and leaning, with a portion of the roof collapsed. The tornado also

GULFPORT	8/29/2012	EF1	0/0	$26,226	collapsed the porch roof of a home on 19th Avenue. It caused mainly tree damage as it continued to move NNW before lifting.
GULFPORT	6/24/2020	EF0	0/0	$20,000	**A National Weather Service Damage Assessment Team has surveyed the storm damage in Gulfport, MS. It has been determined the damage was the result of a tornado. The tornado has been rated an EF-0 on the Enhanced Fujita Scale. Damage estimates were consistent with winds of 65 mph. Several large hardwood tree limbs snapped and minor roof damage to several homes from US Highway 90 near the aquarium to the CSX railway near Henderson Avenue.**
GULFPORT	8/29/2021	EF0	0/0	$100,000	**The tornado developed just to the north of East Railroad Street along Gulf Ave where several large tree limbs were snapped. It continued northwest producing sporadic tree damage. The most significant damage was noted as it crossed 27th Street where numerous large limbs were snapped and a large oak tree was uprooted onto two houses. An older house lost part of its roof as the tornado crossed Broadmoore Pl. The tornado weakened as it crossed 28th Street and dissipated north of Pass Rd where some minor siding damage was noted to an older strip mall. Estimated peak winds of 85 mph.**
(GPT) GULFPORT RGNL A	8/30/2021	EF0	0/0	$50,000	**An EF-0 tornado snapped numerous trees and damaged several roofs in the neighborhood between 26th and 28th Streets and Roberts and Hewes Avenues. It then tracked northeast for at least a half mile, producing minor roof damage and uprooting several trees on 30th Street and D Avenue. Survey conducted remotely via high-res aerial photography. The track may have continued briefly beyond this point, but imagery was unavailable.**

Long Beach					
LONG BEACH	8/27/2001	Waterspout	0/0	$0	A waterspout was observed by law enforcement officials just off the coast of southwest Harrison County.
LONG BEACH	3/9/2011	EF1	0/0	$21,415	A tornado touched down along Landon Road. One home had a portion of roof removed, as well as a storage building and awning destroyed. Several trees were blown down and large branches snapped.
LONG BEACH	4/14/2018	Waterspout	0/0	$0	**A combination of YouTube storm chaser video and a NWS storm survey indicated a multiple vortex waterspout moved through Long Beach Harbor, removing the roof off of an outbuilding and toppling two tall masted sailboats. The waterspout proceeded onshore onto the beach and crossed U.S. Highway 90 near Nicholson Street, lifting in the rear of St. Thomas the Apostle Catholic Church. Estimated maximum winds were 70 mph, path width 75 yards.**
LONG BEACH	6/19/2021	EF0	0/0	$50,000	**A tornado touched down near Twin Lakes Boulevard where large tree limbs were snapped, a fence was blown over and siding torn off a house. Damage to numerous houses was observed along Periwinkle Lane, including roof (shingles peeled and a chimney toppled over) damage, downed fences, a bent garage door, and car windows that were blown out. The tornado continued to produce sporadic damage as it tracked north. The most concentrated damage occurred along Yuca Drive. On one property, a pergola was destroyed, a large oak tree was uprooted, back yard doors were blown in, siding ripped off, and a camper was overturned. The tornado lifted just north of Mossy Oak Drive.**
Pass Christian					
PASS CHRISTIAN	7/31/2004	Funnel Cloud	0/0	$0	A funnel cloud was observed north of Interstate 10 in western Harrison County.

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
PASS CHRISTIAN	4/21/2006	Funnel Cloud	0/0	$0	A funnel cloud was sighted.
PASS CHRISTIAN	6/18/2021	EF0	0/0	$50,000	**Several buildings in Camille Village Apartments sustained minor damage to the siding and front awnings. Two buildings had their AC units blown over. One of the AC units was not found. An awning attached to the front of one of these building was completely destroyed. The roofing and awning material was lofted and found about 1,000 yards to the northwest past a fence and area of trees.**
PASS CHRISTIAN	8/29/2021	EF1/Waterspout	0/0	$50,000	**A waterspout moved onshore near Railroad St and Henderson Ave where it caused minor roof damage to several houses. The most significant damage occurred near Witman Ave where a house sustained extensive roof damage and numerous trees were snapped or uprooted. The tornado tracked to the northwest, causing additional minor roof damage and snapped trees near Blue Lake Cove. It continued to move northwest where a roof was damaged near Prentiss Rd and Hillcrest Drive. Estimated peak winds of 90 mph.**
Unincorporated Area					
HARRISON CO.	8/9/1953	--	0/0	$22,552	--
HARRISON CO.	8/10/1957	F0	0/0	$257	--
HARRISON CO.	2/26/1958	F2	0/0	$208,350	--
HARRISON CO.	4/6/1963	--	0/0	$196,775	--
HARRISON CO.	4/27/1966	F1	0/0	$185,843	--
HARRISON CO.	10/30/1967	F3	4/17	$180,279,192	--

HARRISON CO.	6/11/1968	F1	0/0	$0	Occupant of Delisle residence which probably suffered most said damage occurred between 1:30 and 2:30 p.m. As lightning frightened children, 3 women and 5 children gathered in front where window was open. A "...real smoky blue cloud came swirling into house, it came through there like a big cloud of blue smoke," owner said, and "it came suddenly." She compared its roaring sound to that of a rolling train. Woman next door saw pieces of damaged house flying through air. Porch was reported destroyed; roof ripped off bedroom, dining room and front room, and water dumped into house; power lines were damaged. Another Delisle woman said it was "really rough up here...I don't know that I've ever seen wind that bad except in a hurricane. She reported tree limbs downed in her neighborhood but no real damage.
HARRISON CO.	6/12/1968	--	0/0	$0	--
HARRISON CO.	11/3/1968	F3	0/5	$0	Thunderstorm moved from SW towards NE. Man in Gulfport Airport Control Tower saw debris fly about 1-1/2 SW when funnel touched ground, it then lifted and passed over airport towards NE, tower deserted when winds reached 52 mph. Damage in sparsely populated manufacturing area of Gulfport (lat. 30.4º N, long. 39.2º W) estimated $60,000. Tornado appeared to have first touched down on 33rd Street just west of Illinois Central Railroad where it damaged a chain link fence, then continued general northeastward across U.S. Highway 49. Man about 3 blocks away describing the tornado wrote he "did not hear it long before it touched down...it was raining fairly hard before it passed over and cleared up completely a little while later." A newspaper man mentioned he had heard a noise and went outside to see tornado, he was quoted, "I heard this

					rascal buildup and saw it boiling over the area, it began picking up tin from roofs before it touched down at trailer." This

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					trailer, on 33rd Street lot, W of U.S. 90, was lifted off foundation, bounced after hitting ground and smashed against concrete block building about 80 ft away; the 4 occupants, ages 2-29, received relatively minor cuts and bruises. At SW corner 34th Street and 25 Avenue roofs were lifted off and other heavy damage reported to 5 residences, mostly 2- family dwellings (one concrete block and the others frame). On SE corner man watched clouds and saw funnel coming over buildings across the street, he said, "I saw tin flying and hit the deck," - alongside a counted in office of corner service station; others in station and 2 girls in car outside also got down on the floor; tornado took down a large sign at street corner. Nearby at a glass manufacturing plant (E of U.S. 49) a man, age 52, heard tornado, he got down on the floor, a tremendous draft swept him into a 10-ft. concrete pit, his right food was injured. Building had structural damage estimated at $12,000, mostly to windows and roof. At least 8 structures received varying degrees of damage, power lines were severed, signs knocked down, pine trees broken off half way up to the trunk and several trees blown down. Red Cross reported 10 families affected by the tornado.
HARRISON CO.	5/17/1969	--	0/0	$0	--

HARRISON CO.	2/1/1970	F0	0/10	$1,551,888	Newspaper noted "Three structures at the W. M. Ladnier Homes on 28th Street were extensively damaged as a funnel cloud was observed passing through the area…a duplex and a two story, four-unit building had their roofs lifted off on 30th Street and another building, a central non-housing building, was also heavily damaged. Other less severe damage was reported in the project. No serious personal injuries were reported..." A woman living in the project "...heard the wind coming, grabbed her two small children and got behind a couch for protection. AS the storm hit blowing the roof off the upper floor, glass flew about the room. Her daughter had cuts on her hand." The project manager reported that during rainy weather the storm moved from SW towards NE, there was a "loud road, immediately before the wind had died completely down." Damages were estimated $55,000, and 10 persons injured (mostly elderly, treated for shock and minor cuts).
HARRISON CO.	2/1/1970	F2	0/3	$0	Civil Defense Pass Christian (lat. 30.3º N, long. 89.2º W) reported small tornado

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					moving towards NE, some trees and power lines down. Newspaper noted it touched down on Menge Avenue.
HARRISON CO.	8/27/1971	F1	0/0	$148,675	A white funnel cloud came down Bernard Bayou and struck the Sugar Mill Marina area in Handsboro (lat. 30.4º N, long. 89.0º W) and there was about $10,000 damage. At the marina about $5,000 damages when 9 roofs on boat stalls were lifted by the winds. A building adjoining the marina received about $2,000 damages. Three trucks parked near the building were damaged when the marina roofs fell on them.
HARRISON CO.	9/16/1971	F1	0/0	$0	--
HARRISON CO.	5/7/1972	F1	0/0	$0	--
HARRISON CO.	5/7/1972	F2	0/0	$144,051	--
HARRISON CO.	5/7/1972	F1	0/2	$14,405	--
HARRISON CO.	5/7/1972	F1	0/0	$0	--
HARRISON CO.	5/7/1972	F1	0/0	$14,405	--
HARRISON CO.	5/7/1972	F2	0/0	$144,051	--
					Small tornado touched down north of Pass Christian in Arcadia Bayou section, east of the Adams Bridge. One of the Sheriff's units reported the funnel cloud coming down at 5:53 p.m. CST, and the car was blown in the ditch. Storm moved from SW to NE. Glover home had windows blown out, shingles torn from roof, and small trees and limbs broken. Next damaged roof and interior of Lynch home (several hundred dollars); woman said she got under mattress because of flying glass. Last destroyed Price frame home leaving some of owner's

HARRISON CO.	5/7/1972	F2	0/0	$144,051	belongings strewn amid wreckage of standing walls. Total damages estimated $15,000; no causalities reported.
HARRISON CO.	8/16/1974	F1	0/0	$12,214	The tornado destroyed a mobile office trailer, overturned a truck trailer, and damaged several boats in the harbor.
HARRISON CO.	1/10/1975	F1	0/0	$1,119	--
HARRISON CO.	8/30/1975	F0	0/0	$134	--
HARRISON CO.	10/15/1975	F0	0/0	$0	--
HARRISON CO.	9/5/1977	F2	0/0	$993,618	A tornado spawned by Hurricane Babe touched down briefly at the North Street Elementary School in Pass Christian during the early afternoon while the school was vacated for the Labor Day holiday. One wing of the school collapsed completely demolishing one room and heavily damaging 5 others. The twister lifted shortly after hitting the school. Total damage $250,000/
HARRISON CO.	4/13/1980	F3	0/25	$73,074,333	--

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
HARRISON CO.	5/16/1980	F3	0/0	$730,743	Tornado struck just north of Long Beach, ripping off part of the roof of the city barn, then traveled NE along a skipping path before lifting near I-10 northwest of Biloxi. The hardest hit area appeared to be the Sunkist subdivision northwest of Biloxi, where several well-built brick homes were heavily damaged. Most of the damage path was through wooded areas where considerable timber was destroyed. Property damage included 3 houses and 24 apartments destroyed, 36 houses damaged and 1 trailer destroyed. Estimated property damage $350,000.
HARRISON CO.	5/19/1980	F3	0/4	$7,307,433	--
HARRISON CO.	5/19/1980	F2	0/0	$730,743	--
HARRISON CO.	4/20/1982	F2	0/0	$623,972	--
HARRISON CO.	9/2/1985	F1	0/0	$0	--
HARRISON CO.	9/2/1985	F1	0/0	$0	--
HARRISON CO.	9/23/1985	F0	0/0	$55,960	--
HARRISON CO.	9/23/1985	F2	0/0	$559,603	--
HARRISON CO.	9/23/1985	F1	0/0	$559,603	--
HARRISON CO.	3/29/1987	F0	0/0	$53,005	A weak tornado touched down briefly 10 miles north-northwest of Gulfport. The tops were blown out of some trees and a roof was blown off a barn.
HARRISON CO.	3/29/1987	F0	0/0	$53,005	Another small and very weak tornado touched down in downtown Gulfport. Two buildings had windows broken. Power lines also were knocked down.
HARRISON CO.	3/29/1987	F1	0/0	$53,005	Numerous trees and power lines were blown down 5 miles northeast of Gulfport. Several people heard the roar from the

					tornado.
HARRISON CO.	3/3/1988	F2	0/0	$508,988	A short-lived, but strong tornado moved northeast through a portion of south Biloxi. Heaviest damage was to a paint store where 8-inch I beams attached to the roof were twisted and removed from the building. Damage was estimated at 50,000 dollars. The tornado also picked up a car and carried it 150 feet into an unoccupied room in a retirement home. Damage was estimated at 15,000 dollars.
HARRISON CO.	5/10/1988	F1	0/0	$50,899	A short-lived weak tornado touched down in Lizana. The tornado was traveling to the southeast and heavily damaged 2 mobile homes. A trail of tree damage marked the path.
Woolmarket	4/12/1994	F2	2/15	$8,125,945	Twenty mobile homes were totally destroyed and four brick homes were partially destroyed. At least four businesses were damaged. The two deaths and the fifteen injuries all occurred in mobile homes.

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					Numerous trees and power lines were blown down. Damage was estimated at near one million dollars. F57M M08M
SAUCIER	11/21/1997	F1	0/0	$75,032	A severe thunderstorm moved out of St. Tammany Parish, Louisiana into extreme south Mississippi. Several short-lived tornadoes touched down as it crossed Pearl River, Hancock, and Harrison Counties. Near Nicholson, a tornado touched down near Nicholson, moving through a mobile home park and also passing across the Mississippi Visitors Center on Interstate Highway 59. Damage path was estimated at approximately four miles, due to lack of ground access in Pearl River drainage area to the west of Nicholson. Preliminary reports from Pearl River County and state officials indicated that 3 single family homes were destroyed and 18 others heavily damaged; and 21 mobile homes were destroyed and 8 others heavily damaged. Several car windows were blown out when the tornado passed through the Visitors Center. One person was injured in the mobile home park and another person suffered minor injuries in a nearby subdivision when their auto was hit by falling trees and limbs. Large hail was also reported by the Sheriff's Office in McNeil. Two additional tornado touch-downs were reported in north Hancock County and north Harrison County as the severe thunderstorm moved northeast. In north Hancock County, civil defense reported two homes were damaged along with two mobile homes when a tornado touched down in a rural area. In north Harrison County, a tornado damaged a convenience store along with heavily

					damaging a couple of mobile homes. The tornado path lengths in Hancock and Harrison Counties were estimated from damage reports.
DE LISLE	7/1/1998	Funnel Cloud	0/0	$0	Harrison County CD reported a funnel cloud near the Harrison County and Hancock County border.
ORANGE GROVE	9/2/2000	F0	0/0	$699	A weak tornado briefly touched down near Canal Road knocking down several trees.
HOWISON	3/12/2001	F0	0/0	$2,040	A small tornado knocked down several trees.
AIREY	3/12/2001	F0	0/0	$0	A small tornado briefly touched down knocking down trees and power lines.
ORANGE GROVE	11/24/2004	F2	0/0	$3,825,087	A tornado traveled east to west on path along Dedeaux Road between Highway 49 and Three Rivers Road in the Orange Grove community. Most of the damage was rated a

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					F1 intensity by a NWS ground survey, however there were areas of F2 damage. A large church under-construction was heavily damaged or destroyed. Three homes and five businesses received major damage while twenty homes had minor damage. Early estimates were that damage would approach 3 million dollars.
SAUCIER	3/31/2007	Funnel Cloud	0/0	$0	A funnel cloud was observed.
SAUCIER	6/19/2007	Funnel Cloud	0/0	$0	A funnel cloud was observed near the intersection of West Wortham and Shaw Roads.
LYMAN	9/4/2011	EF1	0/0	$21,415	A weak tornado moved along an intermittent path for about 3.6 miles. Large tree limbs were snapped, several trees were blown down and fences blown down. Roof damage to several homes occurred, as well as mobile home damage. Damage path was 3.6 miles, path width 75 yards. Maximum rating low end EF1.
MISSISSIPPI CITY	9/19/2011	EF0	0/0	$0	Waterspout reported moving onshore by law enforcement near Courthouse Road. Dissipation occurred at 1255 CDT. No damage reported.
LIGANA	3/21/2012	EF0	0/0	$5,245	A NWS storm survey concluded that an EF0 tornado with a path width 50 yards wide was on the ground for about one quarter mile. Winds were estimated at 70 mph. Damage was confined to a trailer at Vidalia and Walnut Roads.
WOOL MARKET	3/21/2012	EF1	0/0	$15,736	NWS Storm survey confirmed a tornado touched down on John Lee Road and Roberts Road. Trees were twisted, a travel trailer was flipped, and several homes lost portions of their roofs. The path width was 100 yards, and was on the ground for nearly 1 mile.

					Estimated wind speed was 90 mph.
LIGANA	12/13/2016	EF0	0/0	$0	**A tornado moved from Hancock County into Harrison County near Bell Creek Road. Once in Harrison County, the tornado continued to cause intermittent damage, mainly to trees. It also peeled a small section of roofing off of a mobile home on Bell Creek Road and caused minor damage to two additional mobile homes on Cemetary Road just east of the Wolf River before lifting. Total path length of tornado was 4.3 miles. Estimated wind speed 75 mph. Event times estimated by radar.**
BEAUVOIR	6/21/2017	Waterspout/ EF0	0/0	$0	**A waterspout came on shore near Beauvoir causing damge to tree limbs and fencing and breaking a single window. It moved almost due north continuing to cause damage mainly to trees. It downed a few trees and a power line between Rich Ave and Popps Ferry Rd. The tornado continued northward causing sporadic damage and lifted near Woolmarket Rd. Intensity is estimated.**
WOOL MARKET	11/01/2018	EF1	0/0	$0	**An EF-1 tornado touched down just south of the Mississippi Highway 67 and 605 interchange, snapping trees and blowing down road signs. Additional snapped trees were observed along the length of Highway 605 on the north side of the interchange. The tornado continued moving north, crossing Hog Branch and moving into the woods. The tornado began to curve more to the northeast, and crossed Blackwell Farm Road and North Carr Bridge Road, where numerous snapped pine trees were observed. The tornado continued through the woods and additional snapped pine trees were observed on Forestry Road Number**

					426. No damage was observed on Bethel Road, indicating the tornado lifted shortly after crossing the Forest Service Road. Estimated peak wind was 105 mph, path length 7 miles, path width 150 yards.
WOOL MARKET	6/24/2020	EF1	0/0	$20,000	**A National Weather Service Damage Assessment Team has surveyed the storm damage in Harrison County, MS north of D'Iberville. It has been determined the damage was the result of a tornado. The tornado has been rated an EF-1 on the Enhanced Fujita Scale. Damage estimates were consistent with winds of 105 mph. Small populated community along Old Highway 15 had a couple of homes with roof damage. Many trees were violently twisted. A power pole was snapped at the base.**
HENDERSON PT.	8/29/2021	Waterspout/ EF0	0/0	$100,000	**A likely waterspout moved onshore near Hwy 90 and Fort Henry Ave. It caused damage to trees and a detached garage on Fort Henry Ave. The tornado then moved north-northwest, damaging several roofs in a subdivision near Bayview St, and snapping trees and power lines. The tornado continued on its north-northwestward track, downing trees and causing additional damage to houses on Louisiana Ave. It lifted near Livingston Drive. Survey conducted remotely via high-res satellite imagery.**
HANDSBORO	8/30/2021	Waterspout/ EF0	0/0	$100,000	**A waterspout moved onshore near the Great Southern Golf Club. Several snapped and uprooted trees were noted in this area and in a wooded area to the northeast of the club. The tornado tracked to the north-northeast, causing damage to several homes along Palmer Dr near Magazine Cir, Oakridge Cir, Hayden Dri, and Lipscomb Ct. A path of downed trees was noted just north of Oakridge Cir. Roof panels were missing from a storage facility building on E Pass Rd. The tornado crossed Debuys Rd and ripped siding**

					off a house on Rainbow Dr. A fence, trees, and large branches were also downed on Rainbow Dr. The tornado lifted shortly thereafter. Survey conducted remotely via high-res aerial photography.
BEAUVOIR	8/30/2021	EF0	0/0	$100,000	**A tornado touched down just north of the Edgewater Mall near Rue Petit Bois where it uprooted a tree and caused minor roof damage. Numerous shingles were missing from a bank on Pass Road and a portion of a roof was torn off a Dunkin Donuts. The tornado tracked north-northeast and produced minor roof damage and downed trees along Lakeview Drive and Fairview Drive. Shingles were missing from an apartment complex on Big Lake Road. A convergent pattern was evident in the tall marshy grass along the south shore of Big Lake. The tornado crossed Big Lake and caused minor damage to several homes near the Sunkist Country Club, including along Barrett Road, Rue Maison, Lackland Drive, and Club Moss Drive. Survey conducted remotely via high-res aerial photography. Peak estimated winds of 85 mph.**
BEAUVOIR	8/30/2021	EF0	0/0	$150,000	**A tornado touched down just north of the Mississippi Coast Coliseum. A half dozen houses along Pinewood Dr and Arbor Dr sustained minor roof damage. An air conditioner was blown off its pad and several trees and large branches were snapped. The tornado tracked north across Pass Rd where a portion of the roof was torn off a restaurant and bank, and several trees were downed in an adjoining parking lot. The tornado then tracked to the north-northwest, eventually crossing Popps Ferry Rd toward Carter Rd, Martin Rd, and Old Bay Rd. Numerous houses with shingle damage, downed fences and a few downed trees were noted in the tornado's path. The tornado tracked along Carmargue Ln and either**

					dissipated shortly thereafter or continued as waterspout in Big Lake. Survey conducted remotely via high-res aerial photography. Estimated peak winds of 80 mph.
BEAUVOIR	12/14/2022	Waterspout/ EF1	0/0	$0	**A waterspout likely came onshore near the Beauvoir section of Biloxi around 5:52 PM CST. The first surveyed damage revealed numerous large limbs snapped on Brady Drive. The tornado then moved northeastward over marsh, reaching Tara Lane where a pine tree fell onto a pavilion and caused damage to the roof. It continued northeast across Pass Road and then through the intersection of Belvedere Drive and Belvedere Circle where tree limbs fell on power lines. The roof of a metal shed was ripped off. The tornado continued across Hiller Park where several pine trees were partially uprooted and unsecured bleachers were thrown 50 yards to the northeast through a chain link fence and on a tennis court. A few roof shingles were missing at nearby military housing. The tornado crossed near Atkinson Rd and Veterans Ave where several oak trees had large limbs snapped. Numerous snapped tree limbs fell, damaging markers at Biloxi National Cemetery. The most significant tornadic damage in the path occurred in the VA Gulf Coast Health Care System Campus along Veterans Avenue where damage was consistent with a EF-1 tornado and maximum winds of 90 mph. A window on the south-facing side of a campus building was blown in and another window was blown out on the northern side of the building. A roof from a small building was peeled off and thrown back to the southeast into an adjacent partially covered outbuilding, causing the outbuilding to collapse. The tornado uprooted several trees just before lifting as it**

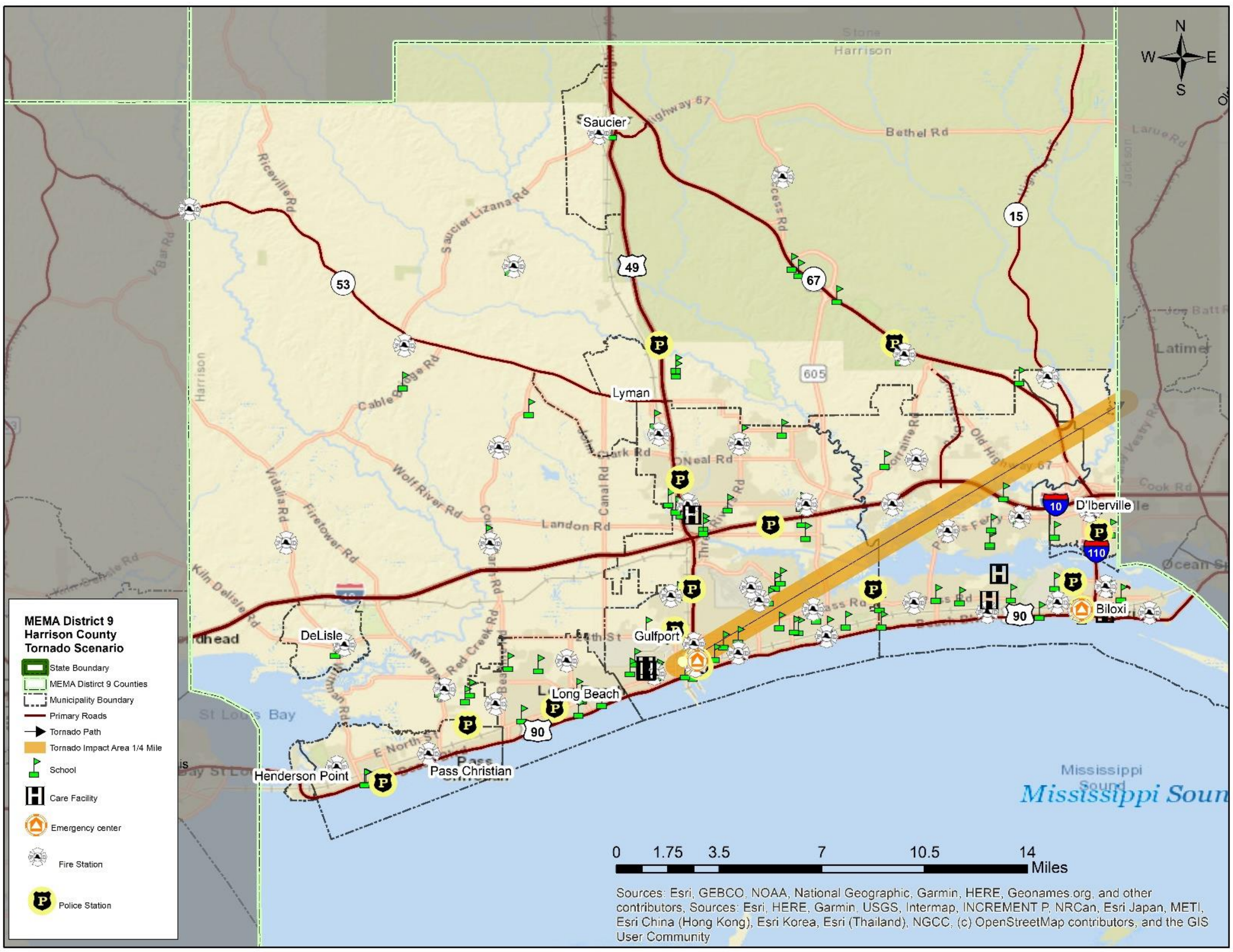
					reached Mullet Lake around 5:55 pm.

*Property damage is reported in 2022 dollars; all damage may not have been reported.
Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

According to historical information, tornado events pose a significant threat to Harrison County. The probability of future tornado occurrences affecting Harrison County is highly likely (100 percent annual probability). The following graphic demonstrates a potential scenario.

Figure C.25: Tornado Scenario



FEMA NRI Expected Annual Loss Estimates

Table C.54: Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR TORNADO EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.5 events/year	0.52	$6,016,981	$3,210,913	$136	$9,228,030	94.0	Relatively High
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table C.55: Harrison County Hazard Specific Risk Index Table

HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – TORNADO	
Risk Index Score	Risk Index Rating
94.1/100	Relatively High
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

WINTER WEATHER

LOCATION AND SPATIAL EXTENT

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. Harrison County is not accustomed to severe winter weather conditions and rarely receives severe winter weather, even during the winter months. Events tend to be mild in nature; however, even relatively small accumulations of snow, ice, or other wintery precipitation can lead to losses and damage due to the fact that these events are not commonplace. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, there have been a total of four recorded winter storm events in Harrison County since 1996. These events did not result in any property damage. A summary of these events is presented in Table C.56. Detailed information on the recorded winter storm events can be found in Table C.57.

TABLE C.56: SUMMARY OF WINTER STORM EVENTS IN HARRISON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2022)	Annualized Property Losses
Harrison County	6	0/0	$0	$0

Source: National Center for Environmental Information

TABLE C.57: HISTORICAL WINTER STORM IMPACTS IN HARRISON COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Biloxi				
None reported	--	--	--	--
D'Iberville				
None reported	--	--	--	--
Gulfport				
None reported	--	--	--	--
Long Beach				
None reported	--	--	--	--
Pass Christian				
None reported	--	--	--	--
Unincorporated Area				
HARRISON (ZONE)	12/18/1996	Heavy Snow	0/0	$0
HARRISON (ZONE)	12/25/2004	Winter Storm	0/0	$0
Location	Date	Type	Deaths/Injuries	Property Damage*
HARRISON (ZONE)	1/24/2014	Winter Weather	0/0	$0
HARRISON (ZONE)	1/28/2014	Winter Storm	0/0	$0
HARRISON (ZONE)	12/08/2017	Winter Weather	0/0	$0
HARRISON (ZONE)	1/16/2018	Winter Weather	0/0	$0

*Property damage is reported in 2022 dollars; all damage may not have been reported.

Source: National Center for Environmental Information

There have been several severe winter weather events in Harrison County. The text below describes one of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

December 2004

A mixture of sleet and snow fell off and on during much of Christmas day resulting in a dusting to one half inch of accumulation across much of southwest, south, and coastal Mississippi. Although not heavy, accumulation of ice and snow in coastal Mississippi is unusual and the winter weather impacted transportation. The mixture of sleet and snow caused a number of bridges and overpasses to become icy which resulted in some traffic accidents and closure of some the elevated roadways.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

PROBABILITY OF FUTURE OCCURRENCES

Winter storm events will continue to occur in Harrison County. Based on historical information, the probability is likely (between 10 and 100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table C.58: Harrison County Expected Annual Loss Table

HARRISON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WINTER WEATHER EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.3 events/year	0.01	$75,612	$69	$2	$75,683	61.4	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table C.59: Harrison County Hazard Specific Risk Index Table

HARRISON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WINTER WEATHER	
Risk Index Score	Risk Index Rating
60.9/100	Relatively Moderate
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

OTHER HAZARDS

CLIMATE CHANGE/SEA LEVEL RISE

LOCATION AND SPATIAL EXTENT

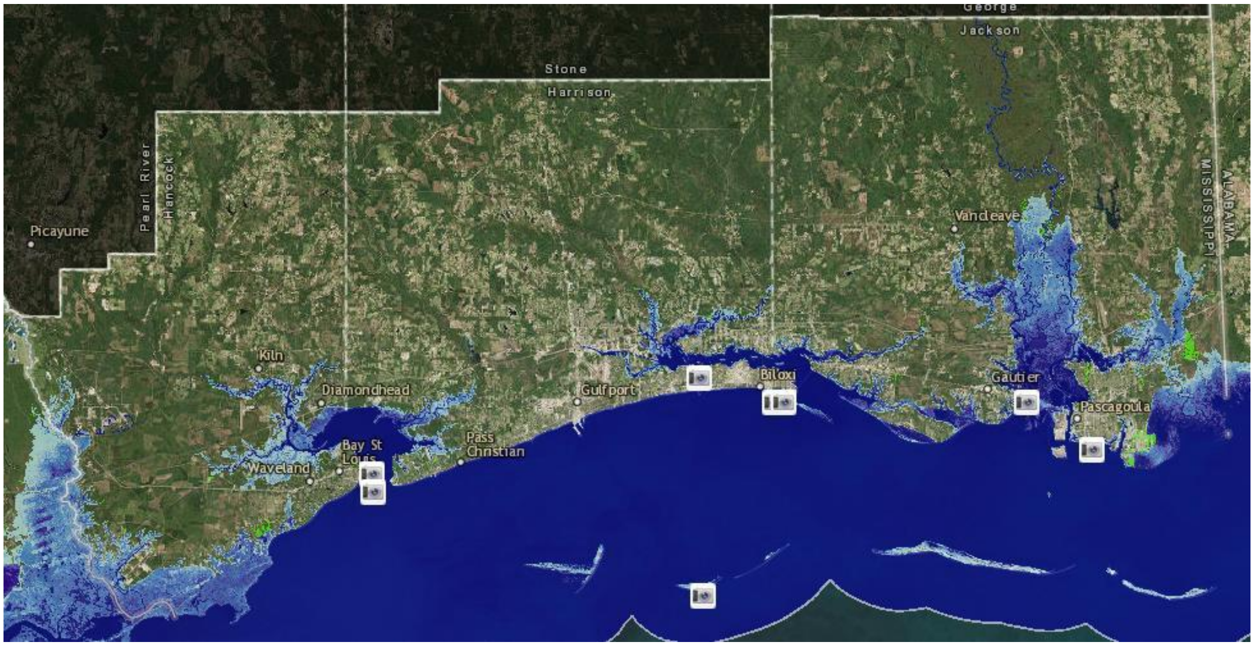
Climate Change

Climate change can have direct implications on many of the other hazards addressed in this plan since it has the potential to alter the nature and frequency of hazards, including increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, strong storms (wind, hurricane). Therefore, it is assumed that Harrison County is uniformly exposed to this hazard.

Sea Level Rise

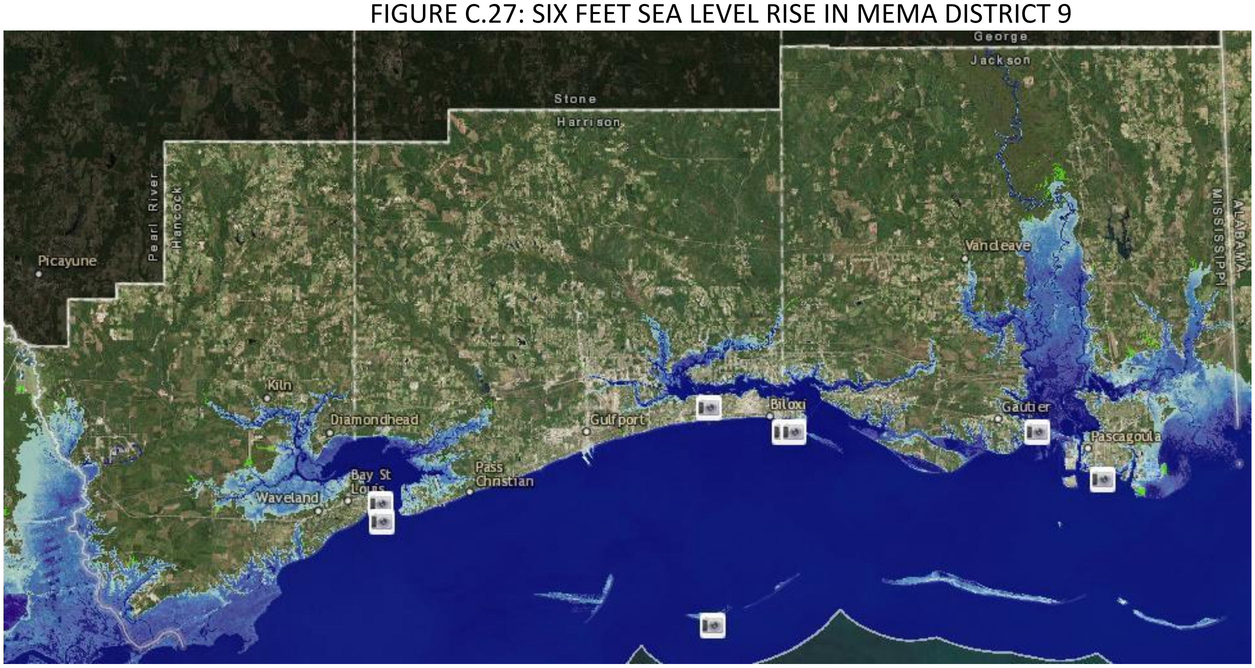
Sea level rise is occurring at a global scale. However, it does not affect areas uniformly and will be more severe in some places. Figure C.26 identifies areas in MEMA District 9 that would be inundated by water as a result of three feet in sea level rise as per projections by NOAA. The highest level of sea level rise projected by NOAA is shown in Figure C.27. This figure shows the inundation areas in the case of six feet of sea level rise. This demonstrates the additional areas that would be impacted beyond the three feet scenario.

FIGURE C.26: THREE FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

FIGURE C.27: SIX FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

HISTORICAL OCCURRENCES

Climate Change

According to the National Climate Assessment, there have been increasing numbers of days above 95^{o}F and nights above 75^{o}F, and decreasing numbers of extremely cold days since 1970 in the Southeast. Daily and five-day rainfall intensities have also increased and summers have been either increasingly dry or extremely wet. The number of

Category 4 and 5 hurricanes in the Atlantic basin has increased substantially since the early 1980s compared to the historic record that dates back to the mid-1880s. This can be attributed to both natural variability and climate change.

Sea Level Rise
Sea level rise is a slow-onset hazard and specific events/occurrences are not possible to determine.

PROBABILITY OF FUTURE OCCURRENCES

Climate Change
According to the National Climate Assessment, temperatures across the Southeast are expected to increase during this century, with shorter-term (year-to-year and decade-to-decade) fluctuations over time due to natural climate variability. Major consequences of warming include significant increases in the number of hot days (95^{o}F or above) and decreases in freezing events. Regional average increases are in the range of 4^{o}F to 8^{o}F by the year 2100.

Projections of future precipitation patterns are less certain than projections for temperature increases. Because the Southeast is located in the transition zone between projected wetter conditions to the north and drier conditions to the southwest, many of the model projections show only small changes relative to natural variations. Additionally, projections further suggest that warming will cause tropical storms to be fewer in number globally, but stronger in force, with more Category 4 and 5 storms, and substantial further increases in extreme precipitation are projected as this century progresses.

Overall, future climate change is considered likely (between 10 and 100 percent annual probability).

Sea Level Rise
There is still much debate regarding the probability of future occurrence of sea level rise. This section will be updated as more information becomes available. Future sea level rise is considered likely (between 10 and 100 percent annual probability).

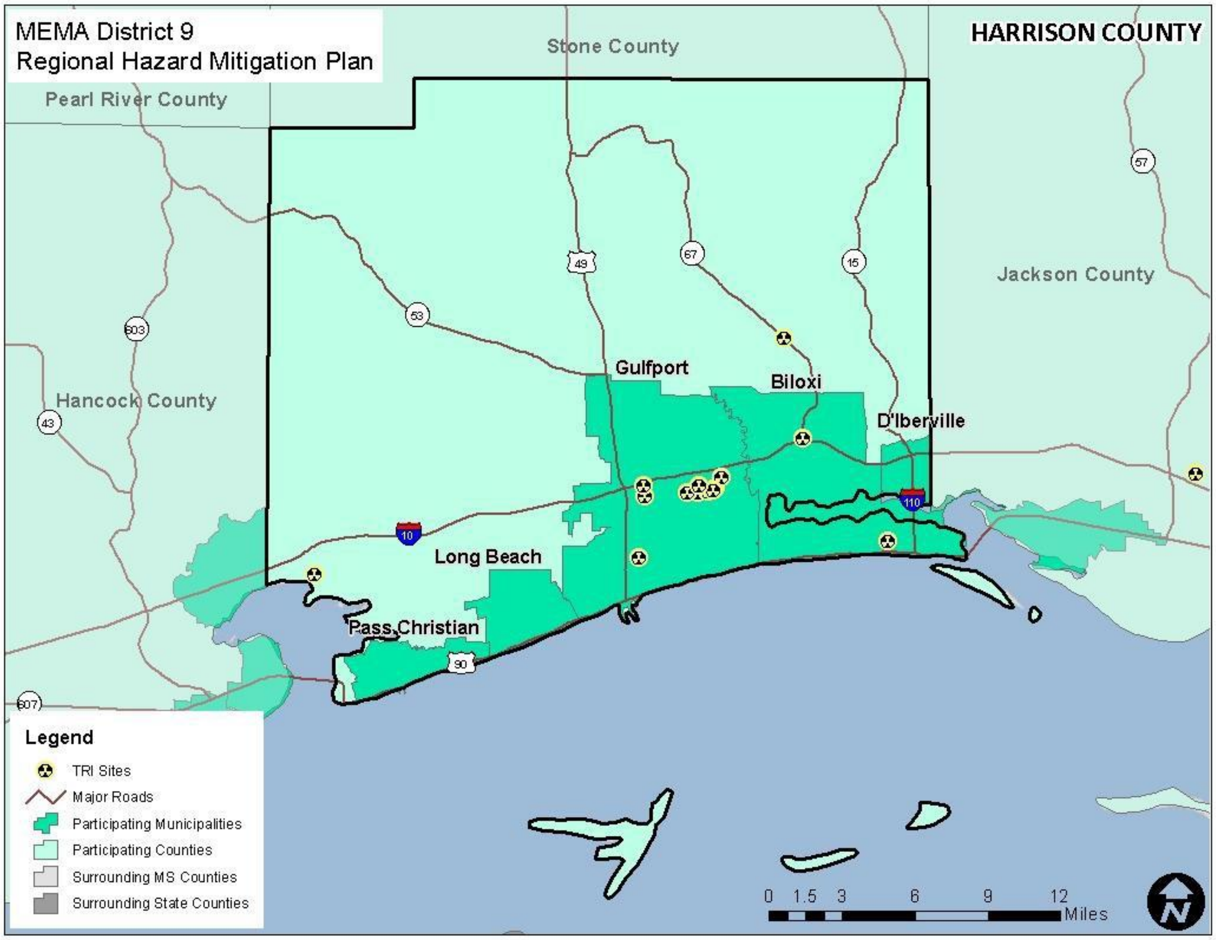
FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess climate change or sea level rise.

HAZARDOUS MATERIALS INCIDENT/TRAIN DERAILMENT

LOCATION AND SPATIAL EXTENT

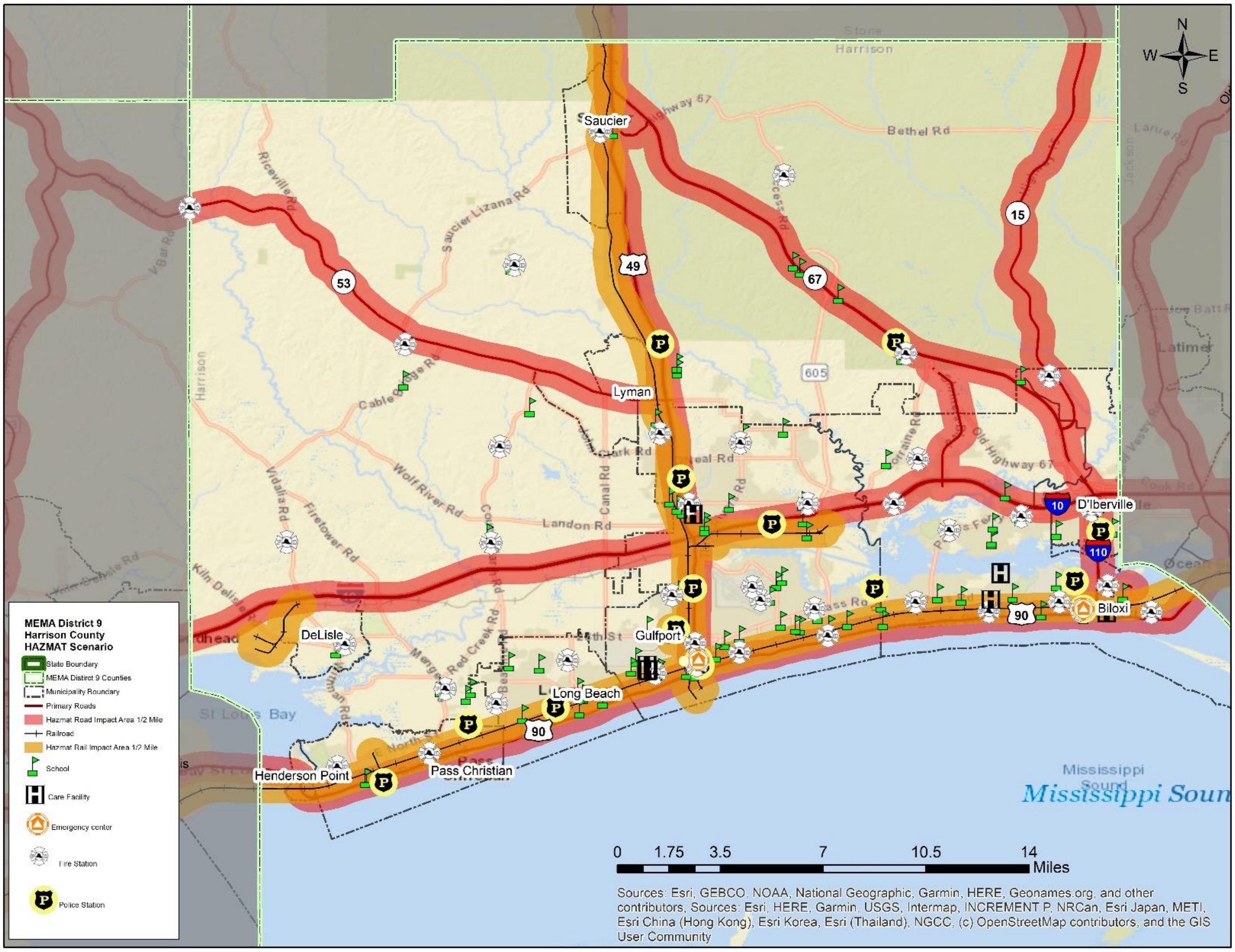
Harrison County has 14 TRI sites. These sites are shown in Figure C.28.

FIGURE C.28: TOXIC RELEASE INVENTORY (TRI) SITES IN HARRISON COUNTY



Source: Environmental Protection Agency

Figure C.29: HAZMAT Scenario



In addition to “fixed” hazardous materials locations, hazardous materials may also impact the county via roadways and railways. Many roads and railways in the county are subject to hazardous materials transport and all roads and railways that permit hazardous material transport are considered potentially at risk to an incident.

HISTORICAL OCCURRENCES

There have been a total of 226 recorded HAZMAT incidents in Harrison County since 1971. These events resulted in over $327,000 (2016 dollars) in property damage as well as five fatalities and one injury.25 Table C.60 summarizes the HAZMAT incidents in Harrison County as reported by PHMSA. Detailed information on these events is presented in Table C.61.

TABLE C.60: SUMMARY OF HAZMAT INCIDENTS IN HARRISON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2016)	Annualized Property Losses
Biloxi	28	5/0	$53,210	$1,182
D'Iberville	0	0/0	$0	$0
Gulfport	182	0/1	$94,524	$2,148
Long Beach	7	0/0	$0	$0
Pass Christian	4	0/0	$179,481	$8,158
Unincorporated Area	5	0/0	$0	$0
HARRISON COUNTY TOTAL	226	5/1	$327,215	$11,489

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE C.61: HAZMAT INCIDENTS IN HARRISON COUNTY

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
Biloxi							
I-1971050036	4/7/1971	BILOXI	Highway	No	0/0	$0	0
I-1972010118	1/10/1972	BILOXI	Highway	No	0/0	$0	0
I-1974090775	9/12/1974	BILOXI	Highway	No	0/0	$0	0
I-1976100494	10/1/1976	BILOXI	Highway	No	0/0	$0	40 LGA
I-1978041179	3/17/1978	BILOXI	Highway	No	0/0	$0	1 LGA
I-1980040502	3/20/1980	BILOXI	Highway	No	0/0	$0	4 LGA
I-1980040504	4/1/1980	BILOXI	Highway	No	0/0	$0	0
I-1982010444	1/13/1982	BILOXI	Highway	No	0/0	$0	60 LGA
I-1982060440	6/5/1982	BILOXI	Highway	No	0/0	$0	0
I-1982060440	6/5/1982	BILOXI	Highway	No	0/0	$0	15 LGA
I-1982110098	10/19/1982	BILOXI	Highway	No	0/0	$0	50 LGA
I-1982110098	10/19/1982	BILOXI	Highway	No	0/0	$0	50 LGA
I-1984080015	7/11/1984	BILOXI	Highway	Yes	0/0	$0	200 LGA
I-1984120186	11/21/1984	BILOXI	Highway	No	0/0	$0	50 LGA
I-1989010371	1/13/1989	BILOXI	Rail	No	0/0	$0	5 LGA
I-1991100049	9/20/1991	BILOXI	Highway	No	0/0	$177	60.75956 LGA
I-1998081332	8/9/1998	BILOXI	Highway	Yes	5/0	$1,182	750 LGA
I-2001040103	3/8/2001	BILOXI	Highway	No	0/0	$796	2 LGA
I-2001041026	4/6/2001	BILOXI	Highway	No	0/0	$408	30 LGA
E-2009120077	11/26/2009	BILOXI	Highway	No	0/0	$6,736	3 LGA
X-2010120001	11/29/2010	BILOXI	Highway	No	0/0	$0	10 LGA
I-2011050376	4/27/2011	BILOXI	Highway	No	0/0	$19,993	100 LGA
I-2012100188	8/16/2012	BILOXI	Highway	Yes	0/0	$22,345	15 LGA
I-2012090193	8/21/2012	BILOXI	Highway	No	0/0	$1,574	5 LGA
I-2012100193	9/9/2012	BILOXI	Highway	No	0/0	$0	20 LGA
I-2012120001	10/23/2012	BILOXI	Highway	No	0/0	$0	0.09375 LGA

X-2015050067	4/13/2015	Biloxi	Highway	No	0/0	$0	5 LGA
E-2016060360	5/28/2016	BULOXIE	Highway	No	0/0	$0	1 LGA
D'Iberville							
None reported	--	--	--	--	--	--	-

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
Gulfport							
I-1972020248	1/10/1972	GULFPORT	Highway	No	0/0	$0	0
I-1972120072	11/16/1972	GULFPORT	Highway	No	0/0	$0	0
I-1973020317	2/13/1973	GULFPORT	Highway	No	0/0	$0	0
I-1973040165	3/23/1973	GULFPORT	Highway	No	0/0	$0	0
I-1973050063	4/23/1973	GULFPORT	Highway	No	0/0	$0	0
I-1974080440	7/30/1974	GULFPORT	Highway	No	0/0	$0	0
I-1975080169	6/30/1975	GULFPORT	Highway	No	0/0	$0	0
I-1975080174	7/22/1975	GULFPORT	Highway	No	0/0	$0	0
I-1975101084	9/30/1975	GULFPORT	Highway	No	0/0	$0	0
I-1975110254	10/27/1975	GULFPORT	Highway	No	0/0	$0	0
I-1976010283	12/11/1975	GULFPORT	Highway	No	0/0	$0	5 LGA
I-1976040493	3/25/1976	GULFPORT	Highway	No	0/0	$0	15 LGA
I-1976050953	4/21/1976	GULFPORT	Highway	No	0/0	$0	0
I-1976120397	10/29/1976	GULFPORT	Highway	No	0/0	$0	0
I-1977020061	1/6/1977	GULFPORT	Highway	No	0/0	$0	0
I-1977020060	1/12/1977	GULFPORT	Highway	No	0/0	$0	1 SLB
I-1977060397	5/17/1977	GULFPORT	Highway	No	0/0	$0	10 LGA
I-1977081290	8/11/1977	GULFPORT	Highway	No	0/0	$0	5 LGA
I-1977100210	8/30/1977	GULFPORT	Highway	No	0/0	$0	0
I-1977100196	9/2/1977	GULFPORT	Highway	No	0/0	$0	0
I-1978080075	7/27/1978	GULFPORT	Highway	No	0/0	$0	15 LGA
I-1978080096	7/28/1978	GULFPORT	Highway	No	0/0	$0	0
I-1978111014	11/8/1978	GULFPORT	Highway	No	0/0	$0	0
I-1979091352	8/7/1979	GULFPORT	Highway	No	0/0	$0	0
I-1979092086	8/16/1979	GULFPORT	Highway	No	0/0	$0	0
I-1980010328	11/26/1979	GULFPORT	Highway	No	0/0	$0	0
I-1980010166	1/7/1980	GULFPORT	Highway	No	0/0	$0	2 LGA
I-1980050296	5/6/1980	GULFPORT	Highway	No	0/0	$0	15 LGA
I-1981060840	5/15/1980	GULFPORT	Highway	No	0/0	$0	1 LGA
I-1980080494	6/6/1980	GULFPORT	Highway	No	0/0	$0	0
I-1980090848	8/12/1980	GULFPORT	Highway	No	0/0	$0	1 LGA
I-1981020382	1/24/1981	GULFPORT	Highway	No	0/0	$0	50 LGA
I-1981050713	5/4/1981	GULFPORT	Highway	Yes	0/0	$0	146 LGA
I-1982030218	2/19/1982	GULFPORT	Highway	No	0/0	$0	25 LGA

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
I-1982050457	5/6/1982	GULFPORT	Highway	Yes	0/0	$0	147 LGA
I-1982050457	5/6/1982	GULFPORT	Highway	Yes	0/0	$0	147 LGA
I-1984060075	5/21/1984	GULFPORT	Highway	No	0/0	$0	5 LGA
I-1984080374	7/9/1984	GULFPORT	Highway	No	0/0	$0	0.81 LGA
I-1984080374	7/9/1984	GULFPORT	Highway	No	0/0	$0	0.19 LGA
I-1984120187	11/23/1984	GULFPORT	Highway	No	0/0	$0	50 LGA
I-1985040559	4/2/1985	GULFPORT	Highway	No	0/0	$0	74 LGA
I-1986090122	8/25/1986	GULFPORT	Highway	No	0/0	$0	2 LGA
I-1987060128	5/13/1987	GULFPORT	Rail	No	0/0	$0	10 LGA
I-1988020373	1/27/1988	GULFPORT	Highway	No	0/0	$0	0.063 SLB
I-1990030301	2/14/1990	GULFPORT	Rail	No	0/0	$0	0
I-1990030302	2/14/1990	GULFPORT	Rail	No	0/0	$0	0
I-1990030303	2/14/1990	GULFPORT	Rail	No	0/0	$0	0
I-1990050695	4/27/1990	GULFPORT	Highway	No	0/0	$92	2 LGA
I-1990080939	7/20/1990	GULFPORT	Rail	No	0/0	$0	0
I-1990100741	10/1/1990	GULFPORT	Highway	No	0/0	$2,027	2 LGA
I-1992030439	2/21/1992	GULFPORT	Highway	No	0/0	$3	8 LGA
I-1992060106	5/8/1992	GULFPORT	Rail	No	0/0	$172	0.125 LGA
I-1992080717	7/21/1992	GULFPORT	Highway	No	0/0	$6,822	50 LGA
I-1992090930	9/3/1992	GULFPORT	Highway	No	0/0	$215	0.078125 LGA
I-1993060712	5/12/1993	GULFPORT	Highway	No	0/0	$208	0.25 LGA
I-1993110464	9/6/1993	GULFPORT	Highway	No	0/0	$208	0.25 LGA
I-1993110475	9/23/1993	GULFPORT	Highway	No	0/0	$208	0.25 LGA
I-1994030036	2/18/1994	GULFPORT	Highway	No	0/0	$869	2 LGA
I-1994040310	2/23/1994	GULFPORT	Highway	No	0/0	$0	0
I-1994030880	2/24/1994	GULFPORT	Highway	No	0/0	$0	0
I-1994060844	4/27/1994	GULFPORT	Highway	No	0/0	$0	0.007813 LGA
I-1994080476	6/29/1994	GULFPORT	Highway	No	0/0	$203	0
I-1994080852	7/5/1994	GULFPORT	Highway	No	0/0	$24	10 LGA
I-1994111288	10/27/1994	GULFPORT	Highway	No	0/0	$203	1 LGA
I-1995061142	5/2/1995	GULFPORT	Highway	No	0/0	$0	1.875 LGA
I-1995071630	7/11/1995	GULFPORT	Highway	No	0/0	$0	1 LGA
I-1995080127	7/26/1995	GULFPORT	Highway	No	0/0	$0	2 LGA
I-1995091293	9/12/1995	GULFPORT	Highway	No	0/0	$0	2 LGA
I-1996020561	1/11/1996	GULFPORT	Highway	No	0/0	$384	0.25 LGA
I-1996020561	1/11/1996	GULFPORT	Highway	No	0/0	$384	0.25 LGA
I-1996020863	2/1/1996	GULFPORT	Highway	No	0/0	$192	0.0625 LGA
I-1996040952	3/28/1996	GULFPORT	Highway	No	0/0	$0	2 LGA

I-1996090883	9/9/1996	GULFPORT	Highway	No	0/0	$829	0.25 LGA
I-1997070748	6/21/1997	GULFPORT	Highway	No	0/0	$23	0
I-1998020016	12/30/1997	GULFPORT	Rail	No	0/1	$0	0
I-1998030591	2/3/1998	GULFPORT	Rail	No	0/0	$0	1 LGA
I-1999040773	4/15/1999	GULFPORT	Highway	No	0/0	$181	0.5 LGA
I-1999051086	4/20/1999	GULFPORT	Highway	No	0/0	$101	0.5 LGA
I-1999050826	4/28/1999	GULFPORT	Highway	No	0/0	$296	0.5 LGA
I-1999061169	6/1/1999	GULFPORT	Highway	No	0/0	$181	0.125 LGA
I-1999070316	6/15/1999	GULFPORT	Highway	No	0/0	$181	4.38 LGA
I-1999080104	7/16/1999	GULFPORT	Highway	No	0/0	$181	0.007813 LGA
I-1999091944	8/27/1999	GULFPORT	Highway	No	0/0	$181	0.5 LGA
I-1999091715	8/31/1999	GULFPORT	Highway	No	0/0	$181	0.25 LGA
I-1999100883	9/8/1999	GULFPORT	Highway	No	0/0	$181	0.0625 LGA
I-1999101071	9/30/1999	GULFPORT	Highway	No	0/0	$181	0.25 LGA
I-1999110672	11/4/1999	GULFPORT	Highway	No	0/0	$181	0.007813 LGA
I-1999111262	11/10/1999	GULFPORT	Highway	No	0/0	$181	0.015625 LGA
I-2000010936	1/12/2000	GULFPORT	Highway	No	0/0	$280	0.125 LGA
I-2000020516	1/21/2000	GULFPORT	Highway	No	0/0	$175	0.007813 LGA
I-2000030370	2/17/2000	GULFPORT	Highway	No	0/0	$6,434	35 LGA

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
I-2000040394	3/6/2000	GULFPORT	Highway	No	0/0	$0	0.0625 LGA
I-2001050321	4/4/2000	GULFPORT	Highway	No	0/0	$769	0.125 LGA
I-2000050862	4/21/2000	GULFPORT	Highway	No	0/0	$175	0.264172 LGA
I-2000051667	5/10/2000	GULFPORT	Highway	No	0/0	$350	0.375 LGA
I-2000060650	5/15/2000	GULFPORT	Highway	No	0/0	$203	0.5 LGA
I-2000090540	5/19/2000	GULFPORT	Highway	No	0/0	$175	0.25 LGA
I-2000060330	5/24/2000	GULFPORT	Highway	No	0/0	$175	0.046875 LGA
I-2000081494	7/24/2000	GULFPORT	Highway	No	0/0	$0	0.125 LGA
I-2000081188	7/27/2000	GULFPORT	Highway	No	0/0	$2,811	20 LGA
I-2000091247	8/10/2000	GULFPORT	Highway	No	0/0	$119	0.015625 LGA
I-2000090885	8/16/2000	GULFPORT	Highway	No	0/0	$455	0.09375 LGA
I-2000100613	9/22/2000	GULFPORT	Highway	No	0/0	$175	0.007813 LGA
I-2000101809	10/9/2000	GULFPORT	Highway	No	0/0	$175	0.015625 LGA
I-2001010156	12/18/2000	GULFPORT	Highway	No	0/0	$0	1 LGA

I-2001051827	5/4/2001	GULFPORT	Highway	No	0/0	$0	50 SLB
I-2001051606	5/15/2001	GULFPORT	Highway	No	0/0	$170	5 LGA
I-2001061556	6/18/2001	GULFPORT	Highway	No	0/0	$170	3 LGA
I-2001071305	7/6/2001	GULFPORT	Highway	No	0/0	$170	0.264063 LGA
I-2001090411	7/27/2001	GULFPORT	Highway	No	0/0	$340	4 LGA
I-2001081639	8/14/2001	GULFPORT	Highway	No	0/0	$170	1 LGA
I-2002011795	10/17/2001	GULFPORT	Highway	No	0/0	$714	0.0625 SLB
I-2001120819	10/23/2001	GULFPORT	Highway	No	0/0	$714	0.5 LGA
I-2002010231	11/15/2001	GULFPORT	Highway	No	0/0	$3,468	40 LGA
I-2002021250	2/5/2002	GULFPORT	Highway	No	0/0	$703	1 LGA
I-2002021352	2/12/2002	GULFPORT	Highway	No	0/0	$703	2 LGA
I-2002030544	2/27/2002	GULFPORT	Highway	No	0/0	$703	2 LGA
I-2002030763	2/28/2002	GULFPORT	Highway	No	0/0	$703	1 LGA
I-2002041329	4/16/2002	GULFPORT	Highway	No	0/0	$703	1 LGA
I-2002050981	5/7/2002	GULFPORT	Highway	No	0/0	$703	1 LGA
I-2002060549	5/24/2002	GULFPORT	Highway	No	0/0	$703	1 LGA
I-2002061185	6/7/2002	GULFPORT	Highway	No	0/0	$410	5 LGA
I-2002070439	6/25/2002	GULFPORT	Highway	No	0/0	$703	2 LGA
I-2003071154	7/2/2003	GULFPORT	Highway	No	0/0	$687	0.125 LGA
I-2004040140	3/25/2004	GULFPORT	Highway	No	0/0	$1,339	0.25 LGA
I-2004040140	3/25/2004	GULFPORT	Highway	No	0/0	$1,339	0.25 LGA
I-2004100191	8/30/2004	GULFPORT	Rail	No	0/0	$10	0.5 LGA
E-2007020133	7/19/2006	GULFPORT	Highway	No	0/0	$0	100 LGA
I-2006101353	10/14/2006	GULFPORT	Highway	No	0/0	$1,278	35 LGA
I-2007061293	6/1/2007	GULFPORT	Highway	No	0/0	$0	1 LGA
X-2007070453	7/24/2007	GULFPORT	Highway	No	0/0	$0	0.039062 LGA
I-2007090291	8/1/2007	GULFPORT	Highway	No	0/0	$0	6 LGA
I-2007100241	9/10/2007	GULFPORT	Highway	No	0/0	$0	1 LGA
E-2007110073	9/27/2007	GULFPORT	Highway	No	0/0	$0	0.125 LGA
X-2007100281	10/2/2007	GULFPORT	Highway	No	0/0	$0	0.125 LGA
X-2007110118	10/30/2007	GULFPORT	Highway	No	0/0	$0	0.078125 LGA
X-2008020206	2/12/2008	GULFPORT	Highway	No	0/0	$0	0.26418 LGA

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
X-2008040272	4/16/2008	GULFPORT	Highway	No	0/0	$0	0.26418 LGA
X-2008040306	4/17/2008	GULFPORT	Highway	No	0/0	$0	0.007812 LGA
X-2008050107	4/25/2008	GULFPORT	Highway	No	0/0	$0	0.015625 LGA
X-2008050129	4/28/2008	GULFPORT	Highway	No	0/0	$0	0.007812 LGA
X-2008080144	7/18/2008	GULFPORT	Highway	No	0/0	$0	1 LGA
I-2008110442	7/20/2008	GULFPORT	Highway	No	0/0	$26,524	0.13368 GCF
I-2008080502	8/6/2008	GULFPORT	Air	No	0/0	$0	0.132085 LGA
X-2008090024	8/18/2008	GULFPORT	Highway	No	0/0	$0	0.5 LGA
X-2008090231	9/5/2008	GULFPORT	Highway	No	0/0	$0	0.125 SLB
I-2009020255	12/17/2008	GULFPORT	Highway	No	0/0	$2,853	18 LGA
I-2009060327	5/26/2009	GULFPORT	Highway	No	0/0	$0	0.007813 LGA
I-2009090007	6/4/2009	GULFPORT	Highway	No	0/0	$0	10 LGA
I-2009070183	6/28/2009	GULFPORT	Highway	No	0/0	$0	0.5 LGA
E-2010030341	3/29/2010	GULFPORT	Highway	No	0/0	$0	0.125 LGA
E-2010060197	6/8/2010	GULFPORT	Highway	No	0/0	$0	0.023438 LGA
E-2010060298	6/18/2010	GULFPORT	Highway	No	0/0	$0	0.25 LGA
I-2010070266	6/22/2010	GULFPORT	Highway	No	0/0	$0	0
E-2010090344	9/12/2010	GULFPORT	Highway	No	0/0	$1,712	0.25 LGA
I-2011040074	3/24/2011	GULFPORT	Highway	No	0/0	$0	1 LGA
I-2011050067	4/16/2011	GULFPORT	Highway	No	0/0	$0	0.125 LGA
X-2012020188	1/30/2012	GULFPORT	Highway	No	0/0	$0	0.01766 GCF
I-2012060145	5/29/2012	GULFPORT	Air	No	0/0	$0	0
X-2012080602	8/1/2012	GULFPORT	Highway	No	0/0	$0	0.023438 LGA
X-2013020003	1/7/2013	GULFPORT	Highway	No	0/0	$0	2 LGA
X-2013070142	6/15/2013	GULFPORT	Highway	No	0/0	$0	2 LGA

E-2013110137	10/23/2013	GULFPORT	Highway	Yes	0/0	$11,890	80 LGA
E-2013110036	11/1/2013	GULFPORT	Highway	No	0/0	$0	0.25 LGA
E-2014010198	1/17/2014	GULFPORT	Highway	No	0/0	$0	30 LGA
I-2014030411	3/14/2014	GULFPORT	Highway	No	0/0	$0	0.25 LGA
X-2014050305	4/24/2014	GULFPORT	Highway	No	0/0	$0	1 LGA
I-2014050279	5/2/2014	GULFPORT	Highway	No	0/0	$0	0.023438 LGA
I-2014090243	6/26/2014	GULFPORT	Highway	No	0/0	$0	0.5 LGA
X-2014070497	7/2/2014	GULFPORT	Highway	No	0/0	$0	0.007812 LGA
I-2014110314	10/14/2014	GULFPORT	Highway	No	0/0	$7,203	25 LGA
X-2014120010	11/4/2014	GULFPORT	Highway	No	0/0	$0	0.015625 LGA
I-2015030228	2/27/2015	GULFPORT	Highway	No	0/0	$0	0.132085 LGA
E-2015040240	4/15/2015	GULFPORT	Highway	No	0/0	$0	20 LGA
X-2015060121	5/13/2015	GULFPORT	Highway	No	0/0	$0	1 LGA
X-2015060141	5/14/2015	GULFPORT	Highway	No	0/0	$0	1 LGA
X-2015070024	6/2/2015	GULFPORT	Highway	No	0/0	$0	0.007812 LGA
I-2015070261	6/24/2015	GULFPORT	Highway	No	0/0	$0	0.625 LGA
X-2015110321	9/22/2015	GULFPORT	Highway	No	0/0	$0	0.007812 LGA
X-2015110228	9/22/2015	GULFPORT	Highway	No	0/0	$0	0.003906 LGA
X-2015120140	11/5/2015	GULFPORT	Highway	No	0/0	$0	1 LGA
X-2016030032	2/3/2016	GULFPORT	Highway	No	0/0	$0	0.0625 LGA

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
Long Beach							
I-1981010297	10/7/1980	LONG BEACH	Highway	No	0/0	$0	0
I-1980110817	10/7/1980	LONG BEACH	Highway	No	0/0	$0	0
I-1981010282	10/17/1980	LONG BEACH	Highway	No	0/0	$0	0
I-1990010431	12/11/1989	LONG BEACH	Highway	No	0/0	$0	45 LGA
I-2003010510	12/17/2002	LONG BEACH	Rail	No	0/0	$0	10 LGA
E-2007120098	12/7/2007	LONG BEACH	Highway	No	0/0	$0	3 LGA
X-2015060105	5/12/2015	Long Beach	Highway	No	0/0	$0	0.007812 LGA
Pass Christian							
I-1994050299	3/30/1994	PASS CHRISTIAN	Highway	No	0/0	$544	2 LGA
I-1998020342	1/21/1998	PASS CHRISTIAN	Highway	No	0/0	$0	1 LGA
E-2010030330	3/19/2010	PASS CHRISTIAN	Highway	Yes	0/0	$93,886	150 LGA
I-2010090296	6/1/2010	PASS CHRISTIAN	Highway	Yes	0/0	$85,050	628 LGA
Unincorporated Area							
I-1980010350	1/4/1980	LIZANNA	Highway	No	0/0	$0	100 LGA
I-2004010564	11/21/2003	DE LISLE	Highway	No	0/0	$0	10 LGA
I-2004071426	7/16/2004	MISSISSIPPI CITY	Rail	No	0/0	$0	1 LGA
I-2004100787	8/23/2004	DE LISLE	Highway	No	0/0	$0	0.5 LGA
I-2005040309	3/23/2005	DELISLE	Highway	No	0/0	$0	50 LGA

*Property damage is reported in 2016 dollars; all damage may not have been reported.
Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

PROBABILITY OF FUTURE OCCURRENCES

Given the location of 14 toxic release inventory sites in Harrison County and prior roadway and railway incidents, it is highly likely (100 percent annual probability) that a hazardous material incident may occur in the county. County and city officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess HAZMAT releases.

INFECTIOUS DISEASE

LOCATION AND SPATIAL EXTENT

Due to the nature of a public health/emerging disease threat, it is difficult to identify a precise location where this type of event would occur. Moreover, a large-scale event would have impacts that spread throughout the county. Therefore, all areas in Harrison County are considered equally susceptible to infectious diseases.

HISTORICAL OCCURRENCES

Mosquito-borne illness in Mississippi include West Nile virus, Chikungunya virus, and Zika virus. These illnesses affect birds, animals, and humans, causing flu-like symptoms in people who are bitten by infected mosquitoes. Occasionally illness can be severe, leading to meningitis or encephalitis. According to the Mississippi State Department of Health (MSDH), there have been two reported cases of Zika in Harrison County as of November 2016. Table C.62 summarizes the mosquito-borne illnesses in humans reported in the county.

TABLE C.62: SUMMARY OF MOSQUITO-BORNE ILLNESSES IN HARRISON COUNTY

Location	West Nile Virus	Chikungunya	Zika	Other*	Deaths
Harrison County	0	0	2	0	0

*Other mosquito-borne illnesses include La Crosse encephalitis, St. Louis encephalitis, and Eastern Equine encephalitis.
Source: Mississippi State Department of Health

Diseases like influenza and norovirus are regularly occurring health issues in Harrison County. These conditions are not legally reportable to county or state public health agencies, so data on disease incidence is not readily available. MSDH relies upon selected sentinel health practitioners across the state to report the percentage and total patient visits consistent with an influenza-like illness (ILI): fever of 100^{o}F or higher and cough or sore throat. Reports are used to estimate the state’s ILI rate and the magnitude of state’s influenza activity on a weekly basis. Reports represent only the distribution of flu in the state, not an actual count of all flu cases statewide.

PROBABILITY OF FUTURE OCCURRENCES

Due to some recent incidents that have been recorded across the State of Mississippi and in Harrison County, future occurrences are considered possible (between 1 and 10 percent annual probability).

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess infectious diseases.

CONCLUSIONS ON HAZARD RISK

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its “How-to” guidance document titled Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

HAZARD EXTENT

Table C.63 describes the extent of each hazard identified for Harrison County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE C.63: EXTENT OF HARRISON COUNTY HAZARDS

Flood-related Hazards	
Dam and Levee Failure	Dam failure extent is defined using the Mississippi Division of Environmental Quality classifications which include Low, Significant, and High. One dam is classified as high-hazard in Harrison County.

Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. Some areas of the barrier islands are eroding at 6 to 8 meters per year in Harrison County according to the USGS Coastal and Marine Geology Program's U.S. Gulf of Mexico Interactive Map.

Flood

Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest flood recorded for the county was at Biloxi River near Wortham. The maximum historic crest was recorded at 28.94 feet, or 5.94 feet above the major flood stage (reported on May 9, 1995). Additional historic crest heights and the corresponding flood categories are in the table below.

Location/ Jurisdiction	Date	Maximum Historic Crest (ft)	Flood categories			
			Action Stage (ft)	Flood Stage (ft)	Moderate Flood Stage (ft)	Major Flood Stage (ft)
Harrison County						
BILOXI RIVER NEAR WORTHAM	5/9/1995	28.94	16	16	18	23
WOLF RIVER NEAR LANDON	8/31/2012	31.31	26	27	28	30
BILOXI RIVER NEAR LYMAN	5/10/1995	20.95	10	12	16	18
TCHOUTACABOUFFA RIVER NEAR D IBERVILLE	9/30/1998	19.00	8	8	15	18
WOLF RIVER ABOVE GULFPORT	9/1/2012	16.50	7	8	12	15

Storm Surge

Storm surge can be defined by the depth of inundation which is defined by the category of hurricane/tropical storm. Since Harrison County could easily be impacted by a Category 3 storm, depth of inundation could be at least 9 feet in many areas.

Fire-related Hazards

Drought

Drought extent is defined by the U.S. Drought Monitor classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought. According to the U.S. Drought Monitor classifications, the most severe drought condition is Exceptional. Harrison County has received this ranking twice over the 17-year reporting period.

Lightning

According to the Vaisala's flash density map, Harrison County is located in an area that experiences 4 to 12 and up lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.

Wildfire

Wildfire data was provided by the Mississippi Forestry Commission and is reported annually by county from 2007-2022. The greatest number of fires to occur in Harrison County in any year 185 in 2011. The greatest number of acres to burn in the county in a single year occurred in 2011 when 4,744 acres were burned. Information on specific occurrences of wildfire and the most severe fires in each jurisdiction is not available. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.

Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale, the Modified Mercalli Intensity (MMI) scale, and the distance of the epicenter from Harrison County. According to data provided by the National Centers for Environmental Information, the greatest earthquake to impact the county had an MMI of V (slightly strong) and a correlating Richter Scale magnitude estimated at less than 4.8 (reported on February 1, 1955). The epicenter of this earthquake was located 2.0 km away.

Wind-related Hazards	
Extreme Cold	The extent of extreme cold can be defined by the minimum temperature reached. Official long term temperature records are not kept for any areas in Harrison County. However, the temperature has previously ranged from 15 to 20 degrees Fahrenheit in southwest and coastal Mississippi (reported on December 18, 1996).
Extreme Heat	The extent of extreme heat can be measured by the record high temperature recorded. Official long term temperature records are not kept for any areas in Harrison County. However, the highest recorded temperature in Beaumont (north of the county) was 105°F and heat index values were recorded as high as 115°F (reported in July 2000).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Harrison County was 2.75 inches (reported on January 24, 1997). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5. The greatest classification of hurricane to traverse directly through Harrison County was Hurricane Elena, a Category 2 storm which carried tropical force winds of 93 knots upon arrival in the county.
Severe Thunderstorm/High Wind	Thunderstorm extent is defined by wind speeds reported. The strongest recorded wind event in Harrison County was 80 knots (reported on April 14, 1964). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by the Fujita/Enhanced Fujita. The greatest magnitude reported in Harrison County was an F3 (last reported on May 19, 1980).
Winter Weather	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest snowfall reported in Harrison County was 1-2 inches (reported on December 18, 1996).
Other Hazards	
Climate Change/Sea Level Rise	It is still uncertain what the extent of climate change will be in the future. However, increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, stronger storms (wind, hurricanes) can be expected. Sea level rise is defined by the areas impacted, but is more often associated with the amount of sea level rise that is expected to take place. Although it is difficult to predict an exact amount of rise, the Climate Change Surging Seas Report intermediate high sea level rise scenario projects 1 foot of rise locally by 2050 and 3.7 feet by 2100.

Hazardous Materials Incident/Train Derailment	According to USDOT PHMSA, the largest hazardous materials incident reported in Harrison County was 750 LGA released on the highway (reported on August 9, 1998). It should be noted that larger events are possible.
Infectious Disease	An infectious disease threat could have large-scale effects throughout the county and may cause illness in many people. Possible impacts from a disease threat depend largely on the impacted population, but might include anything from absenteeism and loss of productivity in the workplace to death or serious illness to humans or livestock. A serious disease threat could affect many thousands of people.

PRIORITY RISK INDEX RESULTS

In order to draw some meaningful planning conclusions on hazard risk for Harrison County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). More information on the PRI and how it was calculated can be found in Section 5.21.2.

Table C.64 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this subsection, as well as input from the Regional Hazard Mitigation Council. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE C.64: SUMMARY OF PRI RESULTS FOR HARRISON COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Flood-related Hazards						
Dam and Levee Failure	Possible	Critical	Small	Less than 6 hours	Less than 6 hours	2.4
Erosion	Likely	Limited	Small	More than 24 hours	More than 1 week	2.4
Flood	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 24 hours	3.2
Storm Surge	Highly Likely	Critical	Moderate	More than 24 hours	Less than 24 hours	3.0
Fire-related Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Lightning	Highly Likely	Limited	Negligible	6 to 12 hours	Less than 6 hours	2.4
Wildfire	Highly Likely	Minor	Small	Less than 6 hours	Less than 1 week	2.6
Geologic Hazards						
Earthquake	Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	2.0
Wind-related Hazards						
Extreme Cold	Possible	Minor	Large	More than 24 hours	Less than 1 week	2.1
Extreme Heat	Highly Likely	Minor	Large	More than 24 hours	More than 1 week	2.8
Hailstorm	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	2.8
Hurricane and Tropical Storm	Highly Likely	Critical	Large	More than 24 hours	Less than 24 hours	3.2
Severe Thunderstorm/ High Wind	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	3.1
Tornado	Highly Likely	Critical	Small	Less than 6 hours	Less than 6 hours	3.0

Winter Weather	Likely	Minor	Moderate	More than 24 hours	Less than 24 hours	2.1
Other Hazards						
Climate Change/Sea Level Rise	Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Hazardous Materials Incident/ Train Derailment	Highly Likely	Limited	Small	Less than 6 hours	Less than 24 hours	2.8
Infectious Disease	Possible	Limited	Large	More than 24 hours	More than 1 week	2.5

FINAL DETERMINATIONS ON HAZARD RISK

The conclusions drawn from the hazard profiling process for Harrison County, including the PRI results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (Table C.65). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Harrison County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: Vulnerability Assessment and below in Section C.3. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

Some priorities have changed since the previous plans were adopted due to the merging of multiple local plans to form this regional plan; however, most priorities remain the same.

TABLE C.65: CONCLUSIONS ON HAZARD RISK FOR HARRISON COUNTY

HIGH RISK	Hurricane and Tropical Storm Flood Severe Thunderstorm/High Wind Storm Surge Tornado
MODERATE RISK	Hailstorm Hazardous Materials Incident/Train Derailment Extreme Heat Wildfire Drought Climate Change/Sea Level Rise Infectious Disease
LOW RISK	Lightning Dam and Levee Failure Erosion Winter Weather Extreme Cold Earthquake

SECTION 17 HARRISON COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Harrison County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: Vulnerability Assessment.

Asset Inventory

Table C.66 lists the estimated number of buildings, parcels, and the total value of improvements for Harrison County and its participating jurisdictions (study area of vulnerability assessment). Because digital parcel data was not available for every community, data obtained from Hazus-MH 3.2 inventory was utilized to supplement the analysis where gaps existed.

TABLE C.66: IMPROVED PROPERTY IN HARRISON COUNTY

Location	Counts of Buildings	Counts of Parcels	Total Value of Improvements
Biloxi	23,001	16,807	$1,542,665,202
D'Iberville	4,751	3,122	$234,845,437
Gulfport	41,641	32,328	$397,918,520
Long Beach	9,188	7,175	$464,548,692
Pass Christian	3,694	6,224	$183,434,546
Unincorporated Area	41,573	30,912	$3,647,401,420
HARRISON COUNTY TOTAL	123,848	96,568	$6,470,813,817

Source: MDEQ, Hazus-MH 3.2

Table C.67 lists the critical facilities located in Harrison County by type according to data provided by local government officials.

In addition, Figure C.67 shows the locations of critical facilities in Harrison County. Table C.84, at the end of this subsection, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. Further, it should be noted that the table below may show that some communities do not have any critical facilities of in certain type, when in reality, that particular type of facility may actually be located within the community. This may occur because spatial data for that facility type was not available or because the facility may have been classified under a different category type for that particular community.

TABLE C.67: CRITICAL FACILITY INVENTORY IN HARRISON COUNTY

Location	Communications	EOC	Fire Stations	Medical	Police Station	Power/ Gas	Private/Non-Profit
Biloxi	3	1	9	6	3	1	24
D'Iberville	1	0	1	2	1	3	0
Gulfport	0	0	12	4	11	1	5
Long Beach	0	0	3	0	1	0	0
Pass Christian	0	1	2	1	1	0	0
Unincorporated Area	0	1	5	0	0	87	0

HARRISON COUNTY TOTAL	4	3	32	13	17	92	29

Source: Local Governments

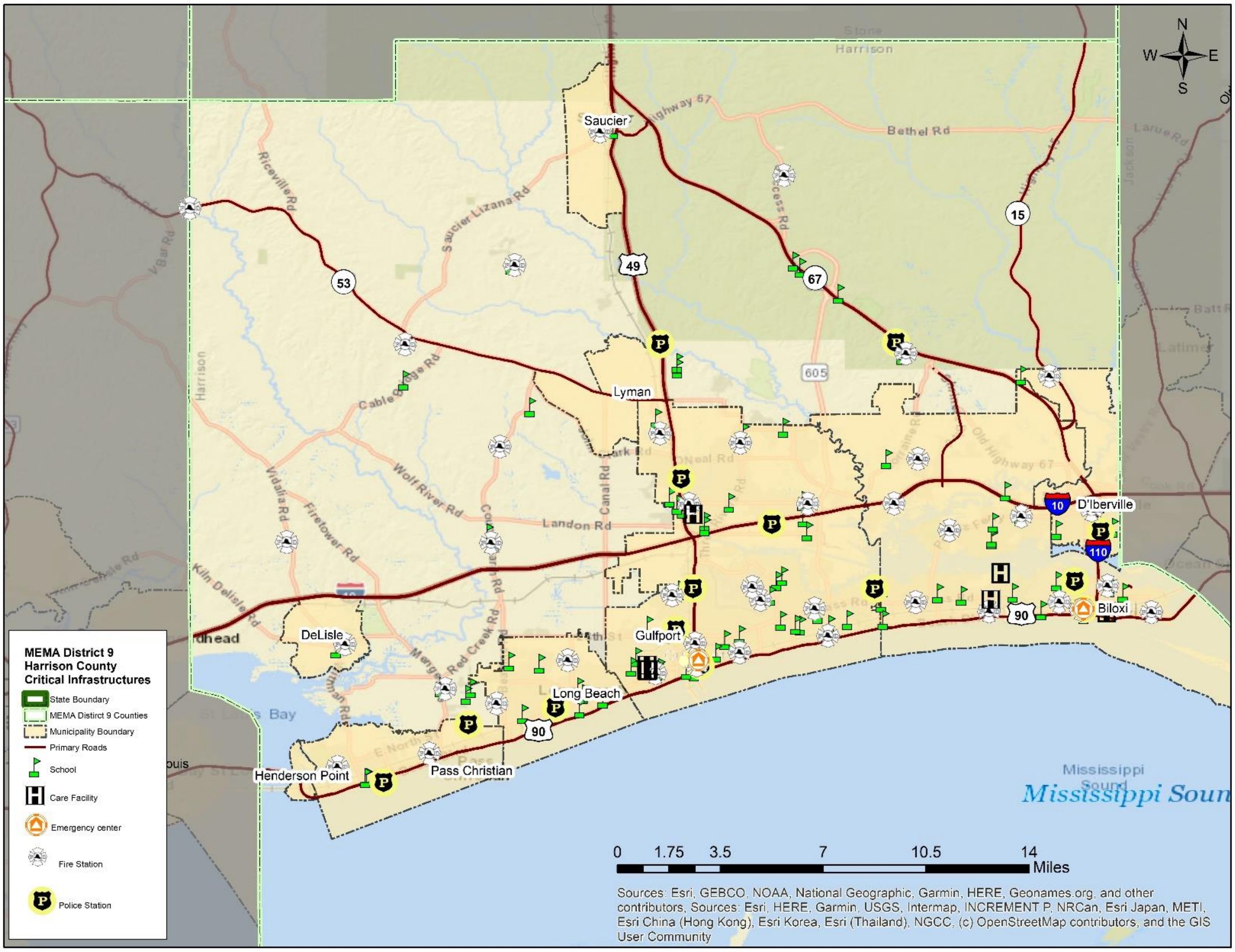
TABLE C.68: CRITICAL FACILITY INVENTORY IN HARRISON COUNTY (CONT.)

Location	Public Facility	School	Shelter	Special Populations	Transportation	Water/ Wastewater
Biloxi	18	9	0	13	2	28
D'Iberville	14	4	0	2	20	4
Gulfport	35	28	3	51	0	4
Long Beach	4	5	0	1	0	3
Location	Public Facility	School	Shelter	Special Populations	Transportation	Water/ Wastewater
Pass Christian	3	3	0	2	3	3
Unincorporated Area	1	19	0	0	1	0
HARRISON COUNTY TOTAL	75	68	3	69	26	42

Source: Local Governments

FIGURE C.30: CRITICAL FACILITY LOCATIONS IN HARRISON COUNTY

Figure C.31: Harrison County Critical Infrastructure



Source: Local Governments

Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Harrison County that are potentially at risk to these hazards.

Table C.69 lists the population by jurisdiction according to American Community Survey 2015 population estimates. The total population in Harrison County according to Census data is 196,268 persons. Additional population estimates are presented above in Section C.1.

TABLE C.69: TOTAL POPULATION IN HARRISON COUNTY

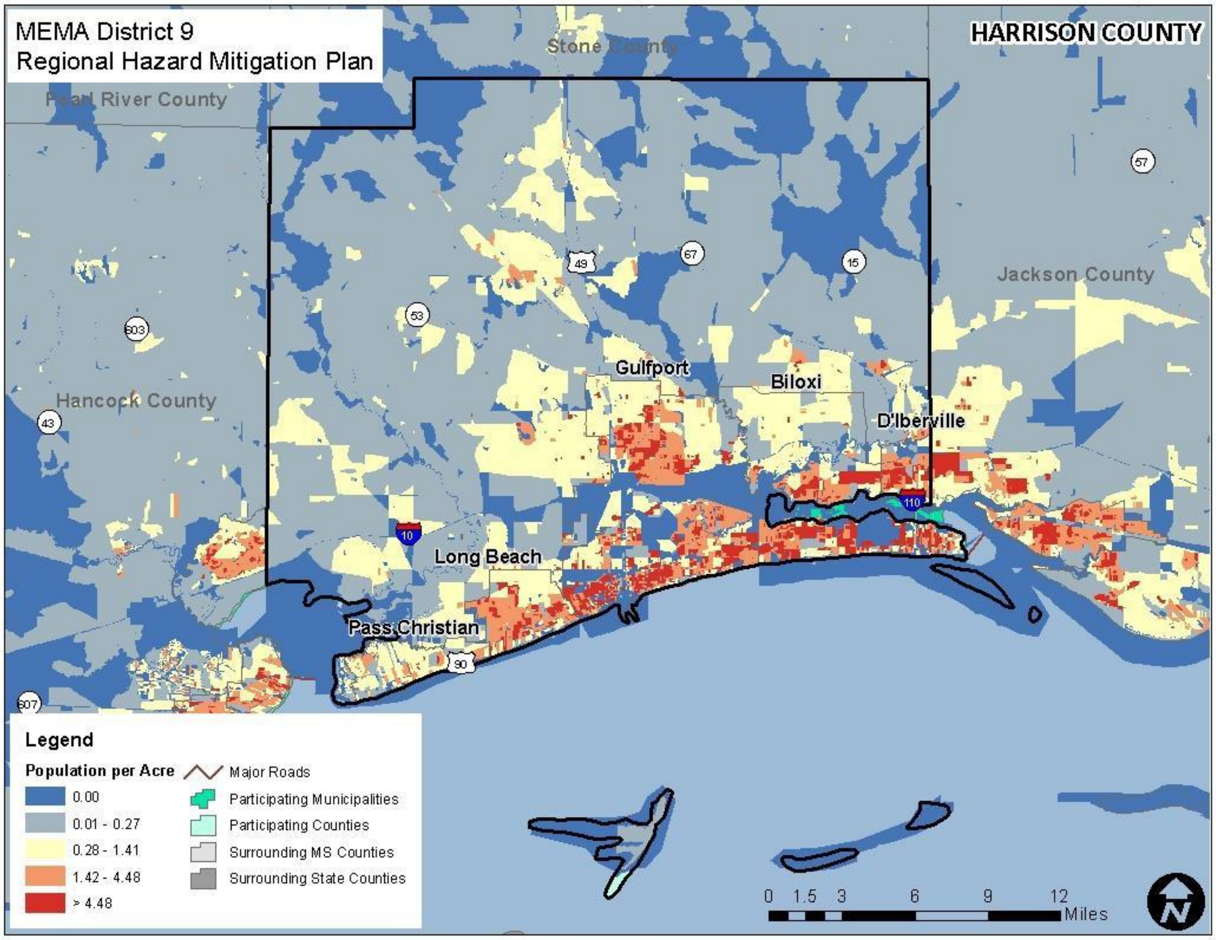
Location	Total 2015 Population
Biloxi	44,825
D'Iberville	10,532
Gulfport	70,642
Long Beach	15,369
Pass Christian	5,130

Unincorporated Area	49,770
HARRISON COUNTY TOTAL	196,268

Source: United States Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

In addition, Figure C.32 illustrates the population density per acre by census block as it was reported by the U.S. Census Bureau in 2010. As can be seen in the figure, the population is spread out through most of the county, with heavy concentrations in Biloxi, D'Iberville, Gulfport, and Long Beach.

FIGURE C.32: POPULATION DENSITY IN HARRISON COUNTY



Source: United States Census Bureau, 2010 Census

Development Trends and Changes in Vulnerability

Since the previous local-level hazard mitigation plans were approved, Harrison County has experienced moderate growth and development. Table C.70 shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

TABLE C.70: BUILDING COUNTS FOR HARRISON COUNTY

Location	2010	2011	2012	2013	2014	2015	% Building Stock Built Post-2010
Biloxi	21,250	21,675	22,094	21,871	21,537	21,506	1.2%
D'Iberville	3,548	3,814	4,051	4,370	4,620	4,836	36.3%
Gulfport	29,619	30,293	31,556	32,092	32,878	33,421	12.8%
Long Beach	6,504	6,755	6,740	6,734	6,696	6,628	1.9%
Pass Christian	2,299	2,549	2,448	2,642	2,698	2,744	19.4%
Unincorporated Area	17,055	17,925	18,159	18,729	19,395	19,686	15.4%
HARRISON COUNTY TOTAL	80,275	83,011	85,048	86,438	87,824	88,821	10.6%

Source: United States Census Bureau, American Community Survey

Table C.71 shows population growth estimates for the county from 2010 to 2015 based on the based on the American Community Survey's annual population estimates.

TABLE C.71: POPULATION GROWTH FOR HARRISON COUNTY

Location	Population Estimates						% Change 2010-2015
	2010	2011	2012	2013	2014	2015	
Biloxi	43,921	44,256	44,223	44,354	44,527	44,825	2.1%
D'Iberville	8,905	9,211	9,539	9,819	10,161	10,532	18.3%
Gulfport	66,286	67,322	68,158	69,004	69,913	70,462	6.3%
Long Beach	14,769	14,872	14,981	15,102	15,224	15,369	4.1%
Pass Christian	4,809	4,756	4,773	4,848	4,957	5,130	6.7%
Unincorporated Area	43,101	44,703	46,436	47,629	48,860	49,950	15.9%
HARRISON COUNTY TOTAL	181,791	185,120	188,110	190,756	193,642	196,268	8.0%

Source: United States Census Bureau, American Community Survey

Based on the data above, there has been a moderate rate of residential development and population growth in the county since 2010, and the City of D'Iberville and the unincorporated area have experienced a significant increase in population while the cities of D'Iberville, Gulfport, and Pass Christian as well as the unincorporated area have experienced a significant increase in housing development, resulting in an increased number of structures and people that are vulnerable to the potential impacts of the identified hazards. Therefore, development and population growth have impacted the county's vulnerability since the previous local hazard mitigation plans were approved and there has been an increase in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains or other identified areas of high risk.

Vulnerability Assessment Results

As noted in Section 6: Vulnerability Assessment, only hazards with a specific geographic boundary, available modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Harrison County, are presented here. All other hazards are assumed to impact the entire planning region (e.g., drought) or, due to lack of data, analysis would not lead to credible results (e.g., infectious disease). The total county exposure, and thus risk to these hazards, was presented in Table C.65.

The hazards to be further analyzed in this subsection include: flood, wildfire, earthquake, hurricane and tropical storm winds and storm surge, hazardous materials incident, dam and levee failure, and sea level rise.

The annualized loss estimate for all hazards is presented near the end of this subsection in Table C.83.

FLOOD

Historical evidence indicates that Harrison County is susceptible to flood events. A total of 45 flood events have been reported by the National Center for Environmental Information resulting in around $3.1 million (2016 dollars) in property damage as well as 1 fatality. On an annualized level, these damages amounted to $286,743 for Harrison County.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with improved property records for Harrison County. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified floodplain.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table C.72 shows the results of the analysis.

TABLE C.72: ESTIMATED EXPOSURE OF PROPERTY TO THE FLOOD HAZARD

Location	1.0-percent ACF		0.2-percent ACF		VE Zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Biloxi	6,417	$365,510,696	4,539	$407,939,146	222	$116,507,908
D'Iberville	1,230	$49,867,008	1,343	$116,368,166	52	$2,113,769
Gulfport	5,127	$379,135,841	7,802	$658,083,931	117	$82,687,105

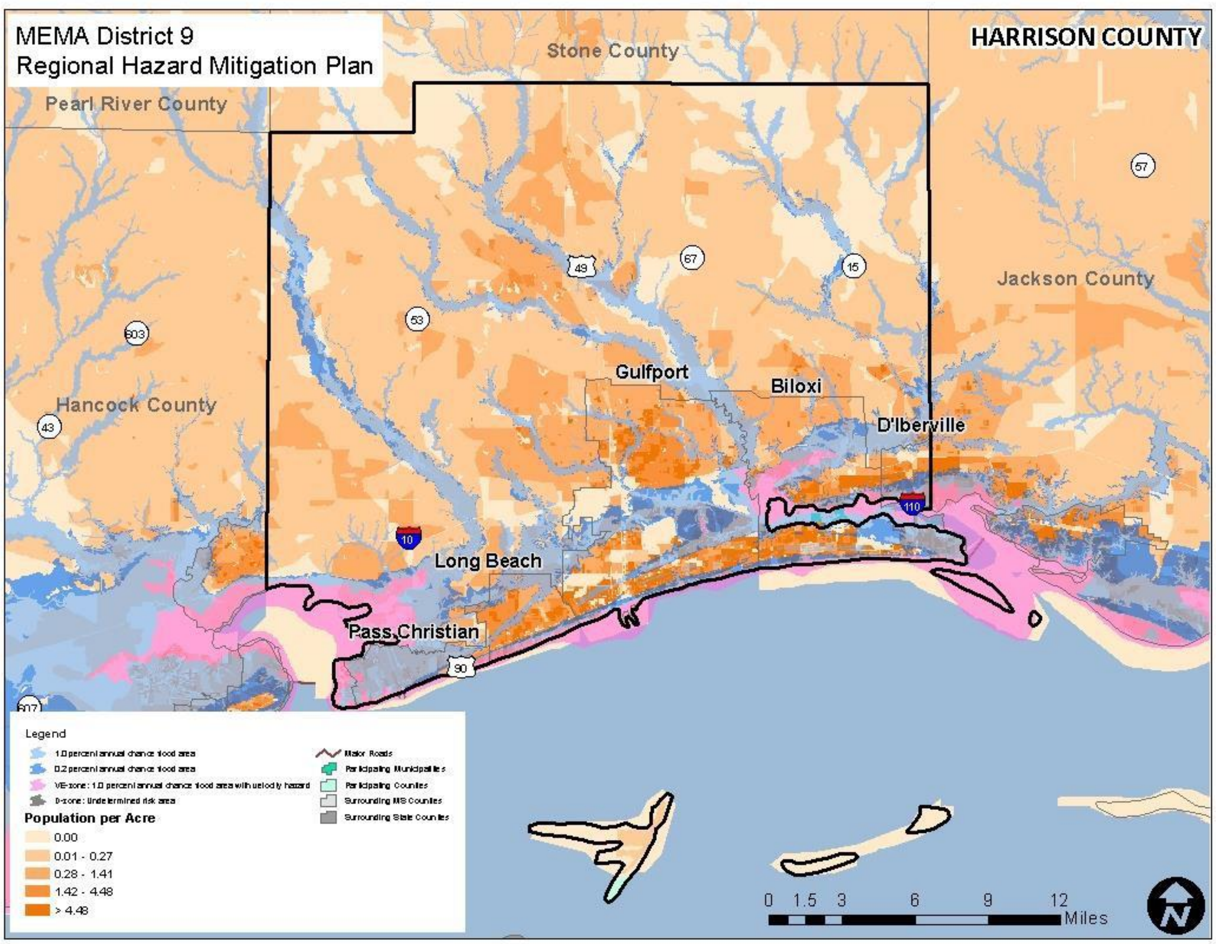
Location	1.0-percent ACF		0.2-percent ACF		VE Zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Long Beach	863	$64,152,921	1,383	$92,278,737	40	$1,523,995
Pass Christian	2,534	$108,363,854	452	$22,954,189	199	$13,772,487
Unincorporated Area	2,445	$112,232,261	1,521	$81,862,192	394	$499,658,084
HARRISON COUNTY TOTAL	18,616	$1,079,262,581	17,040	$1,379,486,361	1,024	$716,263,348

Source: Federal Emergency Management Agency DFIRM, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Figure C.33 is presented to gain a better understanding of at-risk population by evaluating census block level population data against mapped floodplains. There are areas of concern in most of the population centers in the county. Indeed, each of the incorporated municipalities is potentially at risk of being impacted by flooding in some areas of its jurisdiction. Therefore, there is significant population vulnerability to flooding.

FIGURE C.33: POPULATION DENSITY NEAR FLOODPLAINS IN HARRISON COUNTY



Source: Federal Emergency Management Agency DFIRM, United States Census 2010

Critical Facilities
The critical facility analysis revealed that there are 159 facilities located in one of the identified floodplain zones. (Please note, as previously indicated, this analysis does not consider building elevation, which may negate risk.) Of these facilities, 75 are located in the 1.0 percent annual chance flood zone, 67 are located in the 0.2 percent annual chance flood zone, and 17 are located in a VE-zone. A list of specific critical facilities and their associated risk can be found in Table C.84 at the end of this subsection.

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in Harrison County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. Such site-specific vulnerability determinations are outside the scope of this assessment but may be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

WILDFIRE

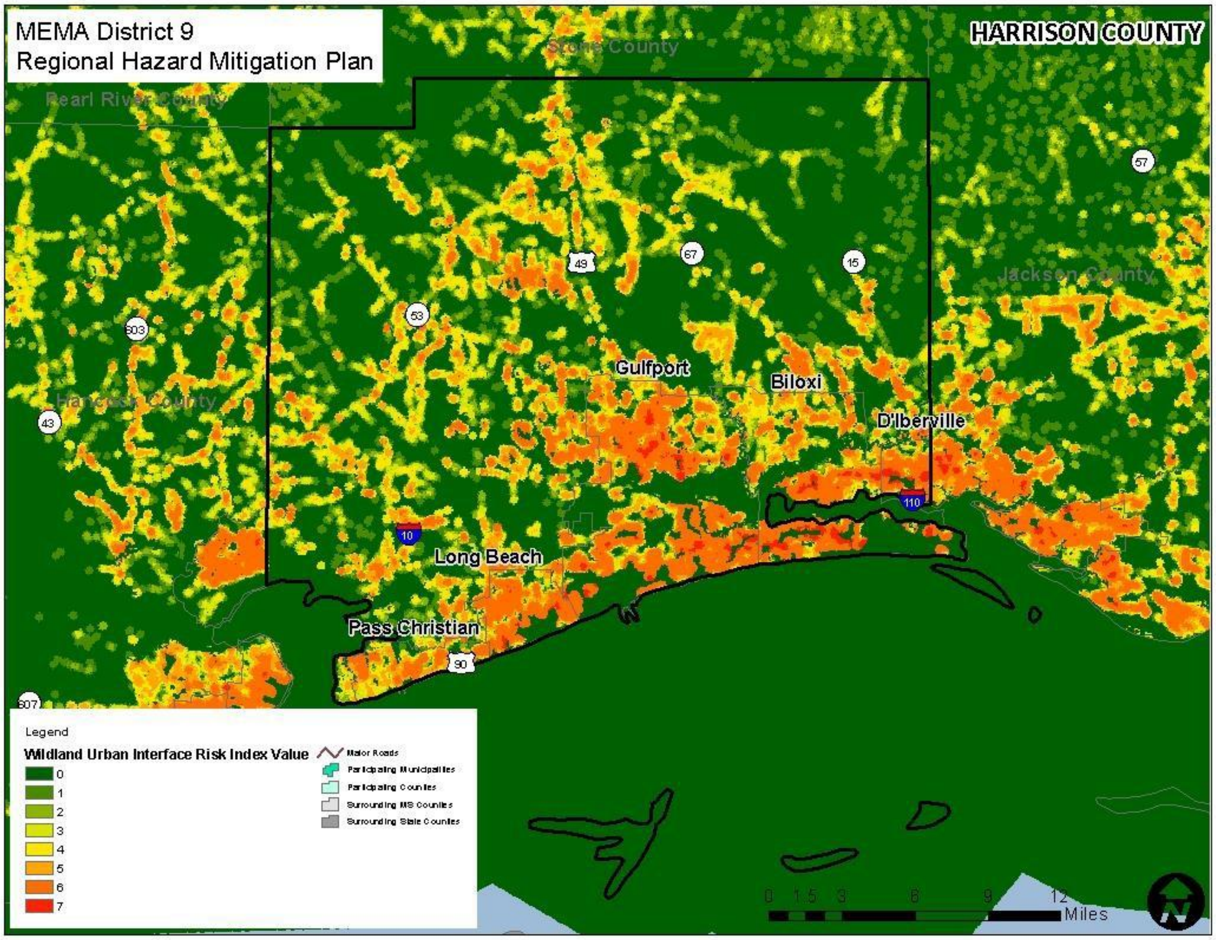
Although historical evidence indicates that Harrison County is susceptible to wildfire events, there are few reports which include information on historic dollar losses. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered relatively low, though it should be noted that a single event could result in significant damages throughout the county.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones. For the critical facility analysis, areas of concern were intersected with critical facility locations.

Figure C.34 shows the Wildland Urban Interface Risk Index (WUIRI) data, which is a data layer that shows a rating of the potential impact of a wildfire on people and their homes. The key input, Wildland Urban Interface (WUI), reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the WUI and rural areas is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, it was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to 7 with higher values being most severe (as noted previously, this is only a measure of relative risk). Figure C.35 shows the areas of analysis where any grid cell is less than 3. Areas with a value below 3 were chosen to be displayed as areas of risk because this showed the upper echelon of the scale and the areas at highest risk.

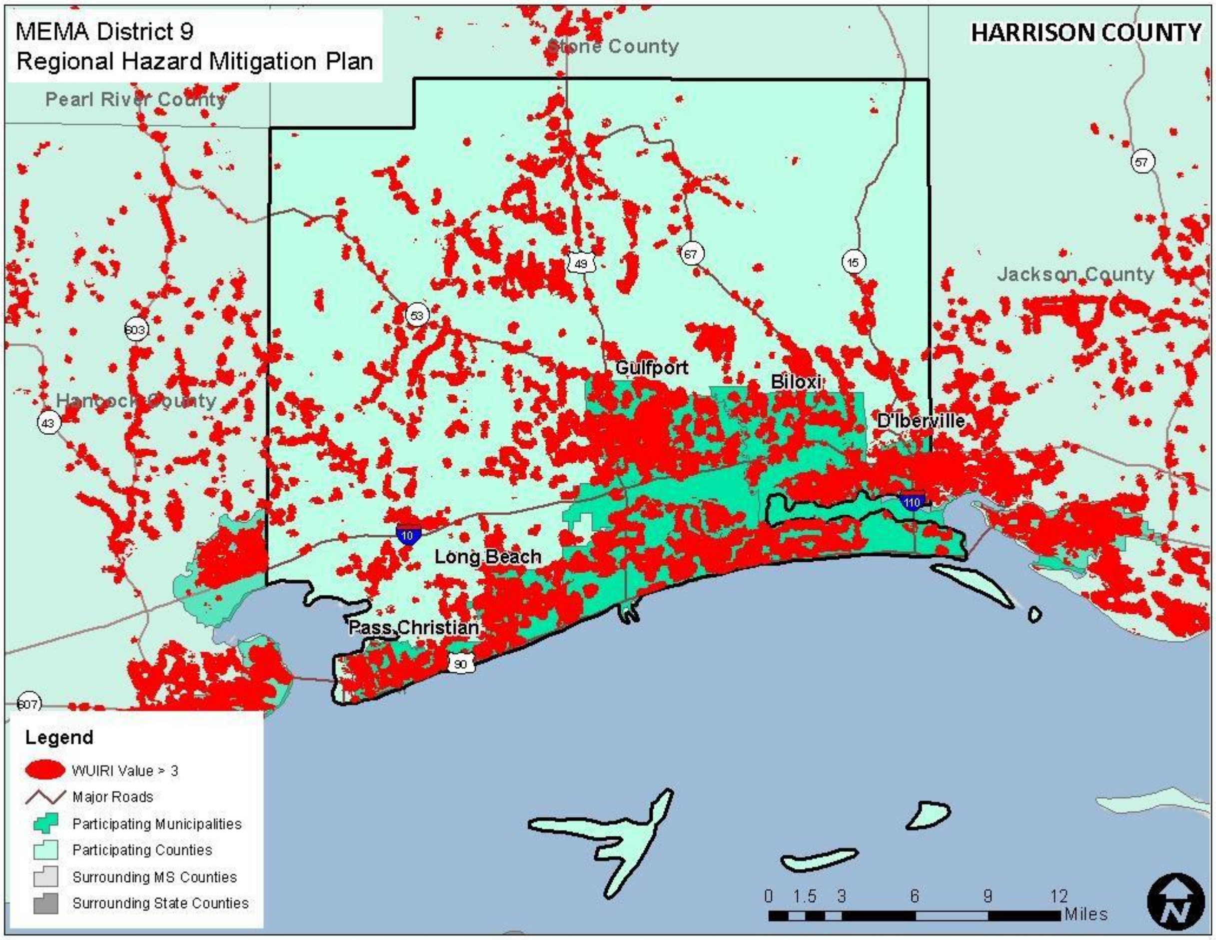
Table C.73 shows the results of the analysis.

FIGURE C.34: WUI RISK INDEX AREAS IN HARRISON COUNTY



Source: Southern Wildfire Risk Assessment Data

FIGURE C.35: WILDFIRE RISK AREAS IN HARRISON COUNTY



Source: Southern Wildfire Risk Assessment Data

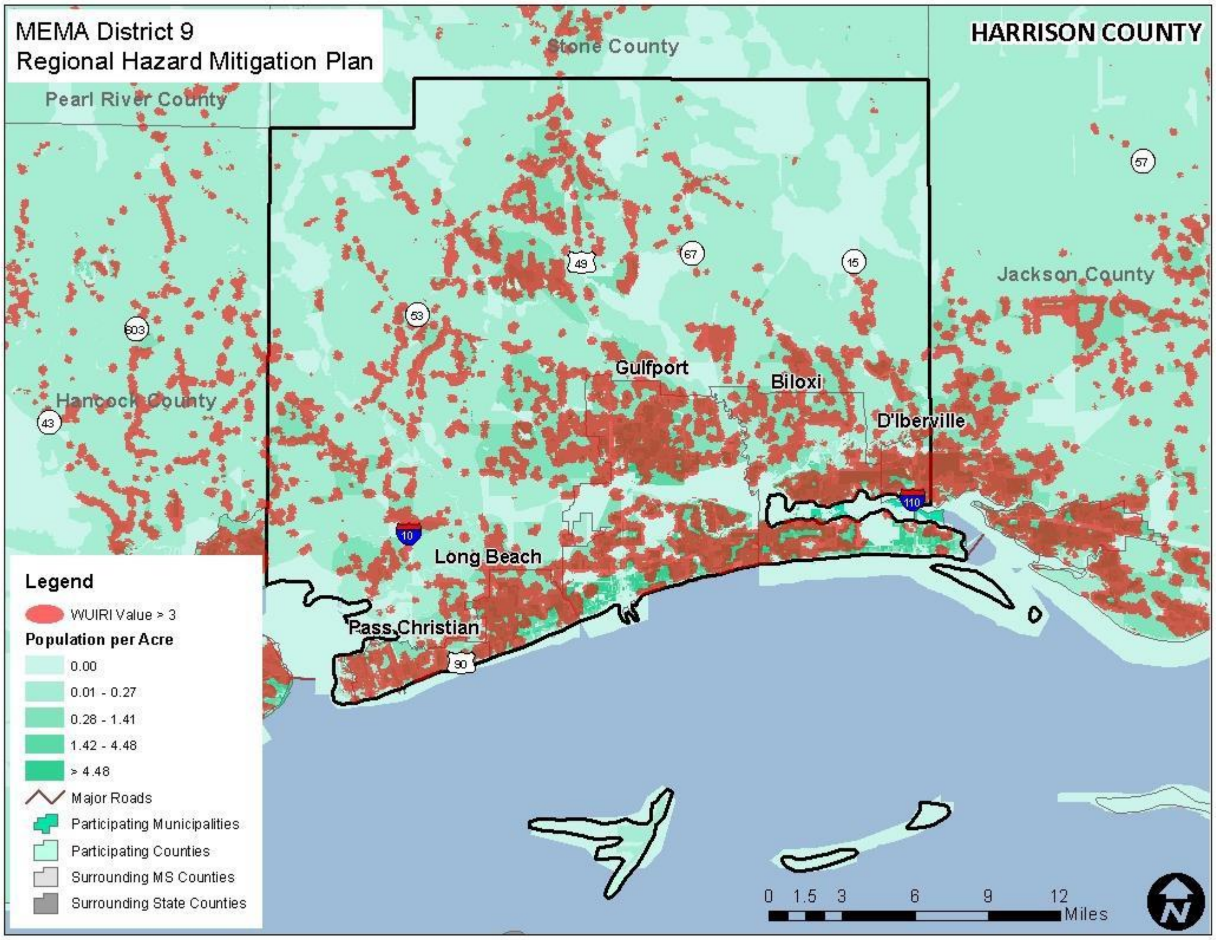
TABLE C.73: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE RISK AREAS

Location	Wildfire Risk	
	Approx. Number of Buildings	Approx. Improved Value
Biloxi	14,782	$990,187,787
D'Iberville	4,036	$173,907,350
Gulfport	30,805	$1,630,516,790
Long Beach	7,348	$392,572,180
Pass Christian	3,413	$164,858,285
Unincorporated Area	27,202	$1,007,466,599
HARRISON COUNTY TOTAL	87,586	$4,359,508,991

Source: SWRA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability
Given some level of susceptibility across the county, it is assumed that the total population is at risk to the wildfire hazard. Figure C.36 shows an overlay of the wildfire risk areas identified above with the population density by census block. This shows that many of the areas of high population concentration are susceptible to wildfire because of their proximity to the wildland urban interface.

FIGURE C.36: WILDFIRE RISK AREAS IN HARRISON COUNTY



Source: Southern Wildfire Risk Assessment Data; United States Census

Critical Facilities
The critical facility analysis revealed that there are 220 critical facilities located in wildfire areas of concern, including 4 communications, 1 EOC, 22 fire stations, 7 medical, 10 police stations, 25 power/gas, 6 private/non-profits, 30 public facilities, 45 schools, 2 shelters, 41 special populations, 3 transportation, and 24 water/wastewater. It should be noted, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in Table C.84 at the end of this subsection.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Harrison County.

EARTHQUAKE

As the Hazus-MH model suggests below, and historical occurrences confirm, any earthquake activity in the area is likely to inflict only minor to moderate damage to the county. Hazus-MH 3.2 estimates a total annualized loss of $87,000 which includes buildings, contents, and inventory throughout the county.

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the average annualized loss for the county. The results of the analysis are generated at the Census Tract level within Hazus-MH and then aggregated to the county level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to structure failure, building loss, contents damage, and inventory loss. They do not include losses to business interruption, lost income, or relocation. Table C.74 summarizes the findings with results rounded to the nearest thousand.

TABLE C.74: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Structural Damage	Non-Structural Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Harrison County	$21,000	$51,000	$15,000	$0	$87,000

Source: Hazus-MH 3.2

Social Vulnerability
It can be assumed that all existing and future populations are at risk to the earthquake hazard.

Critical Facilities
The Hazus-MH probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Harrison County. The Hazus-MH scenario indicates that minimal to moderate damage is expected from an earthquake occurrence. While Harrison County may not experience a large earthquake, localized damage is possible with an occurrence. A list of specific critical facilities and their associated risk can be found in Table C.52 at the end of this subsection.

HURRICANE AND TROPICAL STORM

Historical evidence indicates that Harrison County has very significant risk to the hurricane and tropical storm hazard. There have been 12 disaster declarations due to hurricanes or tropical storms (Hurricanes Betsy, Camille, Frederic, Elena, Georges, Ivan, Dennis, Katrina, Gustav, and Isaac, as well as Tropical Storms Allison and Isidore). A large number tracks have come near or traversed through the county, as shown and discussed in Section C.2.12. Hazus-MH 3.2 estimates a total annualized loss of $162,651,000 which includes buildings, contents, and inventory throughout the county.

Hurricane Winds

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and storm surge and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore, only these two aspects of hurricane losses are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to hurricane and tropical storm wind hazard. Hazus-MH 3.2 was used to determine average annualized losses for the county as shown below in Table C.75. Only losses to buildings, inventory, and contents are included in the results.

TABLE C.75: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Harrison County	$111,346,000	$50,844,000	$461,000	$162,651,000

Source: Hazus-MH 3.2

Storm Surge

In addition, although it was treated as a separate hazard throughout this plan, storm surge is most often associated with hurricanes and tropical storms. Indeed, Hazus incorporates the storm surge model for estimating damage from storm surge as part of the hurricane model. The storm surge model can only be run as part of a historic hurricane model run and not as part of an annualized loss model. Unfortunately, in this model, storm surge impacts are calculated as part of the total damage from the historic event and thus could not be separated out and evaluated solely in terms of storm surge loss. As such, the estimated losses presented below are combined losses from hurricane winds and storm surge. The historic Hurricane Katrina model was utilized as this was certainly one of the most impactful storms in the region and therefore estimates the potential losses that are possible from a large hurricane event. Table C.76 presents the losses from this modeled event.

TABLE C.76: POTENTIAL LOSS ESTIMATIONS FOR LARGE HURRICANE EVENT

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Harrison County	$2,064,136,000	$862,483,000	$7,187,000	$2,933,806,000

Source: Hazus-MH 3.2

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population, both current and future, is at risk to the hurricane and tropical storm wind hazard. In terms of social vulnerability to storm surge, coastal populations are at much higher risk than inland populations. Since large concentrations of population are located along the coast of Harrison County, there is significant social vulnerability to storm surge in the county.

Critical Facilities

Given equal vulnerability across Harrison County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among factors. Determining individual building response to wind and storm surge is beyond the scope of this plan. However, this plan will consider mitigation action for especially vulnerable structures and/or critical facilities to mitigate against the effects of the hurricane hazard. A list of specific critical facilities can be found in Table C.84 at the end of this subsection.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Harrison County.

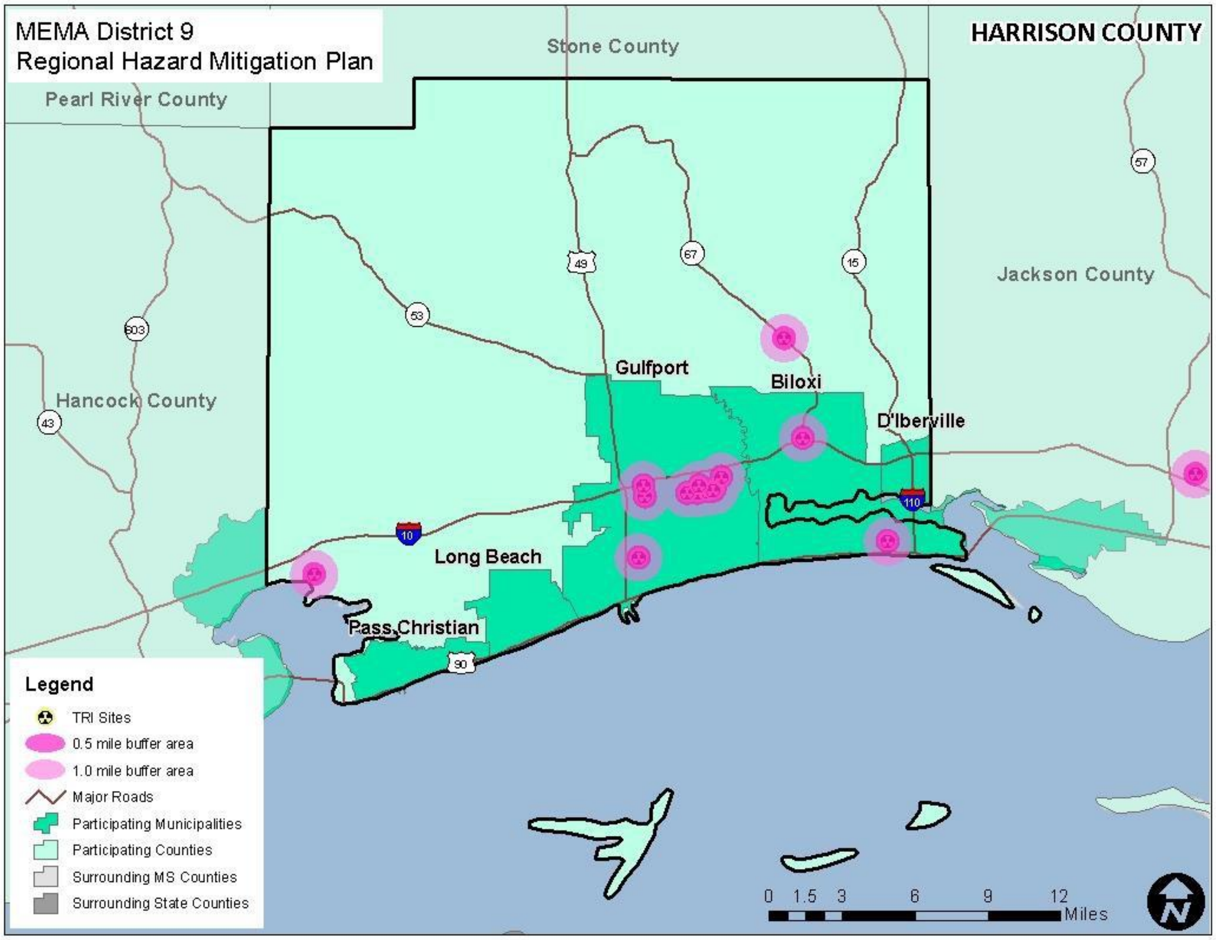
HAZARDOUS MATERIALS INCIDENT

Historical evidence indicates that Harrison County is susceptible to hazardous materials events. A total of 226 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration, resulting in $327,215 (2016 dollars) in property damage as well as 5 deaths and 1 injury. On an annualized level, these damages amount to $11,489 for the county.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities, and cause affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and building footprints/parcels where available and Census block data where footprints/parcels were not available. In both scenarios, two sizes of buffers—0.5-mile and 1.0-mile— were used. These areas are assumed to represent the different levels of effect: immediate (primary) and secondary. Primary and secondary impact zones were selected based on guidance from the PHMSA Emergency Response Guidebook. For the fixed site analysis, geo-referenced TRI sites in the region, along with buffers, were used for analysis as shown in Figure C.37. For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. Figure C.38 shows the areas used for mobile road toxic release buffer analysis and Figure C.40 shows the areas used for the mobile railroad toxic release buffer analysis. The results indicate the approximate number of improved properties and improved value, as shown in Table C.77 (fixed sites), Table C.78 (mobile roads), and Table C.79 (mobile railroad sites).

FIGURE C.37: TRI SITES WITH BUFFERS IN HARRISON COUNTY



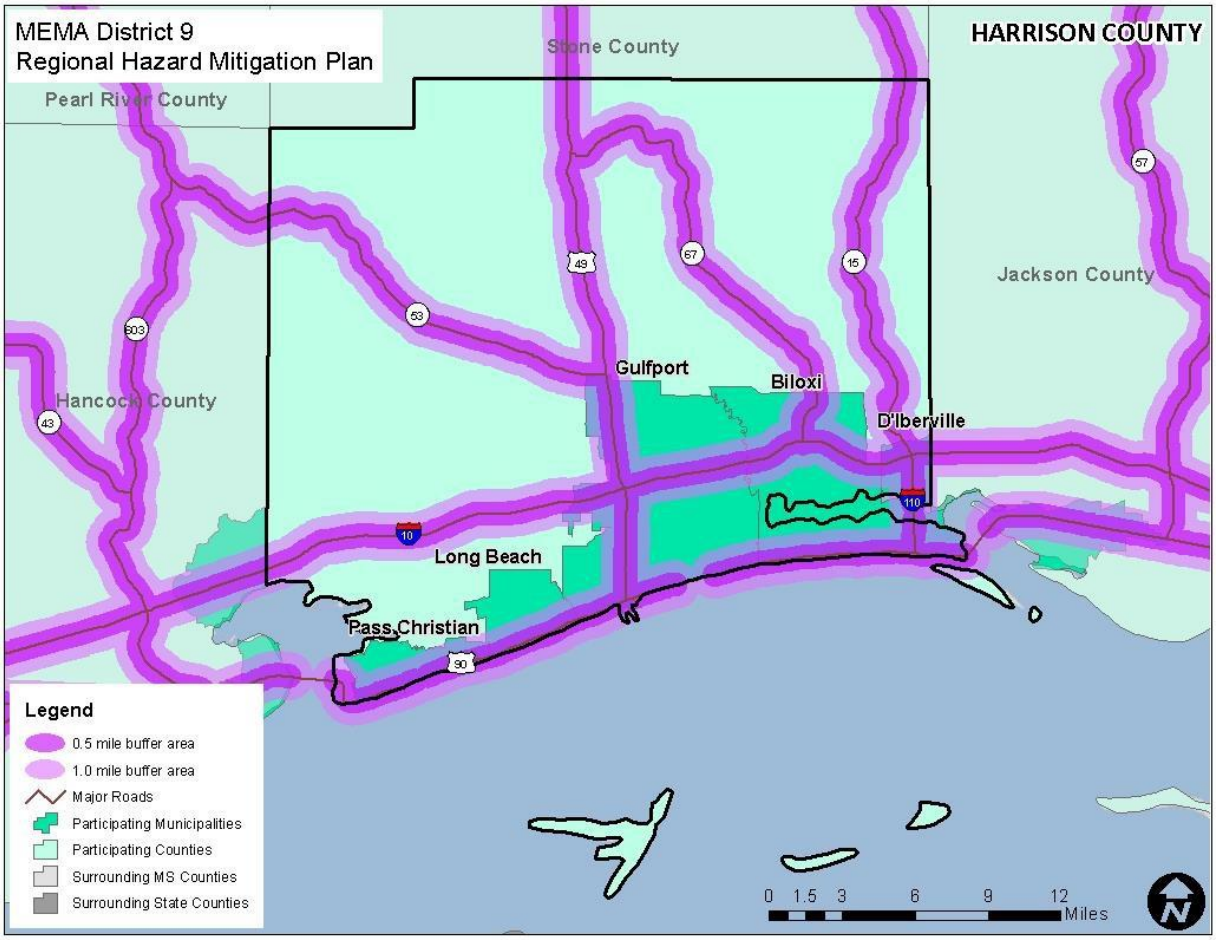
Source: Environmental Protection Agency

TABLE C.77: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Biloxi	921	$26,148,977	3,512	$110,705,101
D'Iberville	0	$0	0	$0
Gulfport	1,901	$110,382,535	8,125	$531,451,341
Long Beach	0	$0	0	$0
Pass Christian	0	$0	0	$0
Unincorporated Area	362	$44,838,092	682	$61,784,053
HARRISON COUNTY TOTAL	3,184	$181,369,604	12,319	$703,940,495

Source: EPA, MDEQ, Hazus MH 3.2 Data

FIGURE C.38: MOBILE (ROAD) HAZMAT BUFFERS IN HARRISON COUNTY



Source: Federal Highway Administration National Highway Planning Network

Figure C.39: HAZMAT Scenario

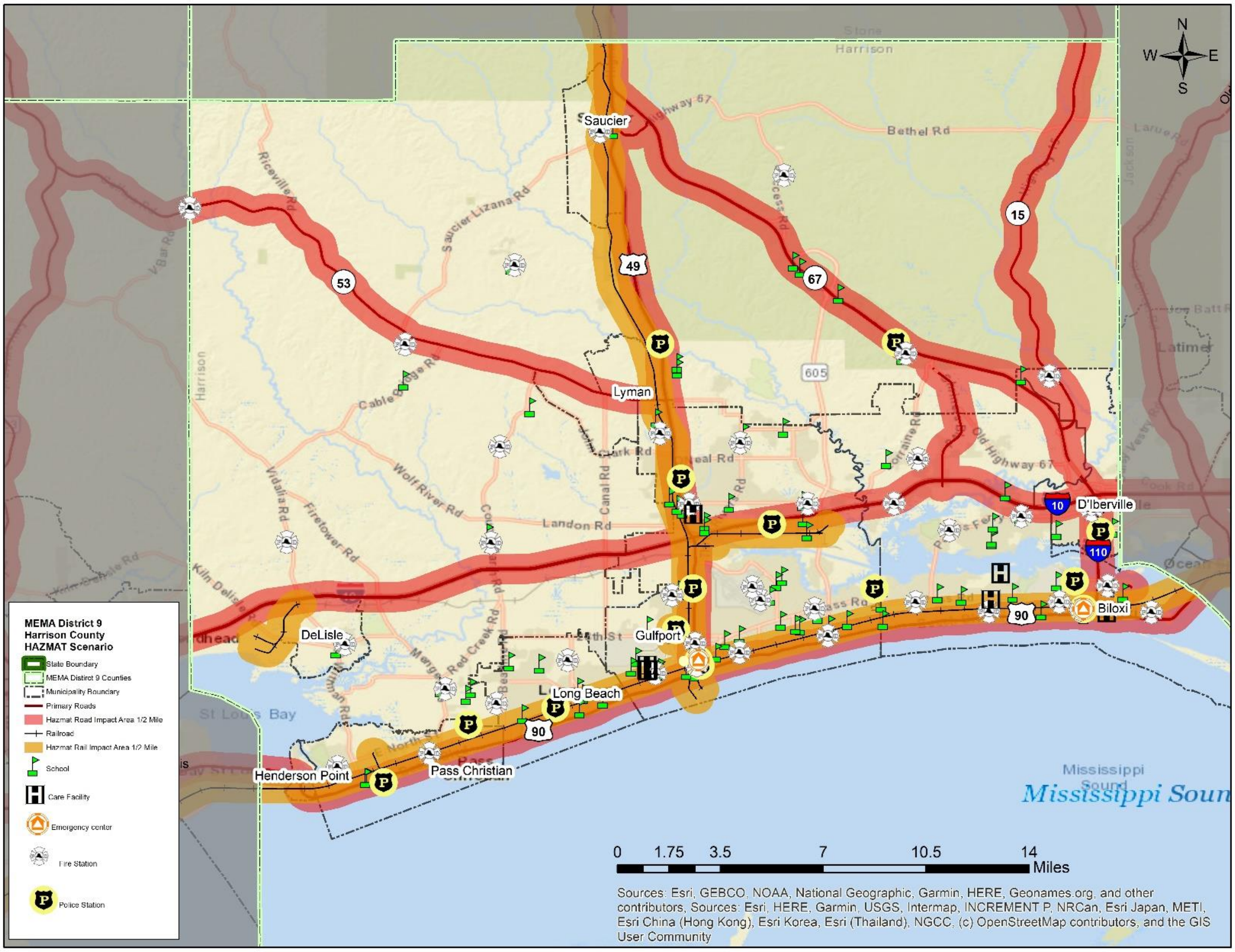
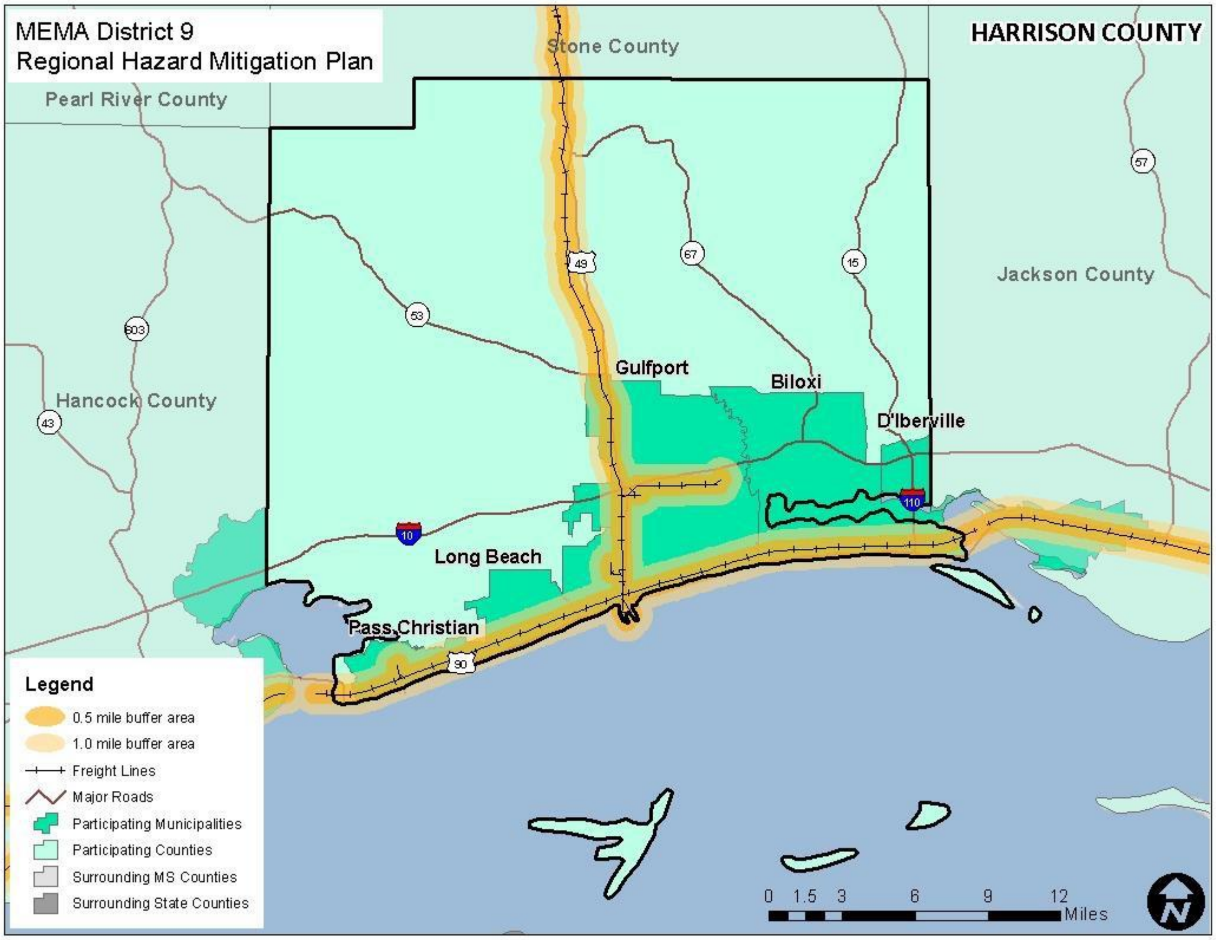

MEMA District 9
Harrison County
HAZMAT Scenario
State Boundary
MEMA District 9 Counties
Municipality Boundary
Primary Roads
Hazmat Road Impact Area 1/2 Mile
Railroad
Hazmat Rail Impact Area 1/2 Mile
School
Care Facility
Emergency center
Fire Station
Police Station
Saucier
Lyman
DeLisle
Gulfport
Long Beach
Pass Christian
Henderson Point
D'Iberville
Biloxi
St Louis Bay
Mississippi Sound
Harrison
Stone
Bethel Rd
Cable Bridge Rd
Wolf River Rd
Landon Rd
Canal Rd
Firetower Rd
Vidalia Rd
Kiln Delisle Rd
Saucier Lizana Rd
Riceville Rd
Old Highway 67
49
53
67
15
605
10
110
90
0 1.75 3.5 7 10.5 14
Miles
N
S
E
W
Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

FIGURE C.40: MOBILE (RAIL) HAZMAT BUFFERS IN HARRISON COUNTY



Source: U.S. Department of Transportation Federal Railroad Administration

TABLE C.78: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Biloxi	8,799	$682,254,259	15,629	$1,016,578,586
D'Iberville	3,119	$166,129,238	4,714	$228,825,255
Gulfport	14,873	$858,010,293	27,596	$1,412,706,984
Long Beach	2,056	$104,404,162	4,838	$226,495,377
Pass Christian	1,761	$78,050,457	3,009	$128,363,439
Unincorporated Area	8,944	$760,225,001	16,110	$1,080,868,709
HARRISON COUNTY TOTAL	39,552	$2,649,073,410	71,896	$4,093,838,350

Source: NHPN, MDEQ, Hazus MH 3.2 Data

TABLE C.79: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Biloxi	8,278	$464,061,769	12,404	$464,061,769
D'Iberville	0	$0	0	$0
Gulfport	15,657	$873,267,174	26,556	$873,267,174
Long Beach	4,006	$183,255,865	5,514	$183,255,865
Pass Christian	2,484	$96,055,588	3,079	$96,055,588
Unincorporated Area	2,126	$394,983,057	4,702	$394,983,057
HARRISON COUNTY TOTAL	32,551	$2,011,623,453	52,255	$2,011,623,453

Source: USDOT FRA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 61 facilities located in a fixed HAZMAT risk zone. Of these, 14 facilities are in the primary (0.5 mile) risk area including 1 medical, 3 power/gas, 2 public facilities, 3 schools, 3 special populations, and 2 water/wastewater. A list of specific critical facilities and their associated risk can be found in Table C.84 at the end of this subsection.

Mobile Analysis:

The critical facility analysis for transportation corridors revealed that there are 300 facilities located in the primary and secondary road HAZMAT buffer areas. Of these, there were 196 critical facilities located in the primary risk zone including 4 communications, 2 EOCs, 18 fire stations, 7 medical, 9 police stations, 19 power/gas, 19 private/non-profit, 44 public facilities, 27 schools, 26 special populations, 4 transportation, and 17 water/wastewater.

For the rail line buffer areas, there were a total of 231 critical facilities located in primary and secondary buffer areas. Of these, 147 facilities are located within the primary buffer area including 1 communications, 2 EOCs, 13 fire stations, 6 medical, 8 police stations, 8 power/gas, 10 private/non-profit, 38 public facilities, 22 schools, 1 shelter, 27 special populations, and 11 water/wastewater.

A list of specific critical facilities and their associated risk can be found in Table C.52 at the end of this subsection.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Harrison County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in condition that could alter the impact area (i.e., direction and speed of wind, volume of release, etc.).

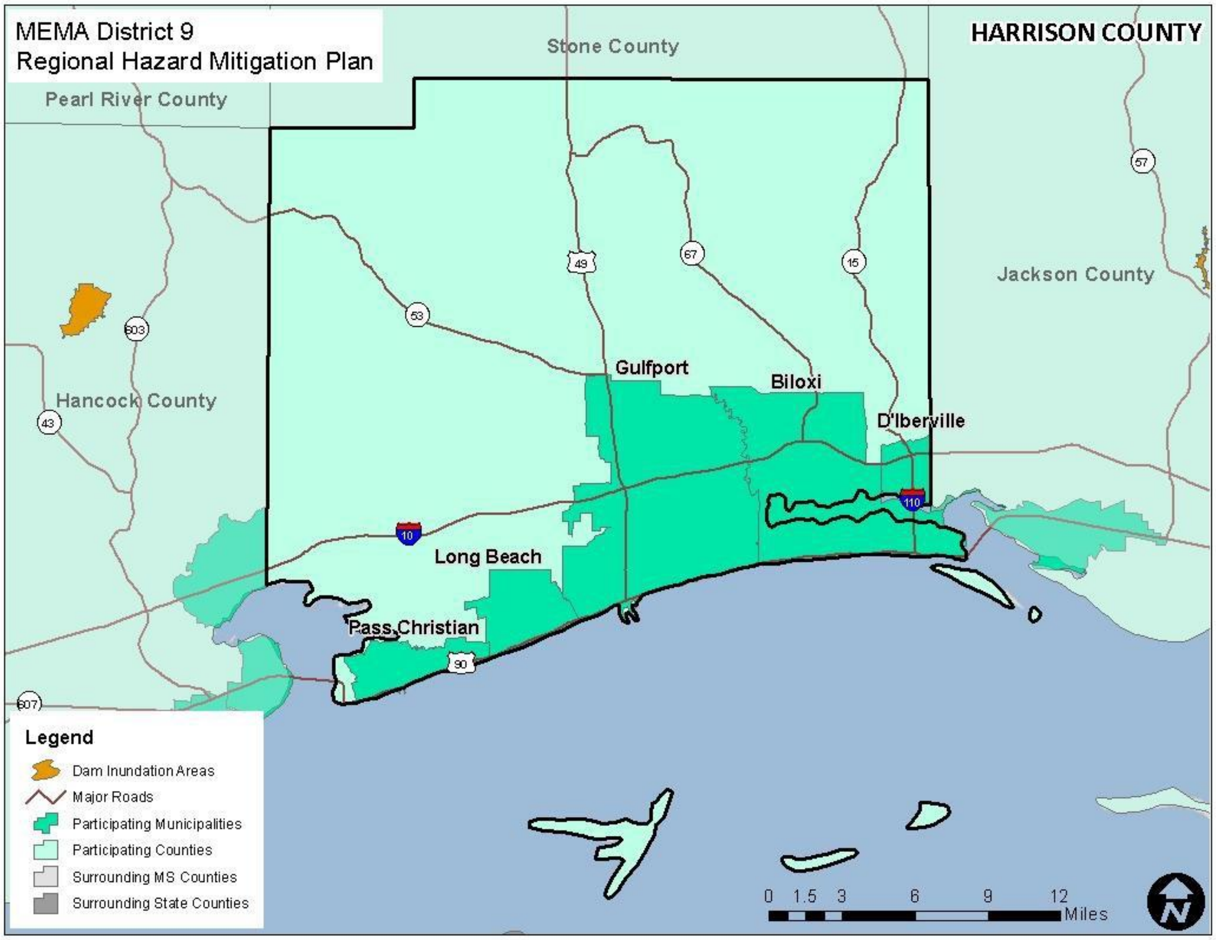
DAM/LEVEE FAILURE

In order to assess risk to a dam or levee failure, a GIS-based analysis was used to estimate exposure to one of the areas delineated by the Mississippi Department of Environmental Quality as a potential inundation area in the event of a failure. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified inundation area. As mentioned previously, this type of inundation mapping has not been completed for every dam/levee in the region, so the results of this analysis likely underestimate the overall vulnerability to a dam or levee failure. However, the analysis is still useful as a sort of baseline minimum of property that is potentially at-risk. The identified inundation areas can be found in Figure C.28.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table C.41 presents the potential at-risk property. Both the number of buildings and the approximate improved value are presented

FIGURE C.41: DAM INUNDATION AREAS IN HARRISON COUNTY



Source: Mississippi Department of Environmental Quality

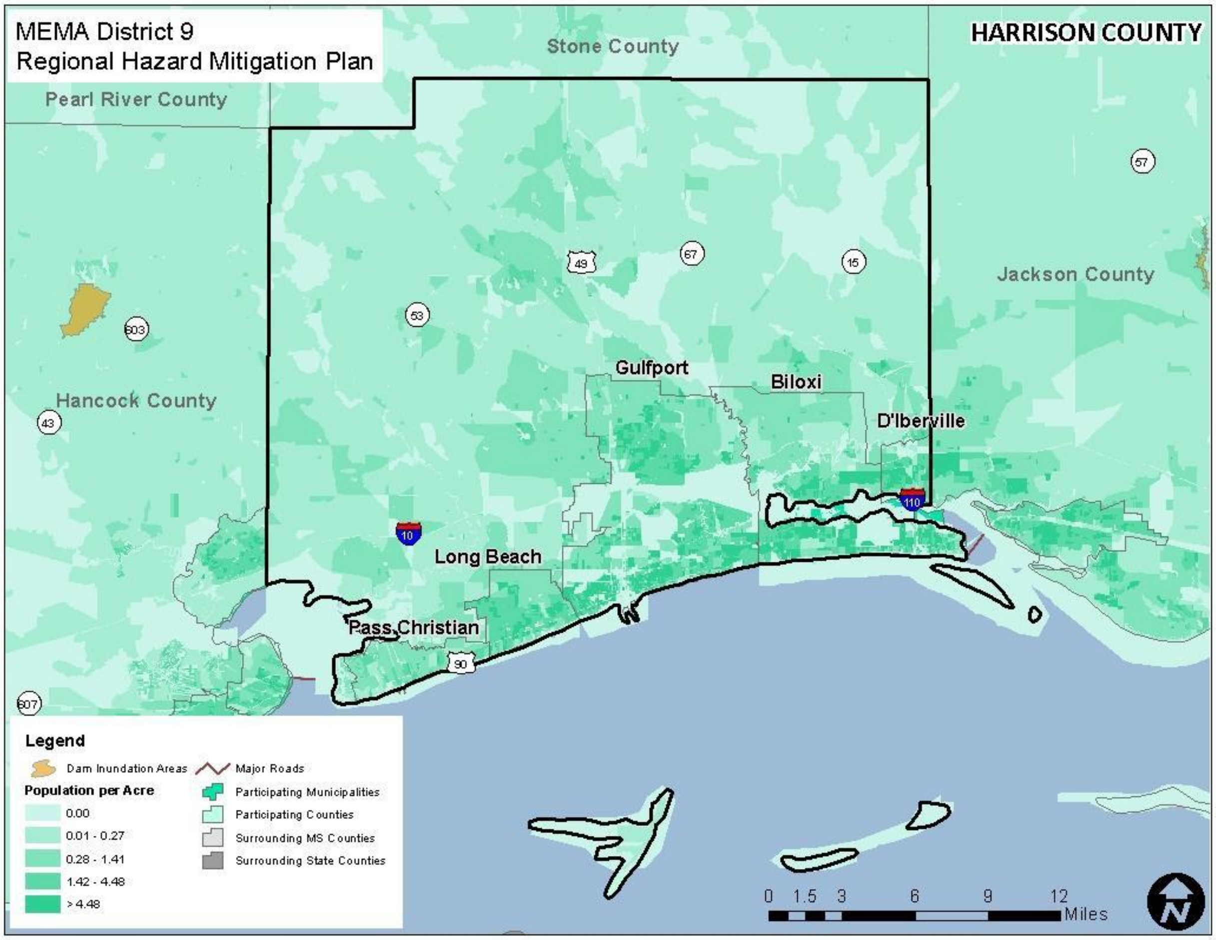
TABLE C.80: ESTIMATED EXPOSURE OF IMPROVEMENTS TO THE DAM/LEVEE FAILURE HAZARD

Location	Dam Inundation Area	
	Approx. Number of Buildings	Approx. Improved Value
Biloxi	0	$0
D'Iberville	0	$0
Gulfport	0	$0
Long Beach	0	$0
Pass Christian	0	$0
Unincorporated Area	0	$0
HARRISON COUNTY TOTAL	0	$0

Source: MDEQ, Hazus 3.2

Social Vulnerability
Figure C.42 is presented to gain a better understanding of at-risk population by evaluating census block level population data against dam inundation areas. There are no areas of concern in the county and it should be noted that most of the population of the region is not at risk to a dam/levee failure.

FIGURE C.42: POPULATION DENSITY NEAR DAM INUNDATION AREAS IN HARRISON COUNTY



Source: MDEQ, United States Census 2010

Critical Facilities
The critical facility analysis revealed that there are no facilities located in dam inundation areas. A list of specific critical facilities and their associated risk can be found in Table C.84 at the end of this subsection.

In conclusion, a dam does not have the potential to impact existing and future buildings, facilities, and populations in Harrison County, though this analysis is not all-encompassing in terms of risk to a dam or levee failure because inundation mapping is not available for all dams in the region.

CLIMATE CHANGE/SEA LEVEL RISE

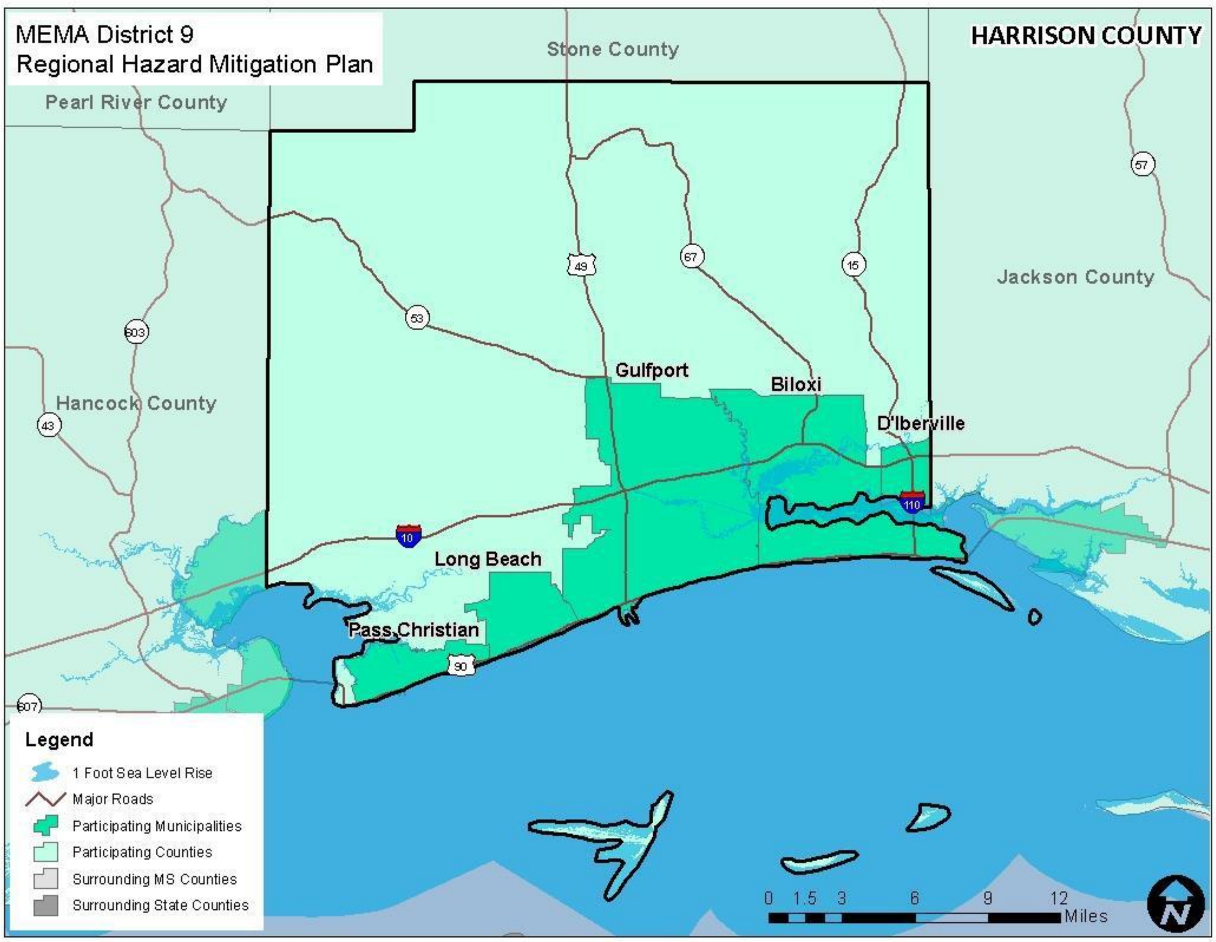
Most assessments carried out across the globe have concluded that climate change is a phenomenon that will impact our planet in the foreseeable future. Among others, the National Climate Assessment, International Panel on Climate Change, and National Oceanic and Atmospheric Administration all project that climate change will impact the United

States and will have a major impact on coastal communities due to the effects of sea level rise. As such, projections concerning sea level rise are important to incorporate into planning efforts in order to identify people and property that may be impacted.

In order to assess sea level rise risk, a GIS-based analysis was used to estimate exposure to future projections of sea level rise using data produced by the National Oceanic and Atmospheric Administration in combination with improved property records for the county. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within the inundation zone that would be created in the event of 1 foot, 3 feet, and 6 feet of sea level rise. A number of different sea level rise scenarios were available via NOAA (from 1 foot to 6 feet, at 1 foot intervals), however these scenarios were selected to demonstrate a range of potential sea level rise scenarios from low to moderate to high projections. These scenarios can be found in Figure C.43, Figure C.44, and Figure C.45.

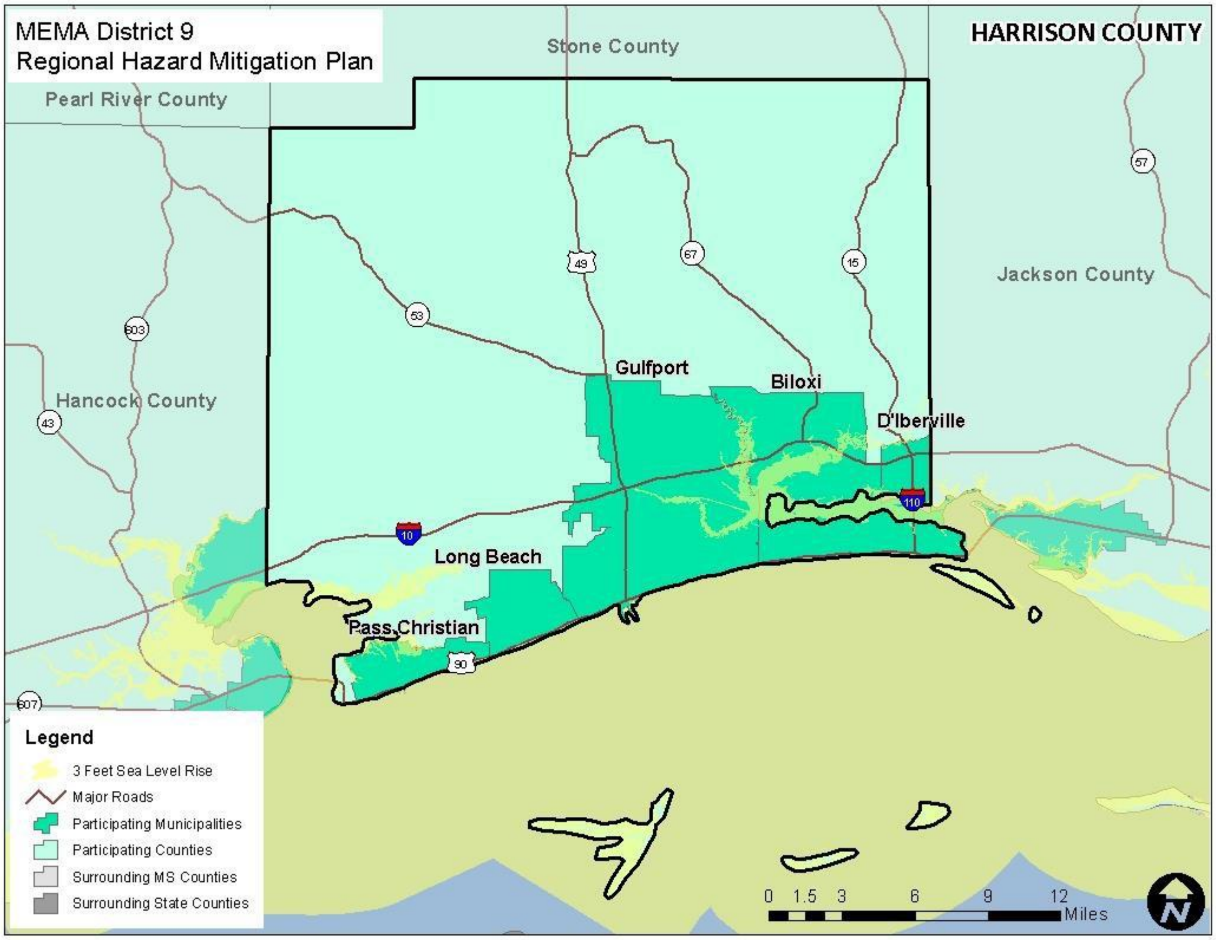
Table C.81 presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

FIGURE C.43: 1 FOOT SEA LEVEL RISE SCENARIO IN HARRISON COUNTY



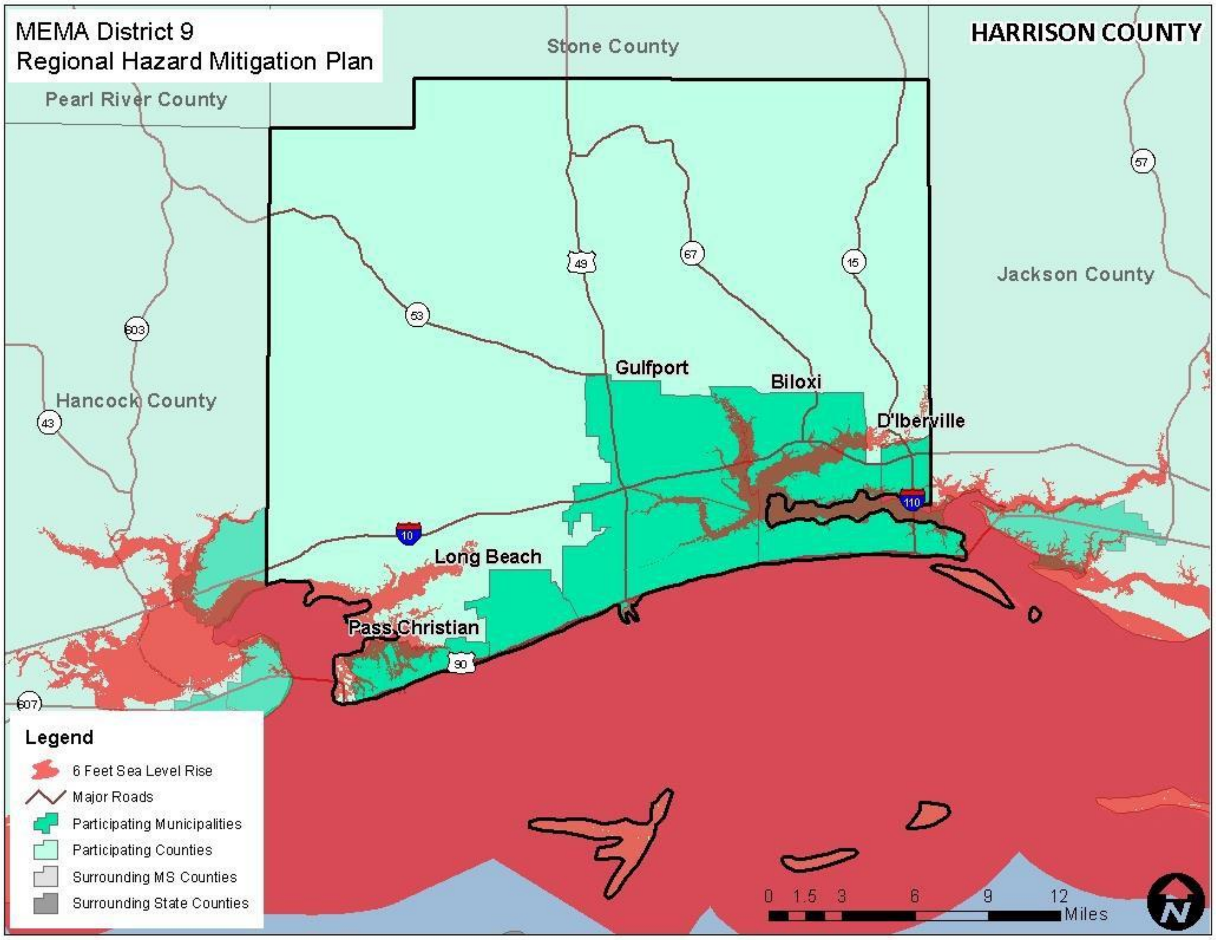
Source: NOAA

FIGURE C.44: 3 FEET SEA LEVEL RISE SCENARIO IN HARRISON COUNTY



Source: NOAA

FIGURE C.45: 6 FEET SEA LEVEL RISE SCENARIO IN HARRISON COUNTY



Source: NOAA

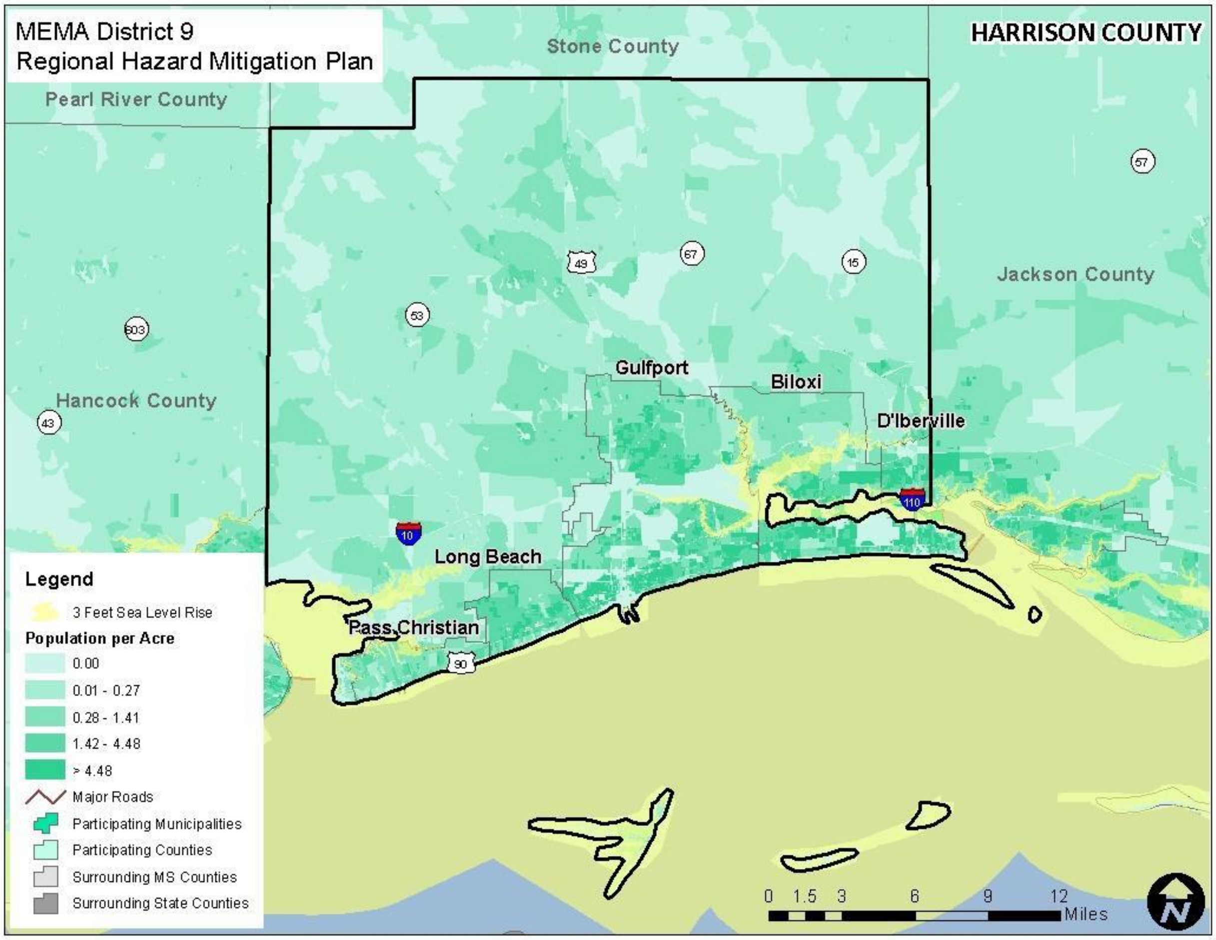
TABLE C.81: ESTIMATED EXPOSURE OF PARCELS TO THE SEA LEVEL RISE HAZARD

Location	1.0 foot		3.0 feet		6.0 feet	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Biloxi	141	$152,875,152	217	$160,571,178	574	$253,581,853
D'Iberville	3	$88,805	3	$88,805	37	$3,062,657
Gulfport	104	$13,795,779	202	$20,682,997	542	$52,554,190
Long Beach	0	$0	0	$0	0	$0
Pass Christian	36	$3,060,166	122	$11,788,951	701	$46,934,462
Unincorporated Area	265	$475,712,940	523	$498,030,811	1,872	$584,772,990
HARRISON COUNTY TOTAL	406	$628,588,092	740	$658,601,989	2,446	$838,354,843

Source: NOAA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability
Figure C.46 is presented to gain a better understanding of at-risk population by evaluating census block level population data against the 3 feet sea level rise scenario. The three feet scenario was selected since this is a moderate level projection. Based on this analysis, parts of the coastal population in the county are vulnerable to sea level rise.

FIGURE C.46: POPULATION DENSITY WITH 3 FEET SEA LEVEL RISE IN HARRISON COUNTY



Source: NOAA, United States Census 2010

Critical Facilities
The critical facility analysis revealed that there are 15 facilities located in the 3 feet of sea level rise scenario inundation area. As mentioned above, this scenario was selected as it is a mid-range projection for sea level rise based on a number of studies. The 15 facilities include 2 private/non-profit, 2 public facilities, 9 transportation, and 2 water/wastewater. A list of specific critical facilities and their associated risk can be found in Table C.84 at the end of this subsection.

CONCLUSIONS ON HAZARD VULNERABILITY

Table C.82 presents an overall summary of the community's vulnerability for each jurisdiction. This summary provides key problem statements and identifies the community's greatest vulnerabilities that will be addressed in the mitigation strategy.

TABLE C.82: SUMMARY OF VULNERABILITY FOR HARRISON COUNTY

	Key Problem Statements
Harrison County	Harrison County, Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian have many low-lying neighborhoods and streets that are especially vulnerable to coastal flooding and storm surge. Vulnerable and at-risk populations including low-income, minority, elderly, or disabled persons disproportionately live in flood prone areas. Additionally, many employers like casinos, resorts, and hotels are located in these vulnerable locations. Disruption or loss of these employers and facilities can result in significant unemployment, economic loss, and migration from the county and cities.

Table C.83 presents a summary of annualized loss for each hazard in Harrison County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the county.

It should also be noted that many of these estimates are based on incomplete data and likely underestimate the historic dollar damage sustained in each county. Especially for hazards such as extreme cold, extreme heat, hail, lightning, and winter weather, it is very likely that more damage occurred historically than has been identified.

TABLE C.83: ANNUALIZED LOSS FOR HARRISON COUNTY

Hazard	Harrison County
Flood-related Hazards	
Dam and Levee Failure	Not Available
Erosion	Not Available
Flood	$286,743
Storm Surge	$534,440,188
Fire-related Hazards	
Drought	Not Available
Lightning	$22,238
Wildfire	Not Available
Geologic Hazards	
Earthquake†	$21,000
Wind-related Hazards	
Extreme Cold	$0
Extreme Heat/Heat Wave	Not Available

Hailstorm	$0

Hazard	Harrison County
Hurricane and Tropical Storm	$208,420,678
Severe Thunderstorm/High Wind	$38,753
Tornado	$4,472,901
Winter Weather	Not Available
Climate Change/Sea Level Rise	Not Available
Hazardous Materials Incident/Train Derailment	$11,489
Infectious Disease	Not Available

†Historic dollar damage was not available for this hazard, but since estimated annualized losses from Hazus were available, those numbers were used in this table.
*In this table, the term "Not Available" is used to indicate that no records of dollar losses for the particular hazard were recorded. This could be the case either because there were no events that caused dollar damage or because documentation of that particular type of event is not well kept.

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to impacts from atmospheric hazards such as drought and hailstorm. Some buildings may be more vulnerable to some of these hazards based on locations, construction, and building type. In addition, all populations are vulnerable to hazards like infectious disease which could presumably impact any segment of the population without regard to geographic location. Table C.84 shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "X").

For a full listing of at-risk assets throughout Harrison County please click the below link:

MEMA_District9_Hazard_TabularData.xlsx

HARRISON COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Harrison County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: Capability Assessment.

Planning and Regulatory Capability

Table C.85 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Harrison County. An x (x) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. A dagger (†) indicates that the given item is administered for that municipality by the county. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the MEMA District 9 Regional Hazard Mitigation Plan.

TABLE C.85: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Threat and Hazard Identification and Risk Assessment (THIRA)	Comprehensive Land Use Plan	Floodplain Management Plan/Flood Mitigation Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Emergency Management Accreditation Program (EMAP Accreditation)	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment/ Reconstruction Plan/ Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System (CRS
HARRISON COUNTY	x		x	x	x	x	x	x	x			x	x		x		x	x	x			x	x	x	x
Biloxi	x		x	x		x	†		x			†			†		x	x	x	x		x	x	x	x
D'Iberville	x		x			x			x		x	†			†		x	x	x			x	x	x	x
Gulfport	x		x	x		x	†		x			†			†		x	x	x			x	x	x	x
Long Beach	x		x	x		x	†		x			†		x	†		x	x	x			x	x	x	x
Pass Christian	x		x	x		x	†		x			†		x	†		x	x	x			x	x	x	x

A more detailed discussion on the county's planning and regulatory capabilities follows.

EMERGENCY MANAGEMENT

Hazard Mitigation Plan
Harrison County has previously adopted a hazard mitigation plan. The cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian have also previously adopted municipal-level hazard mitigation plans.

Disaster Recovery Plan
Harrison County has adopted a disaster recovery plan. The United Way of South Mississippi is the lead partner with Harrison County to manage the county's long-term community recovery plan.

Emergency Operations Plan
Harrison County maintains an emergency operations plan through its Emergency Management Agency. The cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian have also each adopted a municipal-level emergency operations plan.

Continuity of Operations Plan
The City of D'Iberville is the only jurisdiction in Harrison County that has adopted a continuity of operations plan.

Flood Response Plan
Harrison County has adopted a flood response plan.

GENERAL PLANNING

Comprehensive Land Use Plan
Harrison County has adopted a county comprehensive land use plan. The cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian have also adopted municipal comprehensive plans.

Capital Improvements Plan
Harrison County has not adopted a capital improvements plan. However, the cities of Long Beach and Pass Christian have both adopted capital improvements plans.

Historic Preservation Plan
Neither Harrison County nor any of its participating municipalities have a historic preservation plan. However, the cities of Biloxi, Gulfport, and Pass Christian have each adopted a historic preservation ordinance.

Zoning Ordinance
Harrison County and the cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian have each adopted a zoning ordinance. The City of Biloxi includes zoning regulations as part of its local unified development ordinance. The remaining jurisdictions have adopted stand-alone zoning ordinances.

Subdivision Ordinance
Harrison County and the cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian have each adopted a subdivision ordinance. The City of Biloxi includes subdivision regulations as part of its local unified development ordinance. The remaining jurisdictions have adopted stand-alone subdivision ordinances.

Building Codes, Permitting, and Inspections
After Hurricane Katrina, Mississippi Legislature mandated the adoption of the International Building Code and International Residential Code in five coastal counties including Harrison County. The cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian have also adopted building codes.

FLOODPLAIN MANAGEMENT

Table C.86 provides NFIP policy and claim information for each participating jurisdiction in Harrison County.

TABLE C.86: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
HARRISON COUNTY†	06/15/78	06/16/09	2,640	$729,495,100	3,224	$261,560,972
Biloxi	09/11/70	06/16/09	5,206	$1,397,946,300	2,293	$253,008,756
D'Iberville	11/14/88	06/16/09	515	$146,053,100	27	$1,939,357
Gulfport	09/11/70	06/16/09	5,267	$1,410,675,000	3,078	$285,499,409
Long Beach	09/11/70	06/16/09	1,735	$482,745,600	1,505	$152,511,425
Pass Christian	05/26/70	06/16/09	2,093	$541,527,600	2,550	$323,619,220

†Includes unincorporated areas of county only
Source: NFIP Community Status information as of 1/10/2017; NFIP claims and policy information as of 10/31/2016

Community Rating System
Harrison County (Class 6) as well as the cities of Biloxi (Class 5), D'Iberville (Class 6), Gulfport (Class 7), Long Beach (Class 8), and Pass Christian (Class 7) participate in the CRS.

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Harrison County and the cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian all participate in the NFIP and have adopted flood damage prevention ordinances.

Floodplain Management Plan
Harrison County has adopted a floodplain management plan to help prevent damages associated with flooding and flood loss. The cities of Biloxi, Gulfport, Long Beach, and Pass Christian have also adopted floodplain management plans.

Open Space Management Plan
Harrison County has adopted a county parks and recreation master plan as well as a heritage trails blueways/greenways plan.

Stormwater Management Plan
The cities of D'Iberville, Gulfport, and Long Beach have each adopted a stormwater management plan. Harrison County and the cities of Biloxi, D'Iberville, Long Beach, and Pass Christian have adopted local stormwater management ordinances.

Implement the substantial improvement/substantial damage provisions:
Damage Estimates are a part of the National Flood Insurance Program (NFIP). If a community participates in the NFIP, part of the responsibility of the local participating community is to perform damage estimates. These estimates are performed using a FEMA Substantial Damage Estimate software program. This program is used by the Mississippi Emergency Management Agency's (MEMA) Office of Mitigation Floodplain Management (FPM) Bureau to assist local communities in determining damage estimates as it relates to the NFIP. The FPM Bureau is tasked with assisting local communities with the training and deployment of the SDE program. Local building officials/Stormwater management and floodplain managers for each participating jurisdiction are responsible for ensuring that the substantial improvement/substantial damage provisions are implemented following a flood related event within their respective jurisdiction. The local officials will ensure that all NFIP criteria/requirements are implemented and met following a flood event, local officials will work with FEMA to ensure proper documentation/designations are made and properly recorded for structures deemed substantially damaged during an event.

Administrative and Technical Capability

Table C.87 provides a summary of the capability assessment results for Harrison County with regard to relevant staff and personnel resources. An x (x) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill. A dagger (†) indicates a county-level staff member(s) provides the specified knowledge or skill to that municipality.

TABLE C.87: RELEVANT STAFF/PERSONNEL RESOURCES

Staff/Personnel Resource	Planners with knowledge of land development/land management	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human- caused hazards	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
HARRISON COUNTY	x	x	x	x	x	x	x	x	x	
Biloxi	x	x	x	x	x		†	x	x	
D'Iberville	x	x	x	†	x		†	x	x	
Gulfport	x	x	x	x	x		†	x	x	
Long Beach	x	x	x	x	x		†	x	†	x

Pass Christian	x	x	x	†	x		†	x	†	

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

Fiscal Capability

Table C.88 provides a summary of the results for Harrison County with regard to relevant fiscal resources. An x (x) indicates that the given fiscal resource has previously been used to implement hazard mitigation actions. A dagger (†) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

TABLE C.88: RELEVANT FISCAL RESOURCES

Fiscal Tool/Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: HMGP and other federal, state, and private grants/resources
HARRISON COUNTY	†	†	†	†				†	†	x
Biloxi	†								†	x
D'Iberville									†	†
Gulfport	†	†	†						†	x
Long Beach		†	†						†	x
Pass Christian					†				†	x

Political Capability

During the months immediately following a disaster, local public opinion in Harrison County is more likely to shift in support of hazard mitigation efforts.

Table C.89 provides a summary of the results for Harrison County with regard to political capability. An x (x) indicates the expected degree of political support by local elected officials in terms of adopting/funding information.

TABLE C.89: LOCAL POLITICAL SUPPORT

Political Support	Limited	Moderate	High
HARRISON COUNTY			x
Biloxi			x
D'Iberville			x
Gulfport			x
Long Beach			x
Pass Christian			x

Conclusions on Local Capability

Table C.90 shows the results of the capability assessment using the designed scoring methodology described in Section 7: Capability Assessment. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. This information was reviewed by all jurisdictions and each jurisdiction provided feedback on the information included in the capability assessment. Local government input was vital to identifying capabilities. According to the assessment, the average local capability score for the county and its jurisdictions is 50.3, which falls into the high capability ranking.

TABLE C.90: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
HARRISON COUNTY	61	High
Biloxi	49	Moderate
D'Iberville	43	Moderate
Gulfport	50	High
Long Beach	51	High
Pass Christian	48	Moderate

SECTION 18 HARRISON COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Harrison County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Council and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: Mitigation Strategy and Section 9: Mitigation Action Plan.

Mitigation Goals

Harrison County developed nine mitigation goals in coordination with the other participating MEMA District 9 Region jurisdictions. The regional mitigation goals are presented in Table C.91.

TABLE C.91: MEMA DISTRICT 9 REGIONAL MITIGATION GOALS

	Goal
Goal #1	Minimize risk and vulnerability of the community to hazards. Objective 1: Improve understanding of hazard risks through monitoring and assessment projects.
Goal #2	Minimize loss of life, injury, and damages to property, the economy, and the environment. Objective 1: Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment. Objective 2: Improve hazard assessment information to make recommendations for encouraging higher standards for safer development in areas vulnerable to natural and technological hazards. Objective 3: Implement sustainable activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resilient to natural and technological hazards.
Goal #3	Minimize loss to critical facilities and infrastructure, utilities, and services. Objective 1: Prioritize mitigation projects for critical facilities, services, and infrastructure.
Goal #4	Improve, expand, and enhance public education, awareness, and preparedness. Objective 1: Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.
Goal #5	Build and enhance local mitigation capabilities to improve the region’s ability to prepare for, respond to, and recover. Objective 1: Strengthen communication and coordinate participation among and within public agencies, community members, non-profit organizations, business, and industry to gain a vested interest in implementation.
Goal #6	Enter into partnerships with neighboring jurisdictions, federal and state agencies, and others to share information and develop a more hazard resistant community. Objective 1: Encourage leadership within the public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.
Goal #7	Enhance response procedures and emergency management capabilities. Objective 1: Coordinate and integrate natural and technological hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
Goal #8	Reduce economic losses, minimize social disruptions, and maintain quality of life. Objective 1: Reduce losses and repetitive damages for hazard events while promoting insurance coverage for catastrophic hazards.
Goal #9	Protect the environment and natural resources. Objective 1: Preserve, rehabilitate, re-establish, and enhance natural systems to serve natural hazard mitigation functions.

Mitigation Plan Action

The mitigation actions proposed by Harrison County and the cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian are listed in the following individual Mitigation Action Plans.

Harrison County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Identify resources that are available to be shared between municipalities and the county.	Hurricane, Flood, Thunderstorm, Tornado, All Severe Weather	High	Harrison County Emergency Management	N/A	2027	Ongoing
P-2	Build partnerships to share resources.	All	High	Harrison County Emergency Management	N/A	2027	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-3	Identify cross ownership and multi- jurisdictional issues related to flood hazards.	Flood	High	Harrison County Planning and Zoning Department	N/!	2027	Ongoing
P-4	Continue support of the U.S. Army Corps of Engineers study of the Turkey Creek Drainage area and implement recommendations made in the study.	Flood	Moderate	Harrison County Board of Supervisors	U.S. Army Corps of Engineers	2025	Ongoing contingent upon funding
P-5	Develop a data network that provides “real-time” information from data generated through the county building permit program.	Hurricane, Flood	Moderate	Harrison County Data center	Department of Transportation, general revenues	2025	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-6	Adopt Smart Growth policies.	All	Low	Harrison County Board of Supervisors	N/A	2025	Ongoing
P-7	Develop regulatory standards for floodplain management that go beyond the minimum standards of the NFIP.	Flood, Hurricane	Moderate	Harrison County Building Code Administration and Building Official	N/A	2027	Completed/Ongoing
P-8	Develop local, city, and county wetlands regulations that provide the “intent” of the regulations for flood storage (available for CRS credit).	Flood	High	Harrison County Planning and Zoning Department; Planning Departments and Planning Commissions of Biloxi, Gulfport, Long Beach, D’Iberville, and Pass Christian	N/A	2027	Completed/Ongoing

P-10	Continue enforcement of the Zoning Ordinance and amend the ordinance as necessary.	Flood	High	Harrison County Zoning Department and Planning Commission	N/A	2027	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-11	Develop subdivision regulations that require a lower number of lots in order to be reviewed.	Flood	Low	Harrison County Planning Commission; Zoning Department; Engineering Department	N/A	2027	Ongoing
P-12	Adopt the current International Building Code.	Hurricane, Tornado, Thunderstorm, High Wind, Lightning	Moderate	Harrison County Code Administration	N/A	2027	Ongoing
P-13	Encourage plantings of live oak trees on public and private properties.	Hurricane, Flood	Moderate	Harrison County Beautification Department; Municipal Beautification Departments	MS Department of Transportation, general revenues, private funding	2027	Ongoing

P-14	Develop a county-wide Stormwater Plan.	Flood	Moderate	Harrison County Wastewater District	Coastal Impact Assistance Program, general revenues	2025	Completed/Ongoing updates

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-15	Require final inspection by a qualified engineer on behalf of the local government for stormwater conveyances.	Flood	Moderate	Harrison County Board of Supervisors; Cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian	N/A	2027	Ongoing
P-16	Request authority for the Health Department to issue final approval of installed individual onsite wastewater disposal systems.	Flood	Moderate	Mississippi State Department of Health	N/A	2027	Ongoing
P-17	Encourage and keep record of the elevations of homes, bridges, roads, and reference marks.	Flood	High	Harrison County Engineer; CRS Coordinator	General revenues	2027	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-18	Continue to assist FEMA in mapping floodplains by requesting map updates as needed.	Flood	Moderate	Harrison County Emergency Management; Harrison County Board of Supervisors	General revenues, Hazard Mitigation funding	2027	Maps updated 2016, Ongoing Updates
P-19	Develop cross platform mobile device accessible web mapping applications to be used for post-disaster reconnaissance, asset inventory, and damage assessments.	All	Moderate	Harrison County GIS Department	Capital budget, Harrison County GIS Coalition	2025	Partially completed/Ongoing
P-20	Develop and maintain GIS database to track county and city vulnerability (exposure to known hazard areas) through coordination with subject- matter experts and the Harrison County GIS Coalition (HCGISC).	All	Moderate	Harrison County GIS Department; Harrison County Emergency Management Agency	Capital budget, Harrison County GIS Coalition	2025	Completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-21	Implement a county-wide database of utility infrastructure showing geographic location of underground and surface level water and sewer assets. This database will include municipalities. This will enhance the ability during a declared emergency to determine affected assets during surge/flood events.	All	Moderate	Harrison County GIS Department; Harrison County Emergency Management Agency	Capital budget, Harrison County GIS Coalition	2025	Completed/Ongoing updates
P-22	Implement a county-wide database of physical address locations and structures types for rapid spatial analysis of disaster affected properties to determine damage assessments for number of structures by type and estimated values.	All	Moderate	Harrison County GIS Department; Harrison County Emergency Management Agency	Capital budget, Harrison County GIS Coalition	2025	Partially completed/Ongoing
Property Protection							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-1	Continue to participate in the Hazard Mitigation Grant Program to purchase and elevation structures that are repeatedly flooded.	Flood, Hurricane	Moderate	Harrison County Board of Supervisors, Cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian	Hazard Mitigation Grant funds, Flood Mitigation Assistant Program funds, Pre-disaster Mitigation Grant Program	2028	Partially completed/Ongoing
PP-3	Encourage safe room construction in all new structures or substantially improved structures. To include a new EOC/EMA Office (Safe Room) outside the Historic Flood Zone of Downtown Gulfport.	Hurricane, Tornado, Flood, Thunderstorm, High Wind, Lightning, Hail	Moderate	Harrison County Emergency Management	Local, State, Federal	2027	Partially completed/Ongoing
PP-4	Install storm shutters to protect exterior of ambulance service headquarters, dispatch, and personnel area.	Hurricane, Tornado	Moderate	Harrison County American Medical Response	Grant, state funds	2025	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Build out a functional Sheriff's Work Center by installing a 125 kw generator to power inmate housing, kitchen, vehicle maintenance center	All	High	Harrison County Inmate Work Center	Local	2025	Partially completed/Ongoing
PP-6	Construct a new county Emergency Operations Center that is located in a non-flood impact area and which incorporates protection from wind and other hazards to the greatest extent possible	All	High	Harrison County Emergency Management	Hazard Mitigation Grant Funds, Pre-disaster Mitigation Grant Program, Capital Budget	2027	Ongoing contingent on funding
PP-7	Increase stormwater flow capacity along roadways and other critical infrastructure in areas of high flood risk.	Flood, Severe Weather, Tropical Storm Hurricane	High	Harrison County Engineering	BRIC	2027	New
Natural Resource Protection							
NRP-1	Continue to maintain the sand beach.	Hurricane, Flood, High Wind	High	Harrison County Sand Beach Authority	General revenues, USACE	2028	Ongoing

NRP-2	Petition the Secretary of State for tax delinquent properties that lie in the floodplain that may contribute to flood storage, stormwater control, and linked green space. Establish a cooperative maintenance agreement among the communities for the maintenance of these properties.	Flood	Moderate	Community Development; Planning and Recreation Departments of Harrison County and the Cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian	N/A	2025	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
NRP-3	Encourage acquisition or donation of conservation easements and properties in environmentally sensitive areas.	Flood	Moderate	Harrison County Board of Supervisors	N/A	2028	Ongoing
NRP-4	Encourage dune propagation in areas where the seawall is below 10 feet (NGVD).	Hurricane, Flood, High Wind	High	Harrison County Sand Beach Authority	N/A	2028	Ongoing
Structural Projects							
SP-1	Improve East-West Corridor transportation infrastructure to ensure adequate evacuation clearance times.	Hurricane	Moderate	Harrison County Transportation Authority	Department of Transportation, general revenues	2024	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-2	Improve North-South Connector in Biloxi transportation infrastructure to ensure adequate evacuation clearance times.	Hurricane	Moderate	Mississippi Department of Transportation	Federal Highway Funds, MS Department of Transportation Funds	2024	Ongoing
SP-3	Improve North-South Connector in western Harrison County transportation infrastructure to ensure adequate evacuation clearance times.	Hurricane	Moderate	Harrison County Board of Supervisors	Federal Highway Funds, MS Department of Transportation Funds	2024	Ongoing
Emergency Services							
ES-1	Increase above ground fuel storage capacity by at least 12,000 gallons for generators at Memorial Hospital. This would allow fuel capacity operation for 96 hours without replenishment.	All	High	Memorial Hospital	Mitigation Grant, Capital Budget monies	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-2	Increase generator capacity at Memorial Hospital to provide sustained uninterrupted patient care before, during, and after an emergency event.	All	High	Memorial Hospital	Mitigation Grant, Capital Budget monies	2028	Ongoing contingent upon funding
ES-3	Continue to participate in Hazard Mitigation Grant Program to build 361 community shelters (shelters that meet the requirements of FEMA Publication 361: Design and Construction Guidance for Community Shelters) and stand alone within Harrison County for shelter up to 45% of population.	All	Moderate	Harrison County Emergency Management Agency; Harrison County Board of Supervisors; Harrison County School District	General revenues, federal match, grants	2026	Partially completed/ Ongoing contingent upon funding
ES-4	Seek Hazard Mitigation funds to provide generator power back up systems, and retrofit county and city- owned critical facilities to meet extreme wind standards.	All	High	Harrison County Emergency Management Agency; Harrison County Board of Supervisors; Harrison County School	General revenues, Hazard Mitigation funding	2028	Partially completed/ Ongoing contingent upon funding

				District			

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-5	Implement a county-wide database of emergency response inventory showing geographic location and emergency point of contact that includes equipment, supplies, and personnel.	All	High	Harrison County GIS Department, Emergency Management Agency, Board of Supervisors	Capital budget, Harrison County GIS Coalition	2025	Partially completed/Ongoing
ES-6	Enhance Reverse 911 and cell phone registration with web applications and emergency alerts as part of the multiple pre-working systems and expand to cover high risk areas not covered.	All	High	Harrison County Board of Supervisors, Emergency Management Agency, IT	MEMA, private donations from cellular companies	2028	Partially completed/Ongoing
ES-7	Establish evacuation routes to include a north-south transportation evacuation corridor in west Harrison County.	Hurricane, Tropical Storm, Flood	Moderate	Harrison County Transportation Authority, Planning Commission	MS Dept. of Transportation	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-8	Develop a plan that defines and clarifies Special Needs as it relates to evacuation and sheltering throughout Emergency Management Services.	All	High	Emergency Management Agency, Dept. of Health, local hospitals, Red Cross	MEMA	2024	Partially completed/Ongoing
ES-9	Expand the use of weather radios as part of the multiple pre-working systems and expand to cover high risk areas not covered.	All	High	Emergency Management Agency, Board of Supervisors	MEMA, private donations	2028	Ongoing
ES-10	Continue development of water supply in rural areas in order to service wildfires to protect homes, large timberland, and schools located in rural areas.	Wildfire	Moderate	Harrison County Board of Supervisors, Waterwise, Utility Authority District; MS Development Authority	WaterSMART Water and Energy Efficient Grant funding, Alliance Grants	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-11	Expand the current Flood Warning System to include: GIS mapping of developments and inundation areas to inform warning system and ability to access data through online viewer; further define special needs and include in warning system as a separate criterion for warning; provide public education and outreach for how the system works and who will be informed and criteria for implementing system; and broaden warning mechanisms to include TV messages and social media outlets, include school districts as agency for dismissal or holding during a flood hazard.	All	Moderate	Harrison County Emergency Management Agency, Code Enforcement	Capital budget, in- house	2028	Partially completed/Ongoing
ES-12	Construct a 10,000 square foot Emergency Operations Center that will be strategically located within the county to assist in preparing for and responding to future natural hazards.	All	High	Board of Supervisors, Emergency Management Agency	TBS	2028	Ongoing contingent upon funding
ES-13	Add bi-fuel capability for existing hospital generators to utilize natural gas as an alternate fuel source.	All	High	Memorial Hospital	Mitigation Grant, Capital Budget monies	2026	Ongoing contingent upon funding
Public Education and Awareness							

PEA-1	Establish an education program to promote the CRS program.	Flood	Moderate	Harrison County Building Department	General revenues	2024	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Create an education outreach program to encourage better design.	Flood	Low	Mississippi Department of Marine Resources	DEQ, EPA, Conference Fees	2024, Annually	Ongoing
PEA-3	Set up booths/displays for mitigation activities at Homeowners Show and building suppliers. Initiate an annual county-wide hurricane fair.	Hurricane, Flood, High Wind	Moderate	Harrison County Emergency Management	General revenues	2025	Ongoing Annually
PEA-4	Prepare and implement construction workshops with builders.	Hurricane, Tornado, Flood, High Wind	Low	Building Officials from Harrison County and Cities of Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian	N/A	2028	Ongoing
PEA-5	Find funds to develop a model project that contractors and individuals can view.	Hurricane, Tornado, High Wind, Flood	Low	Harrison County Board of Supervisors	FEMA/MEMA, general revenues	2024	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-6	Continue support of Hurricane Museum.	Hurricane, High Wind, Tornado, Flood	Low	Harrison County Board of Supervisors; Mississippi Maritime and Seafood Industry Museum	General revenues	2028	Ongoing
PEA-7	Continue tourist outreach and education about potential hazards and evacuation.	Hurricane, High Wind, Flood	Low	Harrison County Emergency Management; Casino Operators	General revenues	2028	Ongoing
PEA-8	Continue distribution of military orientation package on hazard preparedness.	Hurricane, Tornado, Flood, High Wind	Moderate	Harrison County Emergency Management	General revenues	2028	Ongoing
PEA-9	Prepare an insert on hurricane, tropical storm, and flood preparedness for the Chamber’s newcomer packages.	Hurricane, Tornado, Flood, High Wind	Moderate	Harrison County Emergency Management	General revenues	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-10	Encourage individual residents to purchase and monitor NOAA weather radio broadcasts.	Hurricane, Tornado, Flood, Thunderstorm, High Wind, Lightning, Hail	Moderate	Harrison County Emergency Management Director; local media outlets	N/A	2028	Ongoing
PEA-11	Distribute current stock of disaster preparedness brochures. Print additional brochures. Schedule sessions with local civic groups to discuss preparedness. Provide printed training materials to least EMS agency for employees regarding special needs patients.	All	Moderate	Harrison County Emergency Management Agency	Grant, state funds	2028	Ongoing
PEA-12	Develop a public education outreach program to the public for wildfires procedures and protection. The first step in wildfire prevention education is to raise awareness of the responsibilities of living in a fire-prone environment, individual and community action can ensure that homes and neighborhoods are prepared for wildfire.	Wildfire	Moderate	Harrison County Fire Services; MS Forestry Commission	Firewise.org	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-13	Educate the public on warning system, 911 reverse system, and the importance of having a weather radio. Coordinate with non-profit organizations and VOAD.	All	High	Harrison County Board of Supervisors, Emergency Management Agency	MEMA, private donations from cellular companies	2024	Ongoing
PEA-14	Develop a Public Education Outreach program for education to the public for special needs evacuation and sheltering procedures.	All	High	Emergency Management Agency, Dept. of Health, local hospitals, Red Cross	MEMA	2025	Ongoing
PEA-15	Community education and outreach to develop and provide CEO multi- media services and material to inform residents and absentee property owners in Harrison County about community redevelopment and long- term recovery; natural hazard impacts and risks; hazard mitigation for homeowners and businesses; improved building codes, materials, and techniques; public safety; and property	All	Moderate	Emergency Management Agency, Board of Supervisors	FEMA/MEMA, Home Builders Association	2028	Ongoing

	insurance and insurance incentives.						

City of Biloxi Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Strictly enforce building and related codes to insure design and construction of new structures (building/infrastructure) will provide maximum protection against all hazards.	All	High	City of Biloxi Community Development, Public Works	Existing budget	2028	Ongoing
P-2	Continue to integrate mitigation strategies into the city's planning initiatives including their Comprehensive Plan, Ordinances, Capital Improvement Plans, etc. for all hazards.	All	High	City of Biloxi Community Development, Public Works	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-3	Maintain or improve the status of the City of Biloxi in the Community Rating System and the National Flood Insurance Program.	Flood	High	Community Development, Floodplain Manager	HMGP, existing budget	2028	Ongoing
P-4	Prevent unprotected and improper development in flood hazard areas through the improvement of existing regulations governing building and land development in Biloxi.	Flood	High	Community Development, Floodplain Manager	Existing budget	2028	Ongoing
P-5	Research the potential effects of sea level rise, coastal erosion, and salt water intrusion.	Tropical Storm, Erosion, Hurricane	Low	Public Works	To be determined	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-6	Develop regulation and educational materials for water preservation addressing potential issues that could be caused by drought conditions.	Drought	Moderate	Public Works	Existing budget	2028	Ongoing
P-7	Encourage private and public entities to develop and share Emergency Response Plans/Procedures with the city to improve preparedness and recovery procedures.	All	High	Community Development	Existing budget	2028	Ongoing
P-8	Develop Continuity of Operation Plan for city departments to address health and manmade-related incidents.	Manmade Hazards	High	All departments	EMGP, Homeland Security, existing budget	2024	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Conduct a Commodity Flow Study to identify hazards transported into and around the city or stored at fixed site locations.	Hazardous Materials	Moderate	Biloxi Fire Department	EMGP	2025	Ongoing
P-10	Update and/or develop SOPs for preparedness and response procedures for applicable health and man-made incidents.	Manmade Hazards	High	Biloxi Fire, Police, Public Works, Emergency Management	General budget	2028	Ongoing
P-11	Continue to enforce building codes, fire prevention codes, and other codes and ordinances that help reduce risks to the health, safety, and welfare of citizens and visitors.	Manmade Hazards	High	Biloxi Fire Department; Biloxi Community Development	General budget	2028	Ongoing
Property Protection							
PP-1	Storm proof and/or retrofit existing and new critical facilities and infrastructure.	All	High	City of Biloxi	HMGP, existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	Replace existing traffic signals at major intersections with more durable weather resistant mast arm poles. Install mast arm poles for future traffic improvement projects.	All	High	City of Biloxi Public Works	HMGP	2028	Ongoing
PP-3	Encourage home/business owners affected by flooding to protect existing and new properties with mitigation strategies such as flood insurance, elevation, floodproofing, structural protection, etc.	Flood	Moderate	City of Biloxi Community Development, Floodplain Manager	Existing budget	2028	Ongoing
PP-4	Reduce the number of repetitive losses and severity of flooding for residents of Biloxi with corresponding reduction in costs to federal, state, and local governments.	Flood	High	City of Biloxi Community Development	HMGP	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Retrofit public piers with improved building materials.	Tropical Storm, Hurricane	High		HMGP, existing budget	2028	Partially completed/Ongoing
PP-6	Retrofit/improve bridges.	Hurricane	Moderate	Biloxi Public Works	HMGP	2028	Partially completed/Ongoing
PP-7	Fortification/hardening of the new building for Station 7 on Popps Ferry Road. This will be to establish an improved municipal EOC in this building.	All	High	Biloxi Fire Department and Biloxi Emergency Management	HMGP, existing budget	TBD	Ongoing contingent upon funding
PP-8	Harden waterfront assets with stronger materials and barrier systems. Coliseum pier flow-through and Light House pier North stone jetty with flow through boards and concrete pilings.	Tropical Storm, Hurricane, Storm Surge	High	City of Biloxi Emergency Management Harrison County OEM	HMGP, BRIC, 404 &406	Summer 2024	New
PP-9	Construct new fire stations #8 at Woolmarket Rd and construct fire station #5 at 2499 Pass Rd.	All	High	Biloxi Fire	BRIC, CDBG, HUD	2028	New

PP-10	Construct new bridge at Cedar Lake.	Flood, Storm Surge, Sea Level Rise, Tropical Storm Hurricane	High	City of Biloxi	BRIC	2033	New
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	Continue to improve and upgrade drainage to reduce flooding.	Flood	High	Biloxi Department of Public Works	HMGP, existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-2	Explore road materials/signage for areas prone to limited visibility.	All Severe Weather	Moderate	Public Works	Existing budget	2028	Ongoing
Emergency Services							
ES-1	Evaluate the effectiveness of the outdoor siren system and track maintenance/performance issues.	All	High	Biloxi Emergency Management	Existing budget	2028	Completed/Ongoing
ES-2	Enhance evacuation routes throughout the city including appropriate signage designating evacuation corridors.	Hurricane, Costal Storm	Moderate	Biloxi Public Works	HMGP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-3	Continue to implement the Reverse 911 notification system and research new technology to improve notification procedures.	All	High	Biloxi Emergency Management	HMGP	2028	Ongoing
ES-4	Research and pursue alternative communication devices improving communication before, during, and after a disaster.	All	High	Biloxi Emergency Management	HMGP	2028	Ongoing
ES-5	Continue annual National Incident Management System training for first responders, city officials, and critical employees.	All	High	Biloxi Emergency Management	Existing budget	2028	Completed/Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-6	Continue to maintain and update the city's Comprehensive Emergency Management Plan (CEMP) and Standard Operating Procedures (SOP) for applicable departments. Provide overview for new employees and inform existing employees of changes.	All	High	Biloxi Fire and Police Departments	Existing budget	2028	Ongoing regular updates
ES-7	Purchase a 5-ton truck.	All	High	Biloxi Emergency Management	To be determined	2028	Ongoing contingent upon funding
ES-8	Secure generators ensuring continuous operation for existing and new critical facilities and infrastructure.	All	High	Biloxi Public Works	HMGP	2028	Ongoing contingent upon funding

ES-9	Conduct annual training exercise for potential manmade hazards.	Manmade Hazards	High	Biloxi Fire, Police, Emergency Management	Existing budget	2028	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-10	Continue to explore ways to enhance and improve training and equipment needs for the Biloxi Fire, Police, and Emergency Management Departments.	Manmade Hazards	High	Biloxi Fire and Police	Homeland Security, existing budget	2028	Ongoing
ES-11	Upgrade and improvements to the tornado/hurricane siren warning system located throughout the City of Biloxi.	Tornado, Severe Thunderstorm, Hurricane	High	Biloxi Fire Department and Biloxi Emergency Management	HMGP, existing budget	2025	Ongoing
Public Education and Awareness							
PEA-1	Continue outreach efforts to educate the public about the dangers of all hazards.	All	High	City of Biloxi Public Affairs	Current budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Promote the Firewise awareness program.	Wildfire	High	City of Biloxi Public Affairs	Current budget	2028	Ongoing
PEA-3	Provide all-hazard education and outreach to vulnerable populations.	All	High	City of Biloxi Public Affairs	Existing budget	2028	Ongoing
PEA-4	Work with the Chamber of Commerce and local civic groups to establish continuity in training workshops and distribute education information to new existing businesses.	All	High	Coastal Chamber of Commerce, Biloxi Bay Chamber	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Work with appropriate agencies to identify high risk areas and distribute educational information to residents and business owners.	Manmade Hazards	High	Biloxi Public Affairs	Existing budget	2028	Ongoing
PEA-6	Promote a mosquito control and West Nile Virus Prevention program.	Infectious Disease	High	City of Biloxi Public Affairs	Current budget	2028	Ongoing
PEA-7	Increase the number of hurricane preparedness outreach meetings for the community. This will be established to increase the points to our CRS program and to provide the community with flood insurance program and emergency preparedness information	Hurricane, Flood	High	Biloxi Fire Department and Community Development	Existing budget, outside sources	2024	Ongoing

City of D'Iberville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Continue to maintain and update the city's internal Hurricane Action Plan. Provide overview for new employees and inform existing employees of changes.	All	Moderate	City of D'Iberville	Existing budget	2028	Ongoing
P-2	Strictly enforce building and related codes to insure that design and construction of structures will provide maximum protection against hurricanes, floods, and other natural hazards.	All	High	FEMA	Existing budget	2028	Ongoing
P-3	Prevent unprotected and improper development in flood hazard areas and prohibit development in floodways through the improvement of existing regulations, ordinances, and plans governing building and land development in D'Iberville.	Flood	High	D'Iberville Floodplain Manager	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Continue to maintain elevation certificates for all post-FIRM structures.	Flood, Hurricane	High	D'Iberville Floodplain Manager, CRS Coordinator	Existing budget	2028	Ongoing
P-5	Insure that all properties affected by flooding have some form of protection i.e., flood insurance, elevation, floodproofing, structural protection. etc.	Flood, Hurricane, Storm Surge	High	D'Iberville Floodplain Manager	Existing budget	2028	Ongoing
P-6	Maintain or improve the status of the City of D'Iberville in the Community Rating System and the National Flood Insurance Program.	Flood, Hurricane	High	D'Iberville Floodplain Manager, CRS Coordinator	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Enhance the city's government services continuity plan to ensure that emergency operations within the city can function and that day-to-day operations can resume as soon as possible after an emergency.	All	High	D'Iberville City Manager, Mayor, Council	Existing budget	2028	Ongoing
P-8	Enhance the city's regulatory framework to reduce the risk of manmade hazards.	Man-made Hazards	High	City of D'Iberville	Existing budget	2024, Annual	Ongoing
Property Protection							
PP-1	Storm proof and retrofit critical facilities.	Hurricane, Flood	High	City of D'Iberville	HMGP, existing budget, other	2025	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	Replace existing traffic signals at major intersections with more durable and weather resistant mast arm poles.	Hurricane, Thunderstorm, Tornado	Moderate	City of D'Iberville	HMGP, existing budget, other	2025	Partially Completed/Ongoing
PP-3	Continue to encourage the retrofitting of repetitive loss structures within the city.	Hurricane, Tropical Storm, Tornado, Flood	High	City of D'Iberville Building Department	Existing budget	2028	Ongoing
PP-4	Promote the building of "safe rooms" in new construction and when remodeling existing structures.	Tornado	Low	FEMA	FEMA	2028	Ongoing

PP-5	Relocate all critical Assets from flood zones	Flood, Tropical Storm Hurricane Seal Level Rise	Medium	City of D'Iberville	HMGP, BRIC FMA	TBD	New
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Continue to improve and upgrade drainage to reduce flooding.	Flood, Hurricane	High	D'Iberville Public Works	Existing budget, HMGP	2024, Annual review	Ongoing
Emergency Services							
ES-1	Continue annual National Incident Management System training for first responders, city officials, and critical employees.	All	Moderate	City of D'Iberville	Existing budget	2028	Ongoing Annually
ES-2	Acquire an outdoor siren system.	Tornado, Hurricane, Thunderstorm, Man-made Hazards	High	MEMA, City of D'Iberville	Existing budget	2025	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-3	Continue to enhance evacuation routes throughout the city through placement and maintenance of appropriate signage.	Hurricane	Moderate	City of D'Iberville	Existing budget	2028	Ongoing
ES-4	Coordinate with the City of Biloxi to ensure consistency of evacuation plans for Interstate 10 through D'Iberville.	Hurricane	Moderate	City of D'Iberville	Existing budget	2028	Completed/Ongoing
ES-5	Continue to support and encourage Harrison County's effort to build multiple 361 shelters.	Hurricane	Moderate	Harrison County Emergency Management, Board of Supervisors	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-6	Secure generators to insure continuous operation for critical city facilities and utilities.	Hurricane, Thunderstorm, Winter Storm, Tornado	High	D'Iberville, MEMA	Existing budget	2028	Partially completed/Ongoing
ES-7	Conduct and participate in annual training exercise at major technological sites to increase preparedness in the event of an incident.	Man-made Hazards	Moderate	City of D'Iberville; American Medical Response; Keesler; others	Existing budget	2024, Annual	Ongoing
Public Education and Awareness							
PEA-1	Explore continuing education programs/opportunities for city staff and elected officials.	All	Moderate	City of D'Iberville	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Display hazard outreach materials in lobby of City Hall. Provide outreach materials at city functions and through city mailings.	Hurricane, Thunderstorm, Flood, River Erosion	Moderate	City of D'Iberville, CRS Coordinator	Existing budget	2024, Annual review	Ongoing
PEA-3	Provide hazard education and outreach to vulnerable and underserved populations.	All	Moderate	City of D'Iberville	Existing budget	2024	Ongoing
PEA-4	Develop and promote a wildfire awareness program.	Wildfire	Moderate	City of D'Iberville	Existing budget	2025	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Work with American Medical Response and Harrison County Emergency Management to educate senior citizens, disabled citizens, and special needs patients about the importance of having a personal evacuation plan.	Hurricane	Moderate	American Medical Response; Harrison County Emergency Management Agency	Existing budget	2028	Ongoing.
PEA-6	Enhance the city's elevation awareness program, posting flood elevation markers in flood-prone areas.	Tropical Storm, Flood, Storm Surge, Wave Action	High	City of D'Iberville Floodplain Manager, Building Department	Existing budget	2028	Ongoing
PEA-7	Expand outreach information to property owners regarding retrofitting and floodproofing techniques through community workshops, brochures, and newspaper articles.	Flood	High	City of D'Iberville Floodplain Manager, Building Department	Existing budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-8	Encourage local civic groups to establish continuity training workshops and education information to be distributed to new and existing businesses.	Hurricane	Moderate	Coast Chamber, Civic Organizations	Existing budget	2028	Ongoing
PEA-9	Work with appropriate agencies to identify high risk areas and distribute education information to residents and business owners.	Man-made Hazards	Moderate	City of D'Iberville	Existing budget	2028	Ongoing

City of Gulfport Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Continue participation in C-HOST Program.	Flood, Hurricane	High	Building Department	General budget	2028	Ongoing
P-2	Conduct a feasibility study to mitigate sewer and water lines that cross streams.	Hurricane, Flood	Low	Public Works, Engineering	General funds	2024	Partially completed/Ongoing
P-3	Require concurrence from all departments on projects through site plan.	All	High	Gulfport Building Department	General funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Partner with the Land Trust for the Coastal Mississippi Plain to preserve open space.	Flood and Erosion	High	Land Trust for the Coastal Mississippi Plain	Land Trust secures grants and private funding	2028	Ongoing
P-5	Continue to implement drainage standard operating procedure.	Flood	High	Public Works Director	General funds	2028	Ongoing
P-6	Implement maintenance program for storm water conveyance and detention structures dedicated to the city.	Flood	High	City Public Works Department	CDBG, CIAP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Work with county to determine long- term solutions to flooding along the Flat Branch, Turkey Creek, and Brickyard Bayou.	Flood	High	Building Office	US Army Corps of Engineers, US Environmental Protection Agency, HMGP	2028	Partially completed/Ongoing
P-8	Improve/maintain CRS rating and the NFIP Program.	Flood	High	Building Official	General budget	2028	Ongoing
P-9	Become a Firewise Community.	Wildfire	High	Fire Department	MFC, general budget	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-10	Continue to enforce the city burn ban.	Wildfire	High	City Fire Chief	Currently funds staff to implement	2028	Ongoing when applicable
P-11	Participate in local and statewide studies, workshops, and committees that address the all hazards prone to the Mississippi Coast.	All	High	Planning Department, Building Official, Emergency Manager	General budget	2028	Ongoing
P-12	Monitor water supply and establish conservation regulations.	Drought	Moderate	Public Works	General budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Update the city's Comprehensive Emergency Management Plan (CEMP).	All	High	Police/Fire Departments	Homeland Security, EMPG	2028	Completed/Ongoing regular updates
P-14	Update and implement the Master Drainage Plan.	Flood	High	City Engineer	General budget	2027	Completed/Ongoing regular updates
P-15	Continue to enforce/improve, as needed, the city's ordinances and regulations for all hazards.	All	High	Gulfport Building Office	General funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-16	Enforce the city's substantial damageand substantial improvement rule.	Flood and Hurricane	High	Building Official	General funds	2028	Ongoing
P-17	Require non-conversion agreements for enclosures below the base flood elevation.	Hurricane and Flood	High	Building Official	General funds	2028	Ongoing
P-18	Integrate mitigation in to local planning.	All	High	Planning and Zoning	General budget	2025	Ongoing during annual review and five-year updates

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-19	Conduct post-disaster Hazard Mitigation Committee meetings for declared events to assess the city's impacts to people and property.	All	High	Deputy Building Official and City Emergency Manager	General funds	2028	Ongoing following disasters
P-20	Conduct annual reviews of the hazard mitigation and flood protection plan.	All	High	Deputy Building Office and City Emergency Manager	General funds	2024, Annually	Ongoing
P-21	Pursue funding for mitigation actions.	All	High	Comptroller	General budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-22	Continue to mitigate educate mosquito control procedures.	Infectious Disease	High	Public Affairs, Public Works	General budget	2028	Ongoing
P-23	Develop a Commodity Flow Study.	Technological/ Man-made Hazards	High	Fire Department	HMGP	2024	Ongoing contingent upon funding
Property Protection							
PP-1	Storm proof new critical facilities and infrastructure.	All	High	Mayor and City Council	HMGP, CDBG	2028	Partially Completed/ Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	Retrofit existing critical facilities and infrastructure to be more resistant to all hazards.	All	High	City of Gulfport Comptroller	HMGP, CDBG	2028	Partially completed/ Ongoing contingent upon funding
PP-3	Replace cable hung traffic signals with mast arm signals along major highways.	Hurricane, Severe Storm, Tornado	High	MDOT, FHWA	FHWA, CDBG	2028	Partially completed/ Ongoing contingent upon funding
PP-4	Relocate/retrofit Gulfport's south wastewater treatment plant.	Hurricane, Flood	High	City of Gulfport	HMGP, MDEQ, CDBG, restore/recovery programs	2025	Ongoing contingent upon funding
PP-5	Complete the installation of Supervisory Control and Data Acquisition (SCADA) units.	All	High	Public Works Department	General funds	2024	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-6	Elevate/relocate bridges that provide access to neighborhoods to protect residents.	Flood, Hurricane	Moderate	Engineering	406, HMA, other federal/state transportation programs	2026	Partially completed/ Ongoing contingent upon funding
PP-7	Armor bridge approaches and abutments to prevent washouts.	Hurricane and Flood	Moderate	Mayor and City Council	406, HMA, other federal/state transportation programs	2028	Partially completed/ Ongoing contingent upon funding
PP-8	Upgrade the North Wastewater Treatment Plan to eliminate need for the South Plant.	All	High	Public Works, Engineering; Harrison County Wastewater	HMGP, MDEQ, restore program	2028	Ongoing contingent upon funding
PP-9	Retrofit city-owned piers/pavilions.	Hurricane, Flood, Severe Weather	Low	Public Works	HMGP, general funds	2028	Partially completed/ Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-10	Promote elevation/acquisition activities to residents/commercial owners located in the Special Flood Hazard Area.	Hurricane and Flood	High	City of Gulfport Planning Department	FMA	2028	Ongoing
PP-11	Create defensible space around structures and infrastructure.	Wildfire	High	Public Works	General funds	2028	Partially completed/ Ongoing contingent upon funding
PP-12	Install lightning grounding systems and lighting protection devices on critical sewer and water systems and city buildings.	Hurricane and All Severe Weather	Moderate	Public Works Department	General funds	2028	Partially complete/ Ongoing contingent upon funding

PP-12	Harden all fire station and city hall generators from lightning strikes with electronic protection systems	Lightning	High	City of Gulfport	Grant and General Funds	TBD	New

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
NRP-1	Support Harrison County's efforts to re-nourish the beach and implement beach protection measures.	Hurricane, Erosion, Flood	High	Harrison County Sand Beach Department and Board of Supervisors	Seawall Tax, local funds, funding through NOAA	2028	Ongoing
NRP-2	Support marsh restoration efforts.	Hurricane and Erosion	High	Harrison County Sand Beach	Tidelands funds, foundation funds, funding from NOAA, EPA, CIAP	2028	Ongoing
NRP-3	Support the restoration of the barrier islands.	Hurricane, Erosion	High	Department of Marine Resources	Coastal Impact Assistance Program, Tidelands Funds	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
NRP-4	Continue to enforce no wake zones and water speed limits.	Flood and Erosion	High	MDMR, Harrison County Sherriff, MDWFP	Not applicable	2028	Ongoing
Structural Projects							
SP-1	Promote/build detention ponds when appropriate.	Flood	High	Engineering Department	CDBG, included in new development funding	2028	Ongoing
SP-2	Upgrade drainage systems and culverts.	Flood	High	Engineering Department	HMGP, CDBG, CIAP funding, or as part of developer agreement	2028	Partially completed/ Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Install severe weather warning systems across the city.	All Severe Weather, Tornado	Moderate	Mayor, City Council, Engineering	HMGP	2024	Ongoing
ES-2	Install electronic information alert signs over major evacuation routes to alert residents and travelers of threat conditions.	All	High	Mississippi Department of Transportation	FHWA	2024	Ongoing
ES-3	Continue to work with CTA and other transportation providers to evacuate people that do not have transportation.	Hurricane and Flood	High	Harrison County, MEMA	FEMA	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-4	Secure generators for existing and new critical facilities and infrastructure.	All	High	City of Gulfport Comptroller, Public Works Director	HMGP	2028	Partially completed/ Ongoing contingent upon funding
ES-5	Conduct annual first responder training for all hazards.	All	High	Emergency Manager	General funds	2024, Annual	Ongoing
ES-6	Conduct annual NIMS training for first responders, city officials, and critical employees.	All	High	Fire and Police Departments	General budget	2024, Annual	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-7	Continue to participate with state and federal agencies in training and educational programs for technological, man-made, and health- related hazards.	Hazardous Materials, Infectious Disease	High	City Emergency Manager, key staff	General budget	2028	Ongoing
Public Education and Awareness							
PEA-1	Establish and maintain a hazard preparedness link on the city's webpage.	All	High	Public Affairs	General funds	2028	Ongoing
PEA-2	Promote workshops for emergency preparedness plans.	All	High	Emergency Manager	Undetermined	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-3	Work with applicable agencies to identify high risk areas and distribute educational information.	Infectious Disease, Hazardous Materials	High	Emergency Manager, Public Affairs	MSDH, EMPG, Homeland Security, city general funds	2028	Ongoing
PEA-4	Encourage the development of training and emergency planning for private companies that handle hazardous materials.	Hazardous Materials	High	Emergency Manager, Police and Fire Officials	General budget	2028	Ongoing

City of Long Beach Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Implement a residential water metering program to monitor water usage and promote conservation and limit water usage during periods of severe drought.	Drought	Moderate	Public Works and Board of Alderman	CDBG	2028	Ongoing
P-2	Develop and enhance building codes.	All	Moderate	Building Official	General fund	2025	Ongoing
P-3	Participate as a member of CHOST to meet and discuss issues and solutions to flooding problems with neighboring jurisdictions.	Flood, Hurricane	Moderate	Building Official	General fund	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Acquisition of several repetitive loss properties located within the city limits of Long Beach.	Flood, Hurricane, Thunderstorm	Low	Civil Defense Coordinator and Building Official	HMGP or FMA	2028	Partially completed/ Ongoing contingent upon funding
PP-2	Elevation projects including several residential structures located within the city limits of Long Beach that are below the current BFE requirements.	Flood, Hurricane, Thunderstorm	Moderate	Civil Defense Coordinator and Building Official	HMGP or FMA	2028	Partially completed/ Ongoing contingent upon funding
PP-3	Reconstruction/rebuild of homes through grant funding and public assistance following flooding, tropical storms, and hurricanes.	Flood, Hurricane, Thunderstorm	Moderate	Civil Defense Coordinator and Building Official	HMGP and general fund	2028	Partially completed/ Ongoing contingent upon funding

PP-4	Widening of drainage canal from County through Lib to Pass Christian. Enhance under street drainage to increase flow capacity near new development.	Flood, Hurricane, Erosion	High	Long Beach Wastewater Management District	HMGP, BRIC, FMA	2028	New
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Gandy Circle drainage improvements.	Flood	Moderate	Board of Alderman	HMGP, PA, CDBG	2028	Ongoing contingent upon funding
SP-2	Royal Drive drainage improvements	Flood	Moderate	Board of Alderman	HMGP, PA, CDBG	2028	Ongoing contingent upon funding
SP-3	Bear Creek drainage canal improvements from Douglas to USM to reshape and stabilize drainage channel.	Flood	Moderate	Board of Alderman	CDBG, PDM, HMGP	2028	Ongoing contingent upon funding
SP-4	Canal #1 drainage improvements to reshape and stabilize drainage canal.	Flood	Low	Board of Alderman and County Board of Supervisors	CDBG, PDM, HMGP	2028	Ongoing contingent upon funding
SP-5	Canal #1 bridge replacement. Commission Road Bridge is in poor condition. Timber piling and caps are deteriorating. Bridge should be replaced and channel widened to improve stormwater flow.	Erosion	Moderate	Board of Alderman	CDBG, HMGP	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-6	Gates Avenue drainage outfall needs small, inadequate culverts to be improved.	Flood	Moderate	Board of Alderman	CDBG, PDM, HMGP	2028	Ongoing contingent upon funding.
SP-7	Long Beach Harbor "issues" improvements including bank stabilization and bulkhead replacement.	Erosion	Moderate	Board of Alderman and Port Commission	CDBG, Tidelands, PA, HMGP	2028	Ongoing contingent upon funding
SP-8	Turkey Creek drainage reservoir to retain flood waters and eliminate flooding.	Flood	Low	Board of Alderman and neighboring jurisdictions	FEMA	2028	Ongoing contingent upon funding
SP-9	Commission Road drainage improvements.	Flood	Low	Board of Alderman	CDBG, PDM, PA, HMGP	2028	Ongoing contingent upon funding
SP-10	Citywide drainage canal improvements including reshaping and stabilizing drainage canals throughout the city. (St. Augustine, Green Acres Ditch). Install rip rap/reslope and stabilize.	Flood	Moderate	Board of Alderman	CDBG, PDM, PA, HMGP	2028	Ongoing contingent upon funding

SP-11	Construct new water tower and tank to eliminate low water pressure issues and poor water quality during periods of Drought.	Drought	Low	Board of Alderman	FEMA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-12	Construct new water well to eliminate low water pressure issues and poor water quality during periods of drought.	Drought	Low	Board of Alderman	FEMA	2028	Ongoing contingent upon funding
Emergency Services							
ES-1	Install warning sirens to notify citizens of threatening weather or man-made hazards.	All	High	Fire and Police Departments	HMGP	2028	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Maintain and enhance website to inform residents of hazards and preparation.	All	Moderate	Building Code Office	General fund	2026	Ongoing

City of Pass Christian Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Enhance the city's Continuity Plan to ensure that emergency operations can function and that day-to-day management of the city can be back on track as soon as possible after an emergency.	All	High	Fire and Police Departments	Emergency operations budget	2028	Ongoing regular updates
P-2	Incorporate the Pass Christian hazard Mitigation Plan into the city's Comprehensive Plan and other strategic planning processes.	All	High	Board of Alderman, Planning Commission	City budget	2028	Ongoing during annual review and five-year update
P-3	Develop and implement a Capital Improvement Plan (CIP) for the City of Pass Christian.	All	Moderate	Public Works Department	PDM Grant, FEMA	2028	Ongoing regular updates
Property Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
NRP-1	Work with the Harrison County Sand Beach Authority to continue maintaining the beach and seawall to allow them to continue to serve their function of mitigating wave and flooding action to protect U.S. Highway 90.	Flood, Hurricane	Moderate	Harrison County Sand Beach Authority	Mississippi Coastal Improvement Program, U.S. Army Corps of Engineers	2028	Ongoing
NRP-2	Preserve and protect trees and vegetation on uninhabited properties to improve natural stormwater management and flood control processes.	Flood	Moderate	Public Works Department	City budget	2028	Ongoing
NRP-3	Work with the Harrison County Sand Beach Authority to continue dune propagation in areas along the beach where the seawall is below 10 foot in elevation.	Hurricane, Flood	Low	Harrison County Sand Beach Authority	Harrison County Sand Beach Authority	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Build a new drinking water well in area less prone to flooding.	Flood	High	Water Department	Water Department, water usage fees	2028	Ongoing contingent upon funding
SP-2	Continue the city's efforts to upgrade drainage facilities.	Flood	High	Fire and Police Departments	PDM Grant, FEMA	2028	Ongoing contingent upon funding
SP-3	Develop a new east/west roadway connecting Menge and Easpy Avenues.	All	Moderate	Public Works Department, Harrison County	Public Works Department, Harrison County	2028	Ongoing contingent upon funding
SP-4	Improve the north/south roadway access in western Pass Christian.	All	Moderate	Public Works Department, Harrison County	Public Works Department, Harrison County	2028	Ongoing contingent upon funding
SP-5	Improve drainage through incorporating additional storm sewer improvements on roads that were not upgraded after the storm.	Flood	Moderate	Public Works Department, Harrison County	Public Works Department, Harrison County	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Implement an early warning network to alert citizens to oncoming hazards.	All	High	Fire and Police Departments	PDM Grant, FEMA	2028	Ongoing
ES-2	Upgrade fire protection through acquisition of a new fire truck capable of reaching new elevated buildings and construct a fire station large enough to accommodate it.	Wildfire	High	Fire and Police Department	PDM Grant, FEMA	2028	Ongoing
Public Education and Awareness							
PEA-1	Create a partnership to assist with development of Family Disaster Plans.	All	High	Fire and Police Departments	Emergency operations budget	2028	Ongoing
PEA-2	Establish and implement a public education and outreach program focused on hurricane evacuation procedures.	All	High	Fire and Police Departments	Emergency operations budget	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-3	Reach out to at-risk and vulnerable families through programs aimed at local schools and youth programs.	All	Moderate	Pass Christian Schools	Pass Christian Schools	2028	Ongoing
PEA-4	Educate residents on their part in managing stormwater and reducing flooding through better disposal practices.	Flood	Moderate	Buildings Department	City budget	2028	Ongoing
PEA-5	Continue to teach floodplain management curriculum in Pass Christian High School science classes.	Flood	Low	Pass Christian Schools	Pass Christian Schools	2028	Ongoing
PEA-6	Provide education and outreach materials at local public functions and through direct mail-outs.	All	Low	Buildings Department	Buildings Department	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-7	Work with the Gulf Coast Community Action Agency to provide one-to-one outreach on preparedness and risk to low-income residents.	All	Low	Buildings Department	Buildings Department	2028	Ongoing
PEA-8	Continue participation in the Gulf Coast Homeowner's Show and other "trade" shows to provide mitigation and preparedness information to the public.	All	Low	Buildings Department	Building Departments	2028	Ongoing

ANNEX D: JACKSON COUNTY

This annex includes jurisdiction-specific information for Jackson County and its participating municipalities. It consists of the following five subsections:

D.1 Jackson County Community Profile
D.2 Jackson County Risk Assessment
D.3 Jackson County Vulnerability Assessment
D.4 Jackson County Capability Assessment
D.5 Jackson County Mitigation Strategy

JACKSON COUNTY COMMUNITY PROFILE

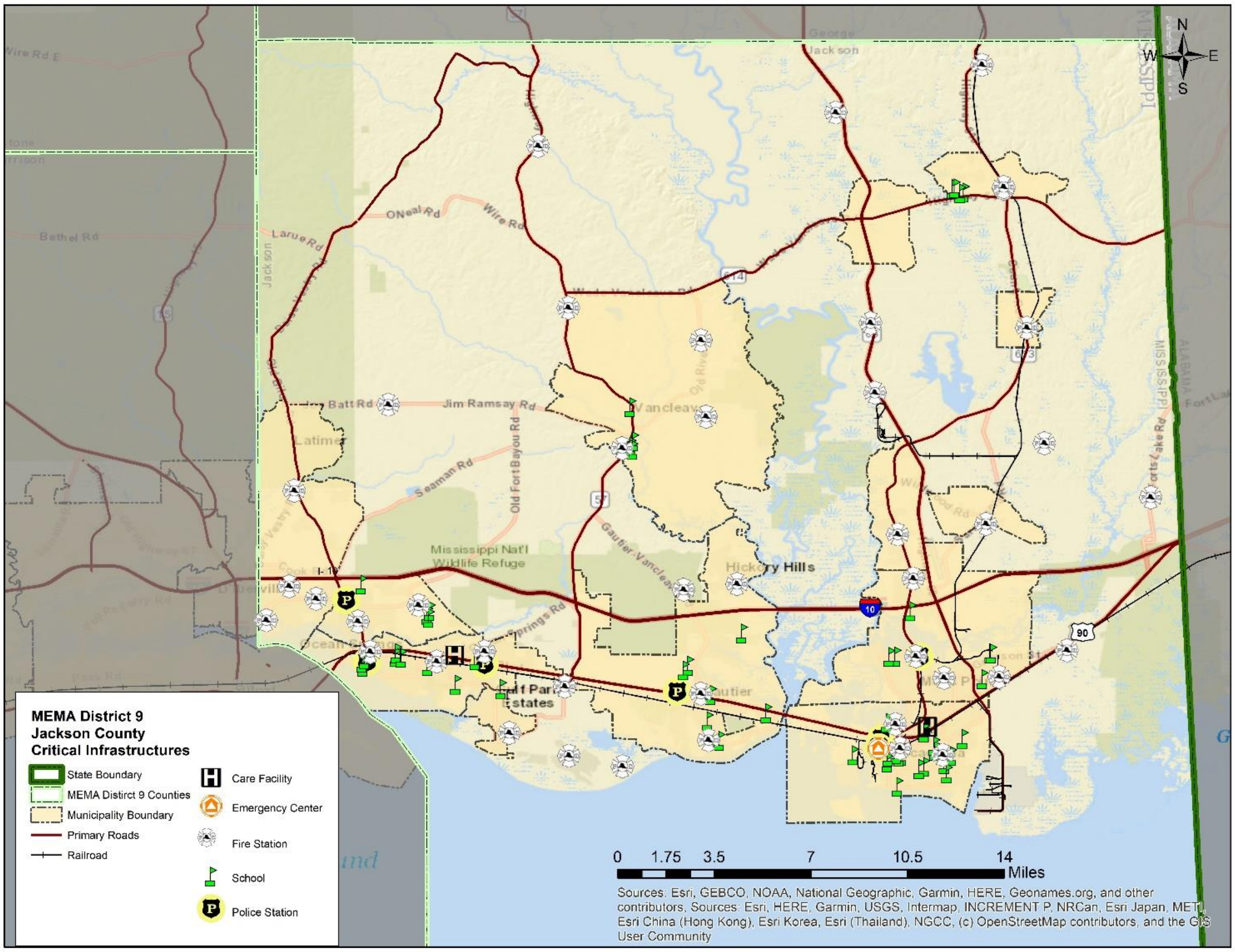
Geography and the Environment

Jackson County is located on the Mississippi coast. It comprises four cities, Gautier, Moss Point, Ocean Springs, and Pascagoula, as well as many small unincorporated communities. An orientation map is provided as Figure D.1.

Jackson County is situated in the East Gulf Coastal Plain. It is made up of the gently rolling Pine Belt, also known as the “Piney Woods,” and the coastal area called the Coastal Meadows or Terrace. The region has generally low topographic elevations and extensive tracts of marshy land. There are many rivers, creeks, bayous, and other natural drainage networks in the region which empty into the Gulf of Mexico. The total area of the county is 1,043 square miles, 321 square miles of which is water area.

Jackson County enjoys four distinct seasons but the climate in the region is generally hot and humid compared to the rest of the United States given its latitude and location along the Gulf Coast. Precipitation is generally highest in winter months when the temperatures are moderately lower, but the likelihood of precipitation remains relatively constant throughout the year. Snowfall is rare but does occur. Summers in the region can become fairly hot with average highs in the nineties and lows in the seventies. The region is also often susceptible to turbulent weather when warm, wet air from the Gulf of Mexico is pushed up into the region to mix with cooler air coming down from across the continent which can result in severe weather conditions. This is particularly true in the spring when seasons are changing and diverse weather patterns interact. The region is also subject to hurricanes and tropical storms from June to October.

FIGURE D.1: JACKSON COUNTY ORIENTATION MAP



Population and Demographics

Population counts from the U.S. Census Bureau for 1990, 2000,2010, and 2020 for the county and participating jurisdictions are presented in Table D.1.

TABLE D.1: POPULATION COUNTS FOR JACKSON COUNTY

Jurisdiction	2000 Census Population	2010 Census Population	2020 Census Population	% Change 2010-2020
Jackson County	131,420	139,668	143,252	2.6%
Gautier	11,681	18,572	19,024	2.4%
Moss Point	15,851	13,704	12,147	-11.4%
Ocean Springs	17,225	17,442	18,429	5.7%
Pascagoula	26,200	22,392	22,010	-1.7%

Source: United States Census Bureau, 1990, 2000, 2010, 2020 Census

The racial characteristics of the county are presented in Table D.2.

TABLE D.2: DEMOGRAPHICS OF JACKSON COUNTY

Jurisdiction	White, Percent (2020)	Black or African American, Percent (2020)	American Indian or Alaska Native, Percent (2020)	Asian, Percent (2020)	Native Hawaiian or Other Pacific Islander, Percent (2020)	Two or More Races, percent (2020)	Persons of Hispanic Origin, Percent (2020)*
Jackson County	73.2%	21.6%	0.5%	2.3%	0.1%	2.3%	7.2%
Gautier	57.1%	32.3%	0.7%	2.3%	0.0%	2.9%	11.5%
Moss Point	18.4%	75.6%	0.0%	0.1%	0.0%	1.2%	3.4%
Ocean Springs	84.6%	4.7%	0.0%	4.3%	0.0%	5.3%	8.3%
Pascagoula	51.0%	36.9%	0.6%	0.9%	0.0%	3.8%	14.10%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau, 2020 Census/2017-2021 ACS

Housing

Housing information for the county and four municipalities is presented in Table D.3.

TABLE D.3: HOUSING CHARACTERISTICS OF JACKSON COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Housing Units (2020)	Median Home Value (2017-2020)
Jackson County	51,678	60,067	63,617	$146,500
Gautier	4,597	8,047	X	$133,600
Moss Point	6,237	6,194	X	$99,000
Ocean Springs	7,072	7,814	X	$184,800
Pascagoula	3,351	10,224	X	$116,000

Source: United States Census Bureau, 2000, 2010, and 2020Census, 2017-2021 American Community Survey 5-Year Estimates

Infrastructure

TRANSPORTATION

In Jackson County, Interstate 10 and U.S. Highway 90 run east to west allowing transportation in southern half of the county. Mississippi Highway 63 and 57 run north-south through Jackson County.

The Trent Lott International Airport and the Ocean Springs Airport are a general aviation and public-use airport, respectively, which are located in Jackson County. The Gulfport-Biloxi International Airport, located in Harrison County, also serves the county. This airport is served by three major airlines with direct flights to Atlanta, Charlotte, Dallas/Ft. Worth, and Houston as well as connections to hundreds of locations in the U.S. and worldwide.

In terms of other transportation services, Port of Pascagoula operates within the county, connecting it to national and global markets. One Class-I Major and one Class-III Local railways also serve the county.

UTILITIES

Electrical power in Jackson County is mainly provided by electric power associations. Mississippi Power Company also provides power to some parts of the county.

There are two private and municipal natural gas suppliers that serve Jackson County. These include CenterPoint Energy Resources and the City of Pascagoula.

Water and sewer service is provided by a number of different sources including several of the participating cities and the county, but unincorporated areas often rely on septic systems and wells in Jackson County.

COMMUNITY FACILITIES

There are a number of buildings and community facilities located throughout Jackson County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 5 communications facilities, 3 emergency operations centers (EOCs), 45 fire stations, 4 medical facilities, 8 police stations, 1 power/gas facility, 20 private/non-profit facilities, 50 public facilities, 75 schools, 7 shelters, 27 special populations facilities, 3 transportation facilities, and 25 water/wastewater facilities located within the county.

There are two hospitals located in Jackson County. These include Singing River Hospital in Pascagoula and Ocean Springs Hospital in Ocean Springs. There are also additional medical care facilities located in the county as outlined in the vulnerability assessment (Section 6.4.1).

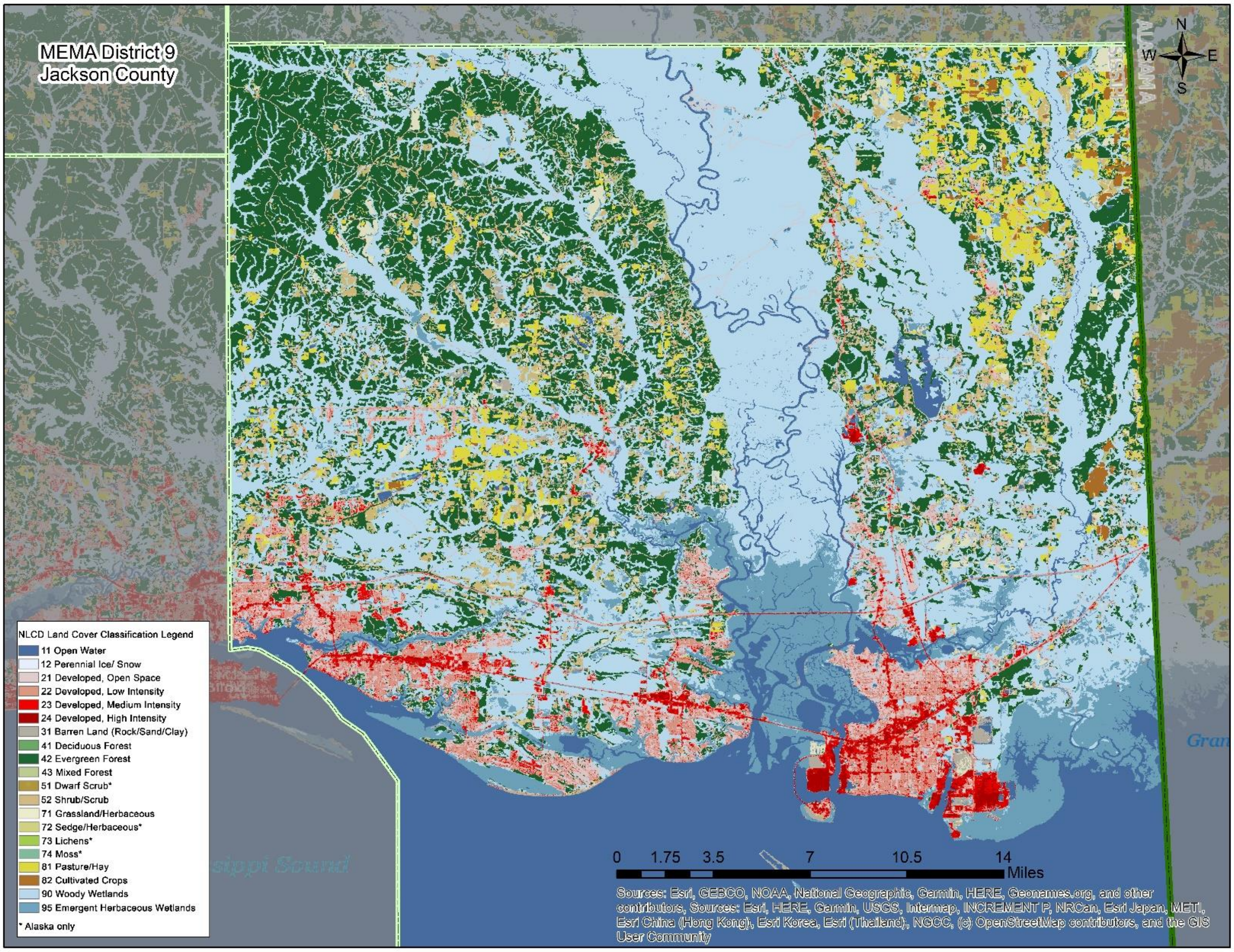
Jackson County contains numerous local, state, and national parks and recreation areas, including the Gulf Islands National Seashore, Mississippi Gulf Coast National Heritage Area, DeSoto National Forest, and Shepard State Park. Golf courses and resorts, recreational and sports fishing, gamming and casinos, and sand beaches are abundant in the county.

Land Use

Many areas of Jackson County are undeveloped or sparsely developed. There are several incorporated municipalities located along the coast. Coastal land use patterns radiate from city centers and commercial land uses are located in central business districts and highway strips, with surrounding housing that becomes progressively large in lot size and floor area with distance from the central business districts. Residential and non-residential densities are generally low, and concentrated mix of uses are infrequent, creating an auto-oriented land use pattern along the coast. Upland land use patterns differ markedly from the coastal plain. There are only a few municipalities and unincorporated rural centers. There is a mix of protected lands, such as the DeSoto National Forest and several National Wildlife Refuges. Private lands are used for exurban housing, agriculture, and forestry. Consistent with its rural character, densities are very low and uses are not mixed, making motor vehicles the only viable mode for virtually all travel.

Local land use and associated regulations are further discussed in Section 7: Capability Assessment.

Figure D.2: Land Classification



Employment and Industry

According to the 2019 American Community Survey (ACS), Jackson County had an average annual employment of 67,894 workers and an average unemployment rate of 4.7 percent (compared to 4.2 percent for the state). In 2019, the average annual median household income in Jackson County was $51,657 compared to $45,081 in the state of Mississippi.

SECTION 19 JACKSON COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: Hazard Identification as they pertain to Jackson County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: Hazard Profiles.

National Risk Index Scores:

The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather. Because not all hazards apply to the County, only those with a defined risk to the County are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability and Community Resilience, to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions but cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision-makers as they develop risk reduction strategies.

Social Vulnerability:
Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Per the FEMA National Risk Index, Jackson County has a Social Vulnerability Rating of **"Relatively High"** and a Social Vulnerability Score of **"71.5"** (FEMA, 2023).

The "Social Vulnerability Score" and "Rating" represent the relative level of a community's social vulnerability compared to all other communities at the same level. A community's Social Vulnerability Score is also proportional to a community's risk. A higher Social Vulnerability Score results in a higher Risk Index Score (FEMA, 2023).

Social vulnerability is also one of five components included in the formulation of the "National Risk Index Score" in addition to community resilience, estimated annual loss (EAL) based on exposure, annualized frequency, and historic Loss Ratio (HLR) factors (FEMA, 2023).

Table D.4:. Social Vulnerability FEMA NRI Score

JACKSON COUNTY, MS FEMA NRI SOCIAL VULNERABILITY SCORE	
Social Vulnerability Score	**Social Vulnerability Rating**
71.5	Relatively High
Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).	
Source: hazards.fema.gov/nri/social-vulnerability	

Community Resilience:
Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Table D.5: Community Resilience FEMA NRI Score

JACKSON COUNTY, MS FEMA NRI COMMUNITY RESILIENCE SCORE	
Community Resilience Score	**Community Resilience Rating**
75.9	Relatively High
Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).	
Source: hazards.fema.gov/nri/community-resilience	

Expected Annual Loss:

Table D.6:. Expected Annual Loss FEMA NRI Score (All Natural Hazards)

EXPECTED ANNUAL LOSS FOR JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS SCORE	
Expected Annual Loss Score	**Expected Annual Loss Rating**
95.9	Relatively High

Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio).
Source: hazards.fema.gov/nri/expected-annual-loss

FEMA National Risk Index Score:

Table D.7:. Overall FEMA NRI Score

FEMA OVERALL NRI SCORE FOR JACKSON COUNTY,MS FEMA OVERALL NRI SCORE	
FEMA Overall NRI Score	FEMA Overall NRI Rating
95.99	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience. (Expected Annual Loss X Social Vulnerability / Community Resilience = Risk Index).	
Source: hazards.fema.gov/nri/determining-risk	

--- County Overall Risk Scores:

The following tables represent the new overall risk scores for ---- County based on the described methodology above. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores. FEMA NRI Scores were used as appropriate and applicable to inform the analysis.

Table D.8: 2023 Hazard Risk Scores Jackson County

Hazard Event	Probability	Consequence				Total Risk Score (Probability x Consequence)
	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Factors	Sum of Weighted Impact Factors	Consequence Score	
Dam and Levee Failure	1	1	6	15	22	14
Erosion	3	5	11	19	35	56
Flood	3	12	12	32	56	84
Storm Surge	3	8	12	32	52	78
Drought	2	8	11	18	37	41
Lightning	3	10	11	22	43	67
Wildfire	3	6	6	24	36	57
Earthquake	1	0	4	12	16	11
Extreme Cold	1	7	5	19	31	19
Extreme Heat/Heat Wave	3	9	10	27	46	71
Hailstorm	2	7	6	13	26	30
Hurricane Tropical Storm	3	12	17	39	68	99
Severe Thunderstorm/High Wind	3	10	16	32	58	86
Tornado	3	8	15	34	57	85
Winter Weather	2	6	7	26	39	43
Climate Change/Sea Level Rise	3	8	6	22	36	57
HAZMAT/Train Derailment	2	7	8	17	32	36
Infectious Disease	1	11	8	27	46	27

For full hazard rankings and methodologies spreadsheet, please click the below link:

JacksonCounty_RankingSpreadsheet.xlsx

Table D.9: Hazard Risk Scores Legend

Probability Factor		Sum of Weighted Extent Factors		Sum of Weighted Vulnerability Factors		Sum of Weighted Impact Factors		Consequence Score		Total Risk Score	
1	Low (L)	0–6	Low (L)	0–6	Low (L)	0–12	Low (L)	0–25	Low (L)	0–24	Low (L)
2	Medium (M)	7–12	Medium (M)	7–12	Medium (M)	13–26	Medium (M)	26–50	Medium (M)	25–59	Medium (M)
3	High (H)	13–18	High (H)	13–18	High (H)	27–39	High (H)	51–75	High (H)	60–100	High (H)

** The **Legend** – specifically the assignment of low, medium, and high—provides an additional means to qualitatively assess the probability factor, sum of weighted factors, and the total risk scores for each hazard.*

*The **Consequence Score** represents the sum of the Extent, Vulnerability, and Impact Factors.*

*The **Total Risk Score** is a measure of Probability and Consequence.*

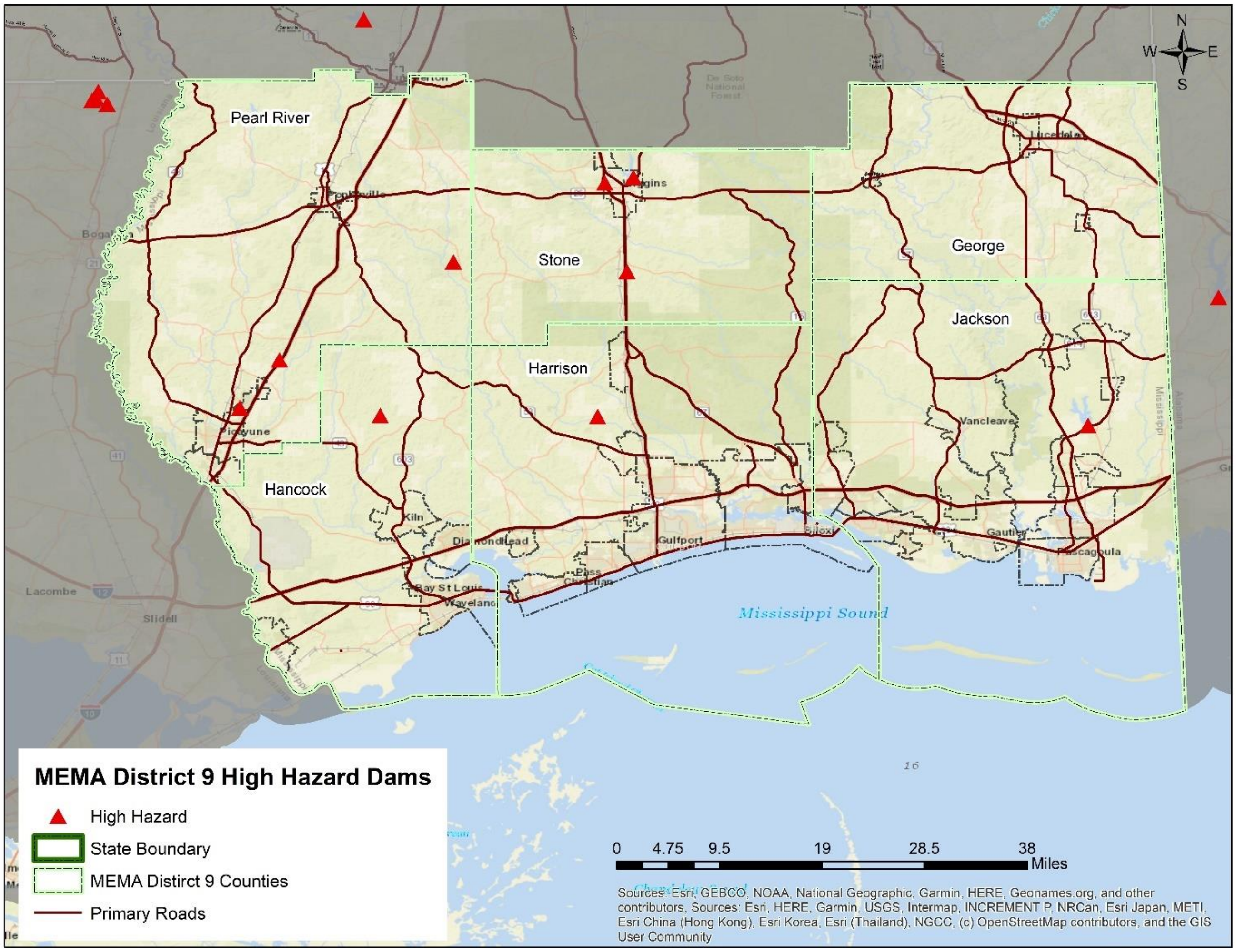
FLOOD-RELATED HAZARDS

Dam and Levee Failure

LOCATION AND SPATIAL EXTENT

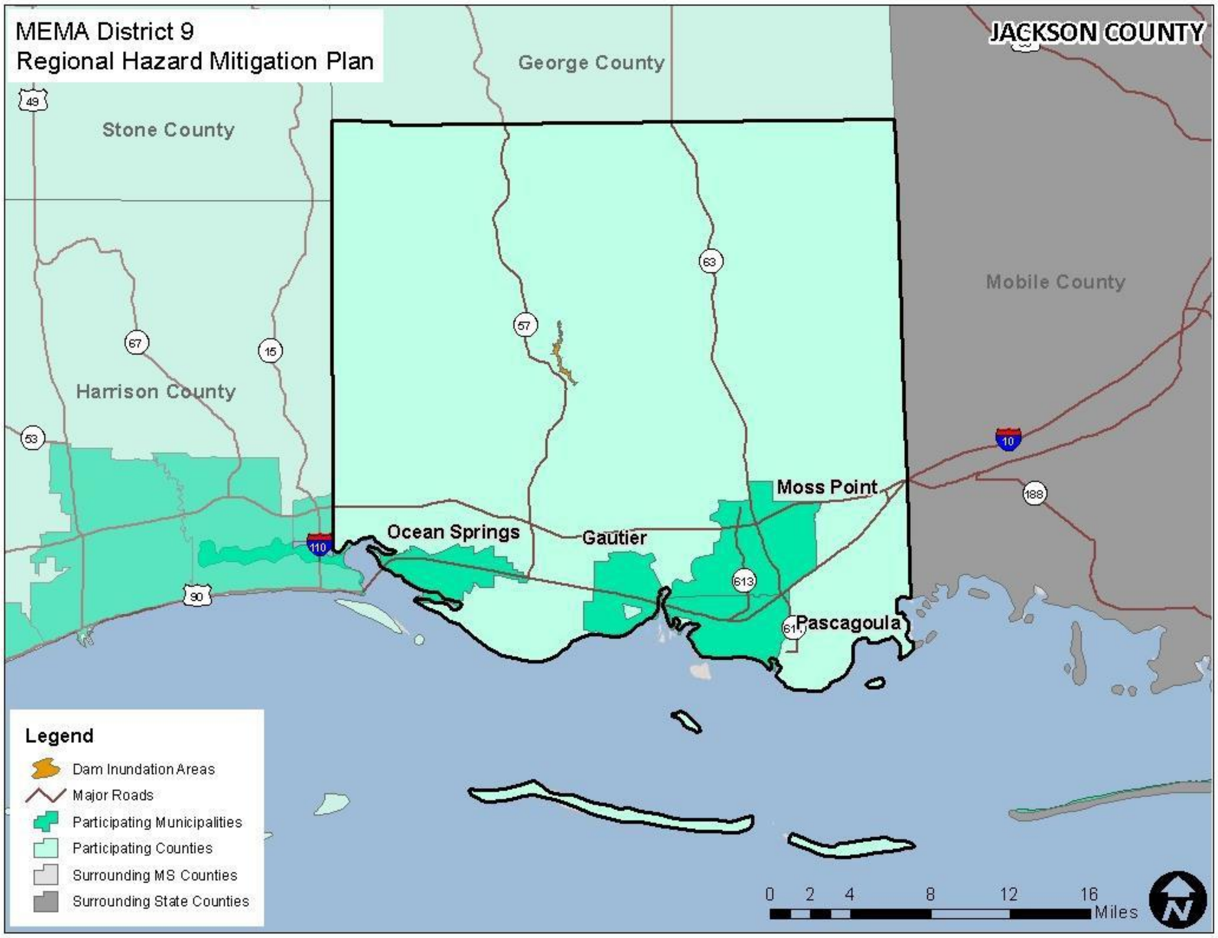
According to the Mississippi Department of Environmental Quality, there is one high hazard dam in Jackson County. Figure D.3 and Figure D.4 show the location of this high hazard dam as well as mapped dam inundation areas, and Table D.10 lists it by name.

FIGURE D.3: JACKSON COUNTY HIGH HAZARD DAM LOCATIONS



Source: Mississippi Department of Environmental Quality

FIGURE D.4: JACKSON COUNTY DAM INUNDATION AREAS



Source: Mississippi Department of Environmental Quality

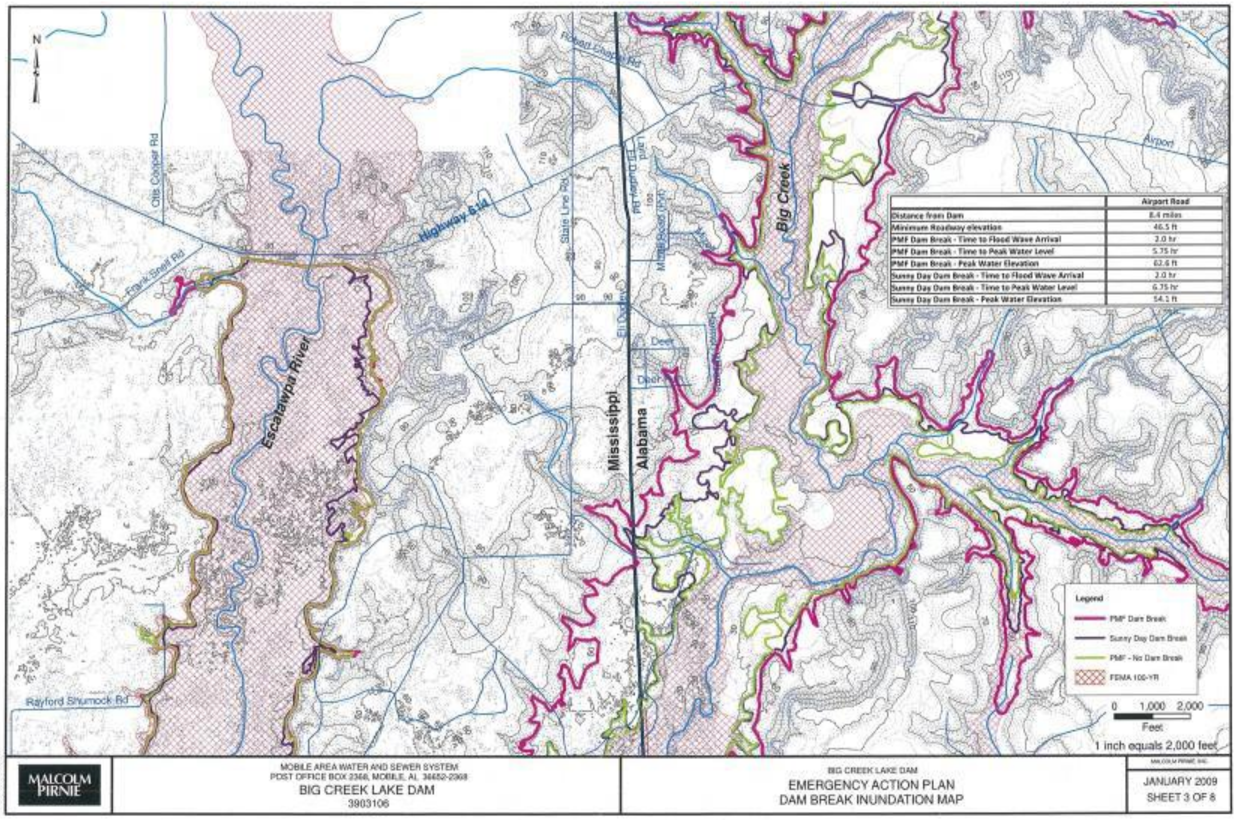
TABLE D.10: JACKSON COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential
Jackson County	
BLACK CREEK COOLING WATER DAM	High

Source: Mississippi Department of Environmental Quality

Additionally, although it is technically outside the State of Mississippi, the Big Creek Lake Dam in Alabama poses a potential risk to some areas in eastern Jackson County and has been identified as the greatest threat in terms of dam failure in the county. The Emergency Action Plan for this dam provides probable maximum flood areas in both Alabama and Mississippi, demonstrating potential areas at risk in several scenarios including dam break, sunny day dam break, and no dam break. This mapping is found in Figure D.5, Figure D.6, Figure D.7, Figure D.8, Figure D.9, and Figure D.10.

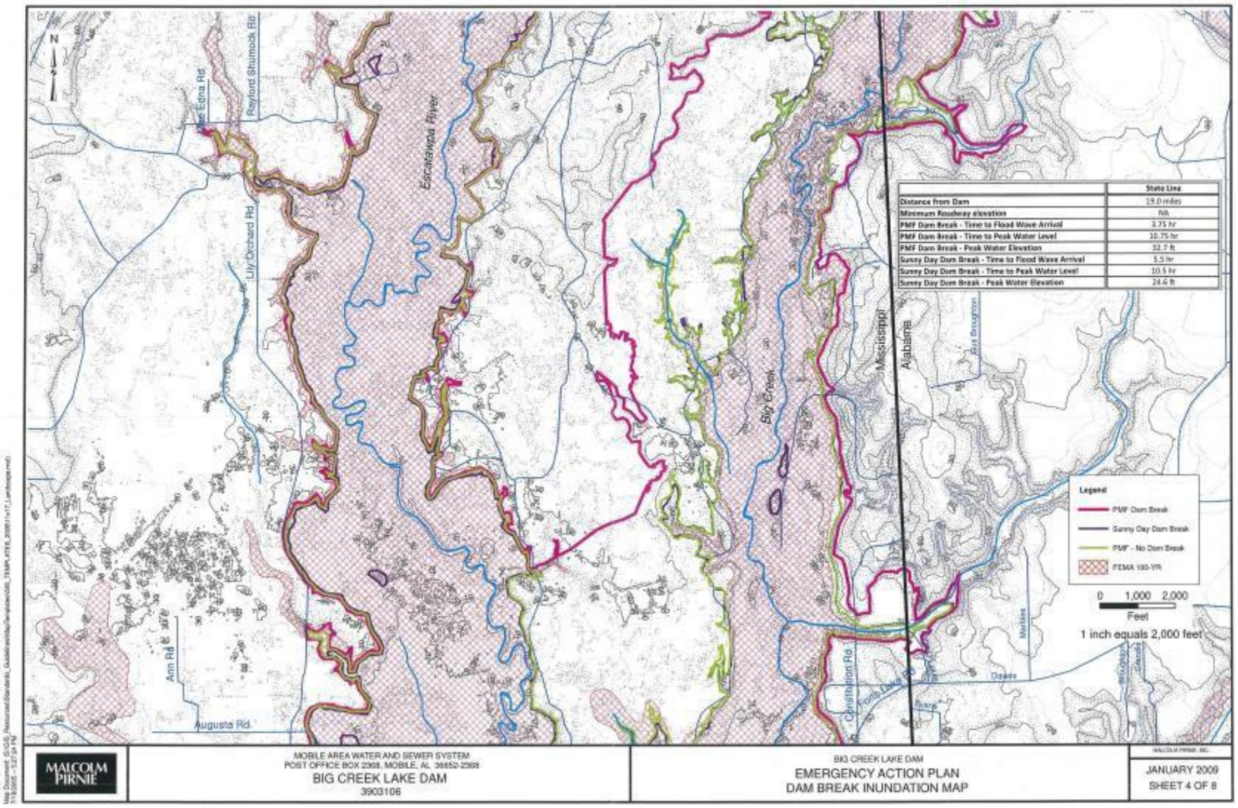
FIGURE D.5: BIG CREEK LAKE DAM FAILURE SCENARIOS



	Airport Road
Distance from Dam	8.4 miles
Minimum Roadway elevation	46.5 ft
PMF Dam Break - Time to Flood Wave Arrival	2.0 hr
PMF Dam Break - Time to Peak Water Level	5.75 hr
PMF Dam Break - Peak Water Elevation	62.6 ft
Sunny Day Dam Break - Time to Flood Wave Arrival	2.0 hr
Sunny Day Dam Break - Time to Peak Water Level	6.75 hr
Sunny Day Dam Break - Peak Water Elevation	54.1 ft

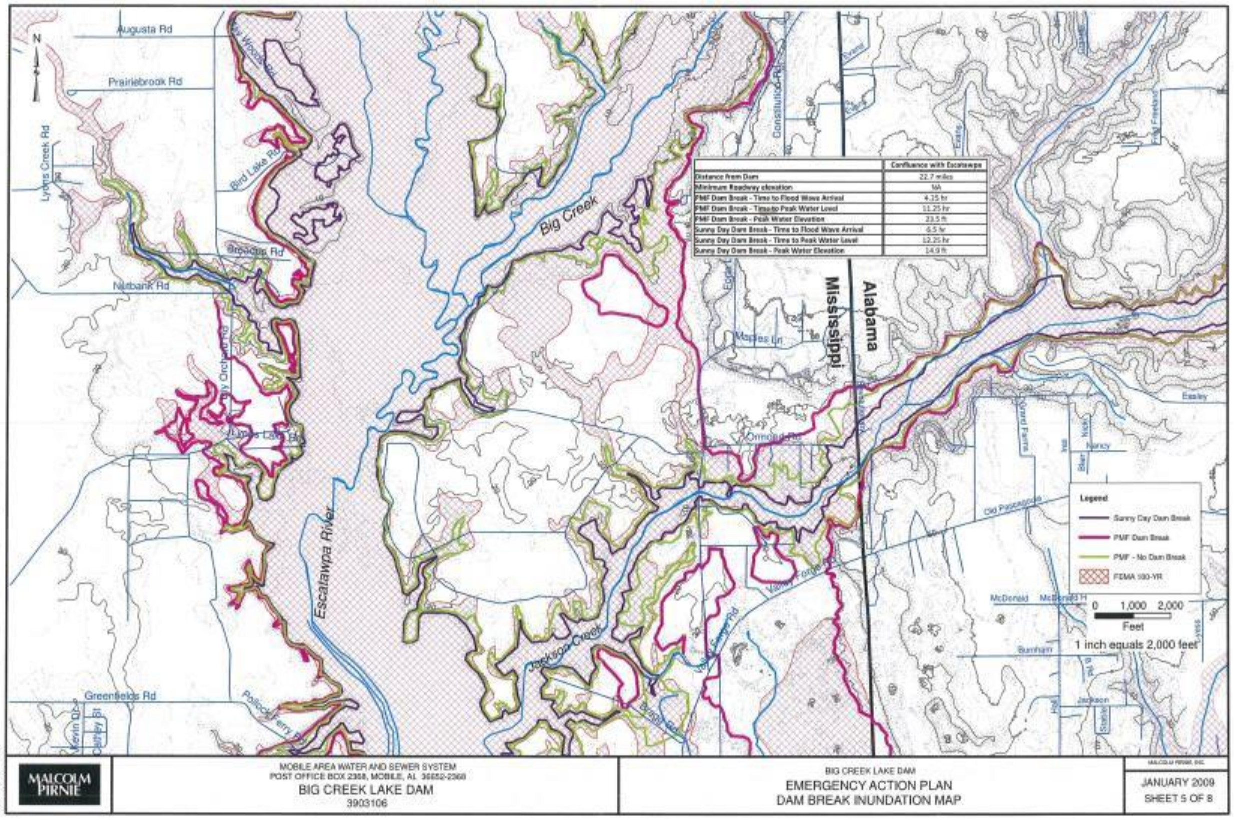
Source: Big Creek Lake Dam Emergency Action Plan

FIGURE D.6: BIG CREEK LAKE DAM FAILURE SCENARIOS



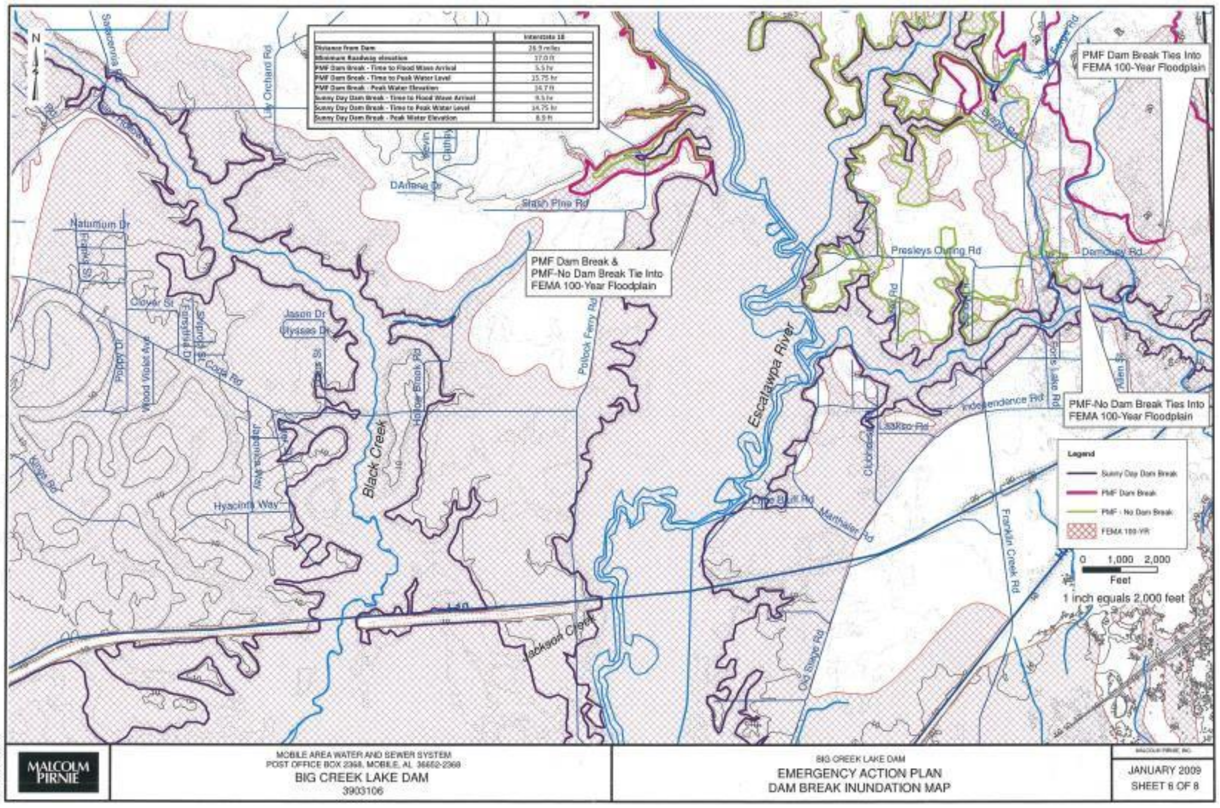
Source: Big Creek Lake Dam Emergency Action Plan

FIGURE D.7: BIG CREEK LAKE DAM FAILURE SCENARIOS



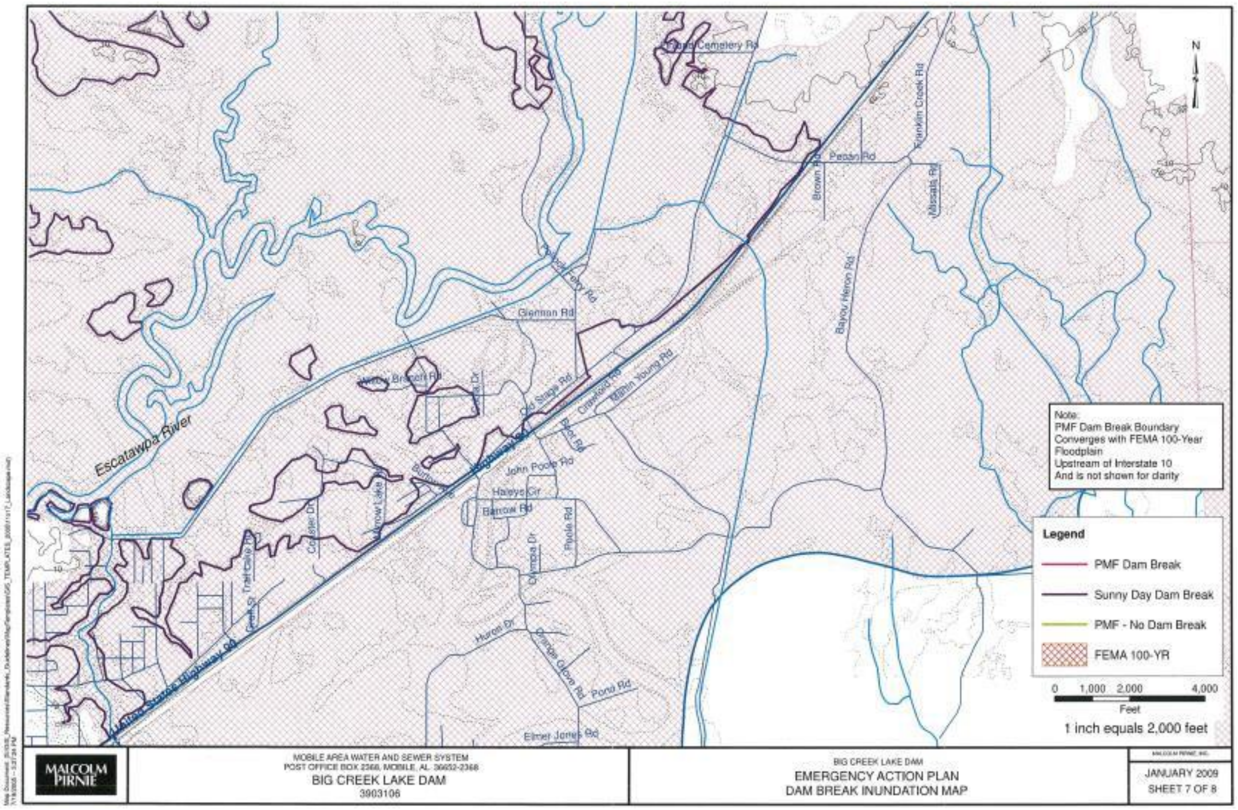
Source: Big Creek Lake Dam Emergency Action Plan

FIGURE D.8: BIG CREEK LAKE DAM FAILURE SCENARIOS



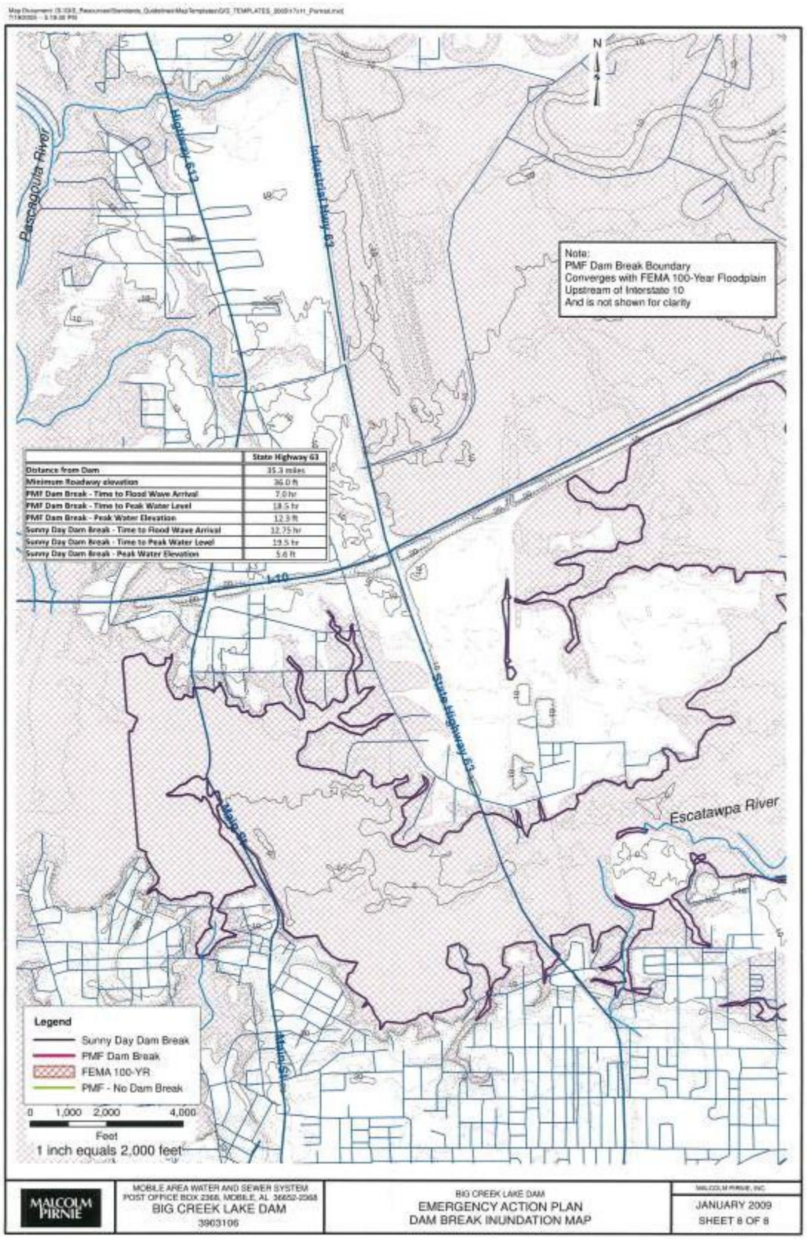
Source: Big Creek Lake Dam Emergency Action Plan

FIGURE D.9: BIG CREEK LAKE DAM FAILURE SCENARIOS



Source: Big Creek Lake Dam Emergency Action Plan

FIGURE D.10: BIG CREEK LAKE DAM FAILURE SCENARIOS



Source: Big Creek Lake Dam Emergency Action Plan

HISTORICAL OCCURRENCES

According to the Mississippi State Hazard Mitigation Plan, there have been no dam failures reported in Jackson County (Table D.11). However, several breach scenarios in the region could be catastrophic.

TABLE D.11: JACKSON COUNTY DAM FAILURES (1982-2022)

Date	County	Structure Name	Cause of Failure
None reported	Jackson	--	--

Source: Mississippi State Hazard Mitigation Plan

PROBABILITY OF FUTURE OCCURRENCES

Given the current dam inventory and historic data, a dam breach is possible (between 1 and 10 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess high-hazard dams and levees.

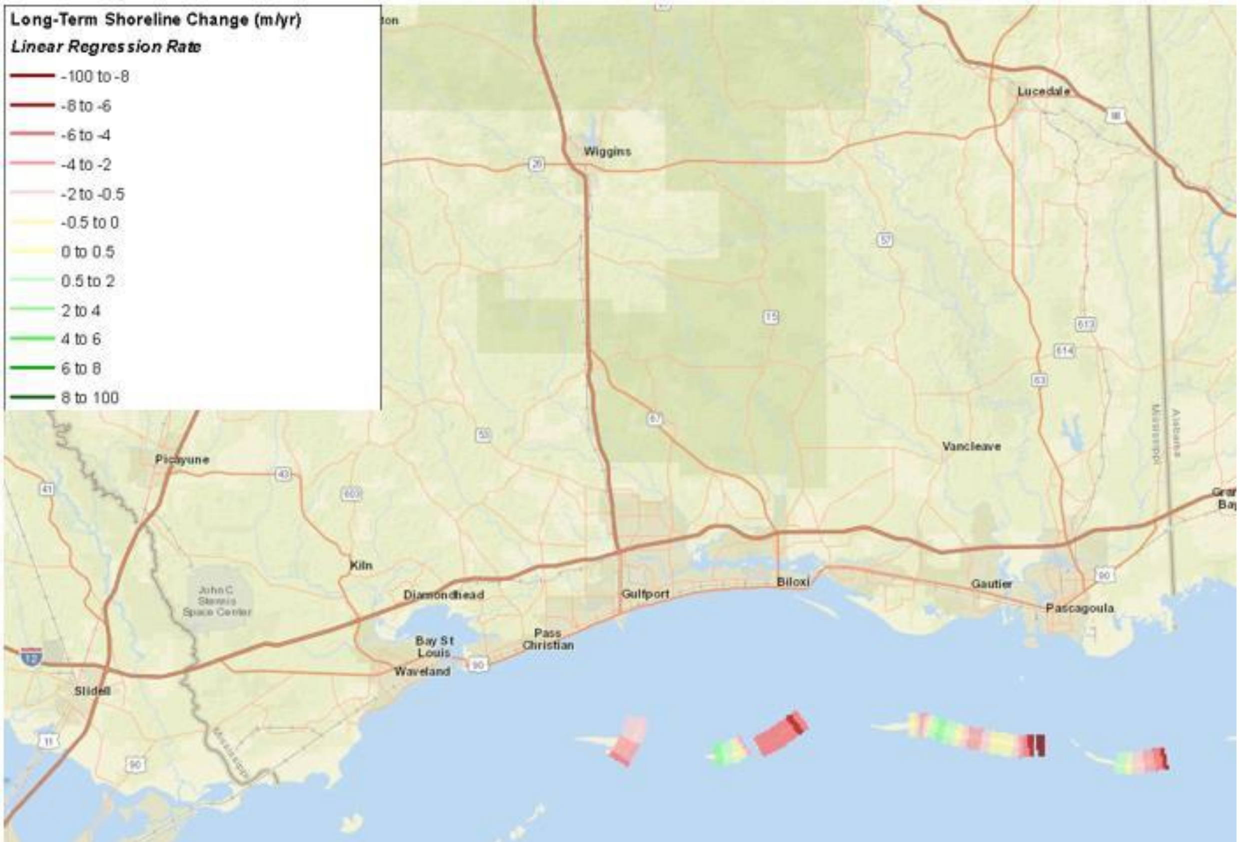
Erosion

LOCATION AND SPATIAL EXTENT

For the most part, major erosion in Jackson County is typically caused by coastal tides, ocean currents, and storm events. Although the county also experiences riverine erosion in many of its inland areas, these are of somewhat less concern than coastal erosion areas which historically have had larger impacts. Unlike inland areas, where the soil has greater organic matter content, coastal soils are mainly composed of fine grained particles such as sand. This makes coastal soils much more susceptible to erosion. Although some areas of the Jackson County coast are protected and natural erosion processes are allowed to take place for the most part, many areas near where development has occurred are especially susceptible.

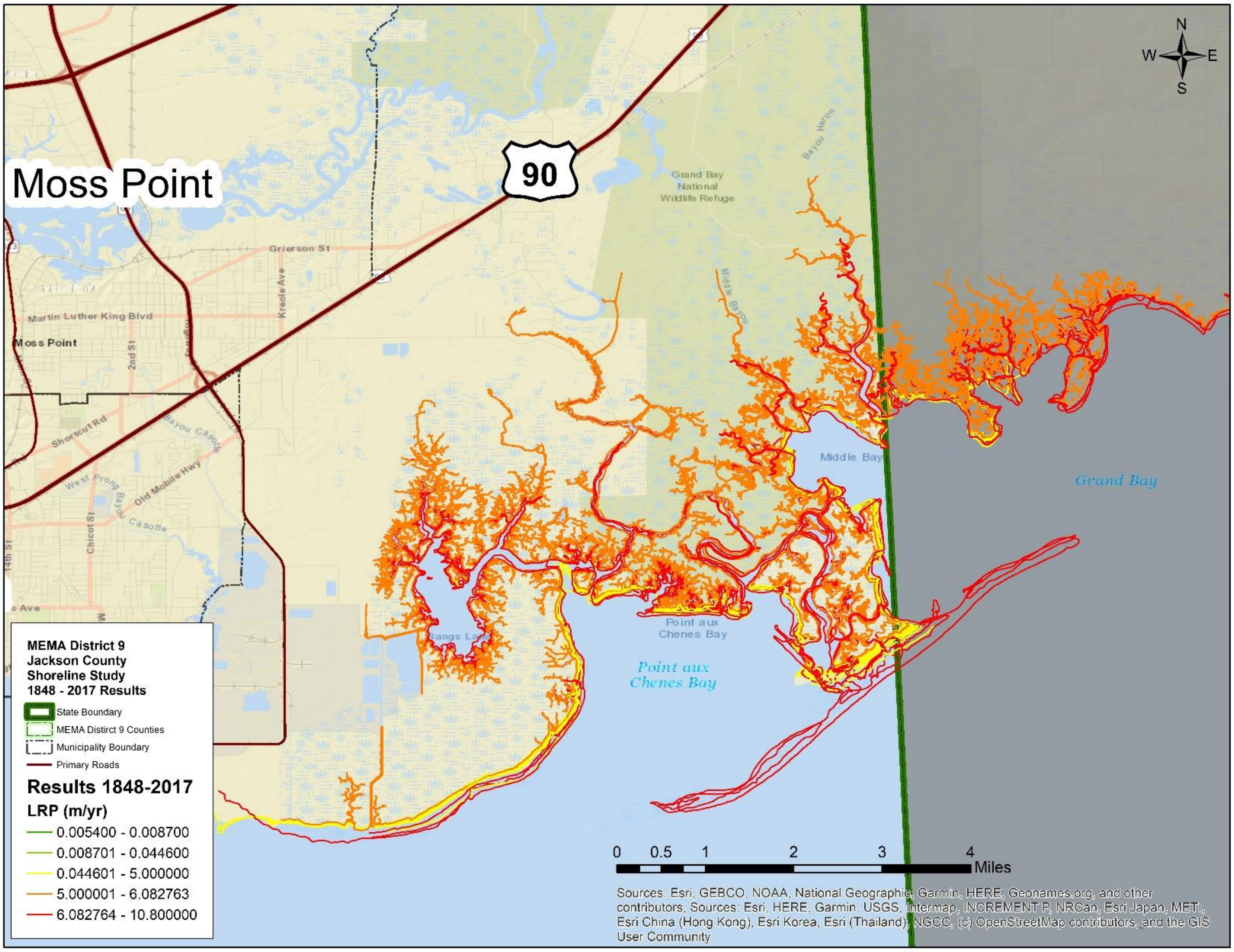
At this time, there is limited data available on localized areas of erosion. Most of the information collected by the United States Geological Survey (USGS) is focused on the barrier islands that are just off the coast of the mainland. The long-term shoreline change for the barrier islands as calculated by the USGS can be found in Figure D.11 It should be noted that many areas of the coast are protected through the use of structural techniques. Also, a great deal of renourishment activities are carried out along the mainland coastal communities.

FIGURE D.11: LONG-TERM SHORELINE CHANGE (M/YR) IN THE MEMA DISTRICT 9 REGION



Source: United States Geological Survey

Figure D.12: Shoreline Study (1848-2017)



HISTORICAL OCCURRENCES

Several sources were vetted to identify areas of erosion in Jackson County. This includes searching local newspapers, interviewing local officials, and reviewing previous hazard mitigation plans. Because dramatic, short-term erosion tends to take place after major storm events such as hurricanes, flooding, or storm surge, the erosion events often correspond directly with those events. Conversely, with long- term erosion, it is difficult to identify a specific historic occurrence because these events are by nature occurring at all times over a long period at a very gradual rate. Therefore, long-term historic erosion events cannot be confined to a specific timeframe or occurrence.

PROBABILITY OF FUTURE OCCURRENCES

Erosion remains a natural, dynamic, and continuous process for Jackson County, and it will continue to occur. The annual probability level assigned for erosion is likely (between 10 and 100 percent annually).

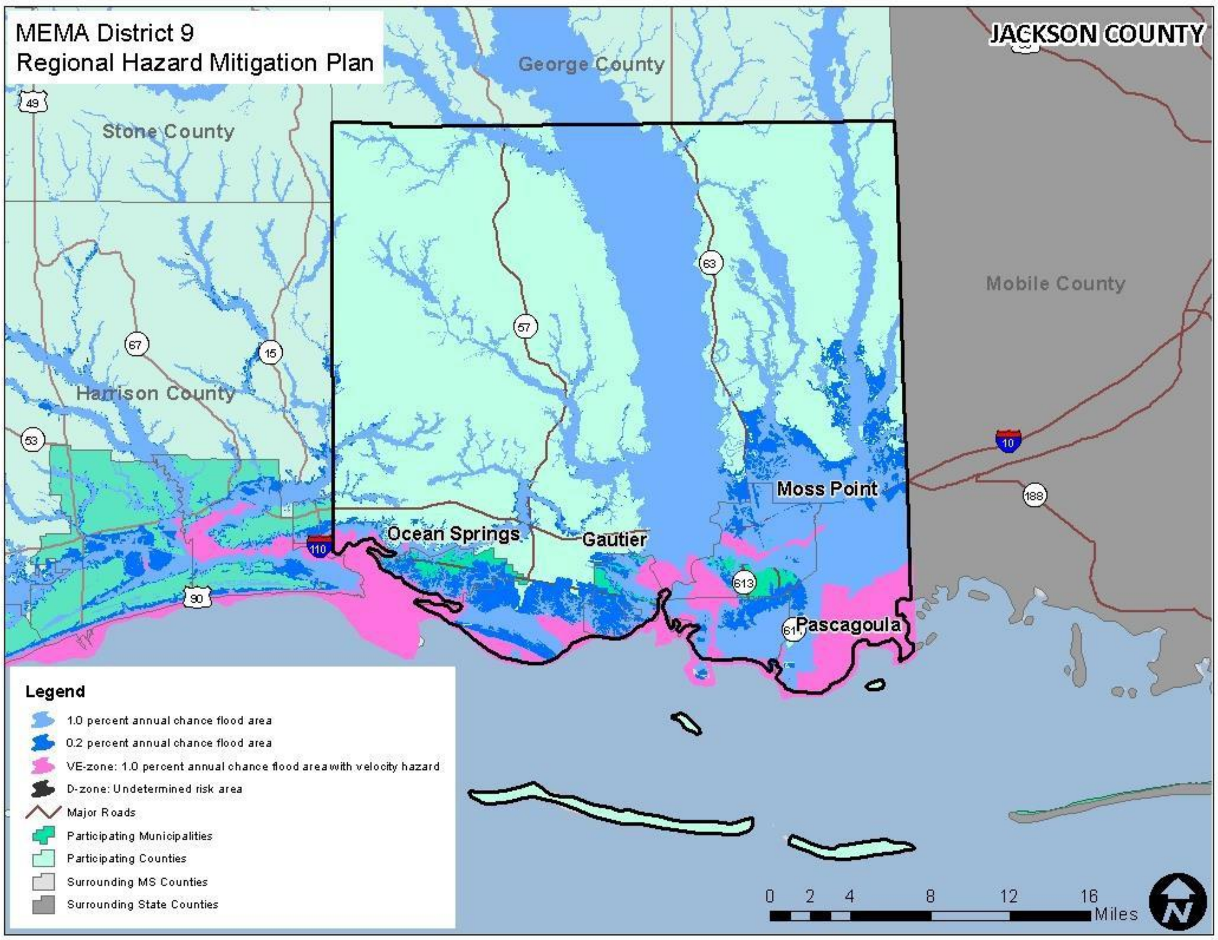
FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess erosion events.

Flood

LOCATION AND SPATIAL EXTENT

There are areas in Jackson County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM). This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevations), Zone VE (1-percent annual chance floodplain with additional hazards due to storm-induced velocity wave action), Zone X500 (0.2-percent annual chance floodplain), and Zone D (undetermined risk area). Figure D.13 illustrates the location and extent of currently mapped special flood hazard areas for the county based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

FIGURE D.13: SPECIAL FLOOD HAZARD AREAS IN JACKSON COUNTY



Source: Federal Emergency Management Agency

Figure D. 14: National Flood Hazard Layer (No Facilities)

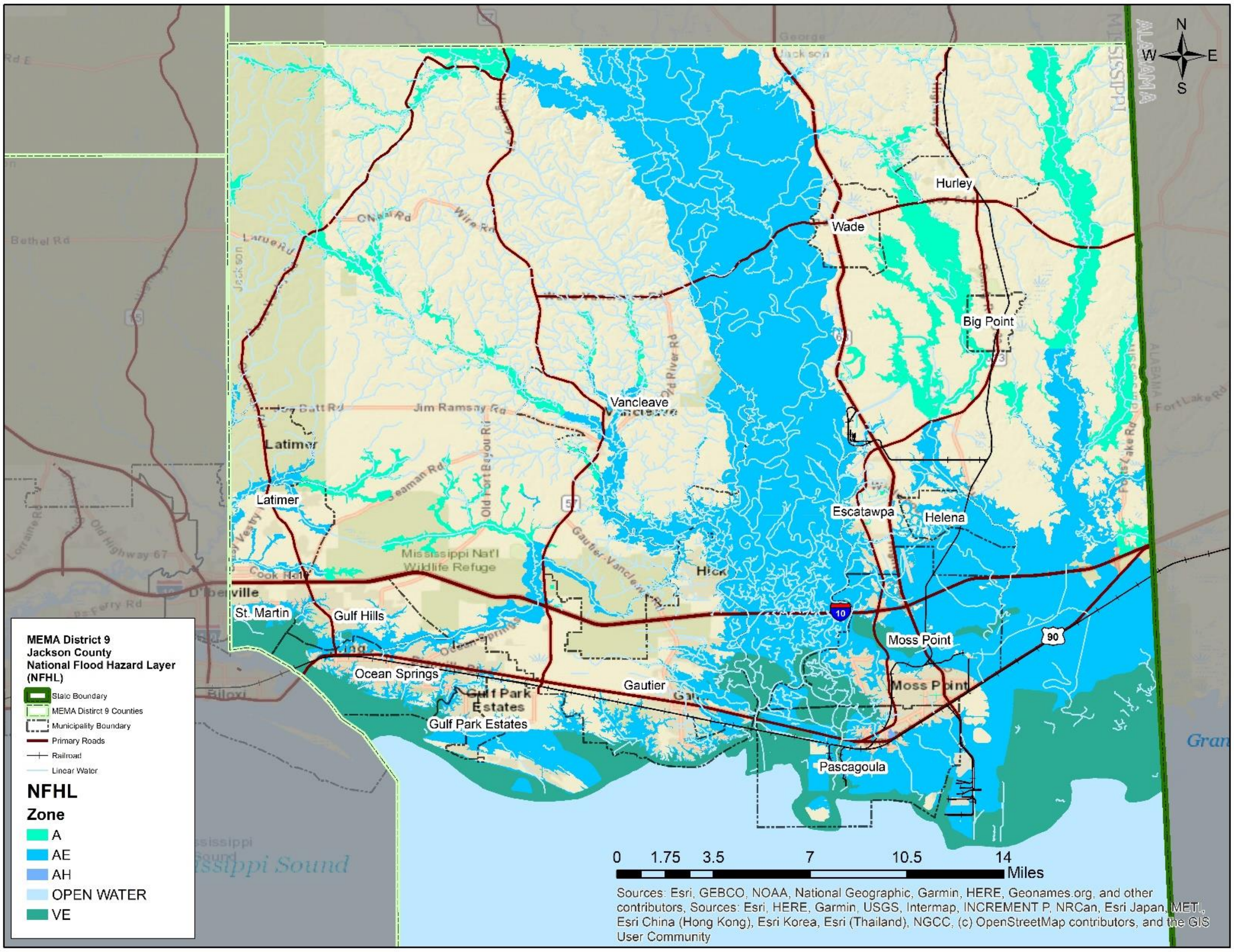


Figure D. 15: National Flood Hazard Layer (Facilities)

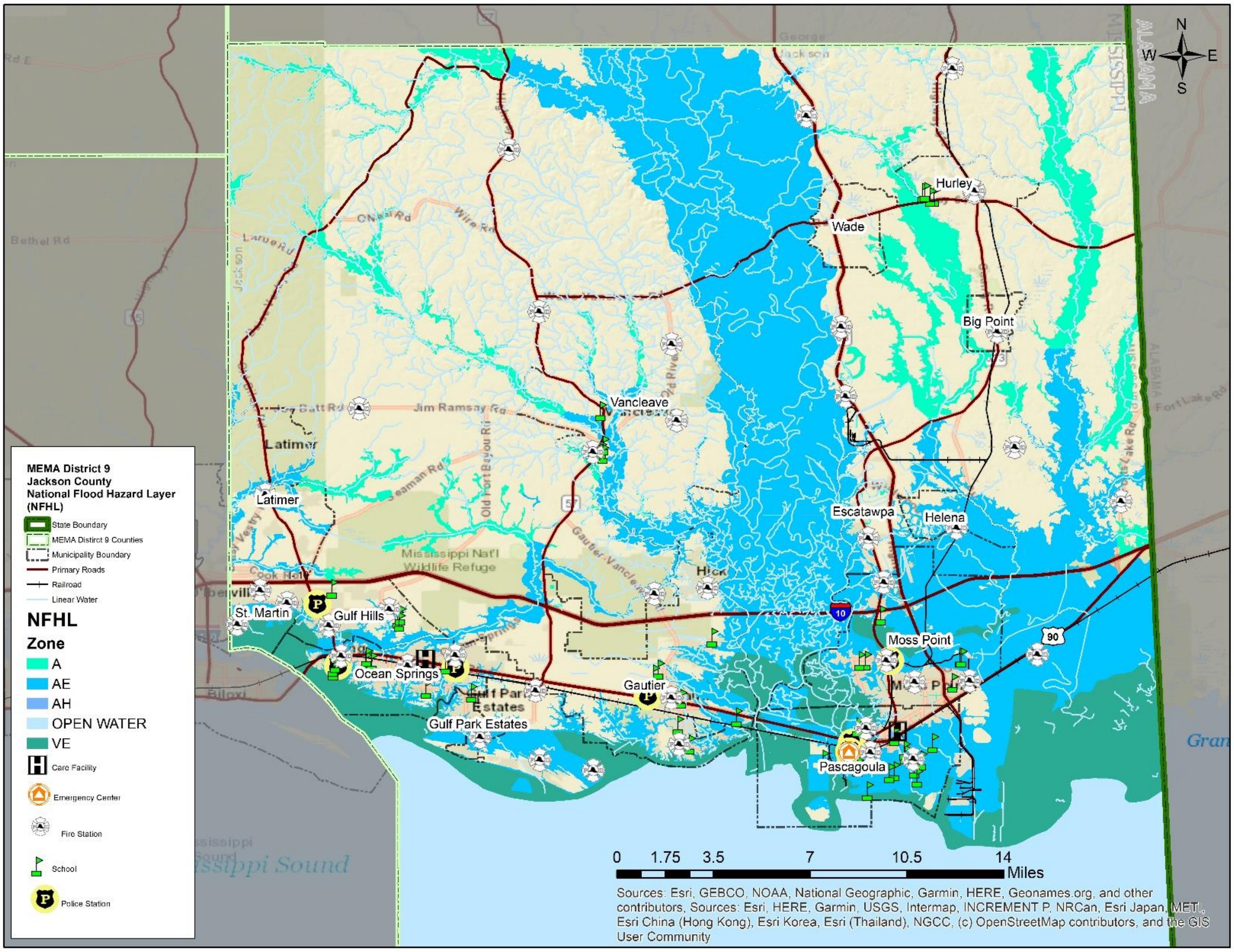
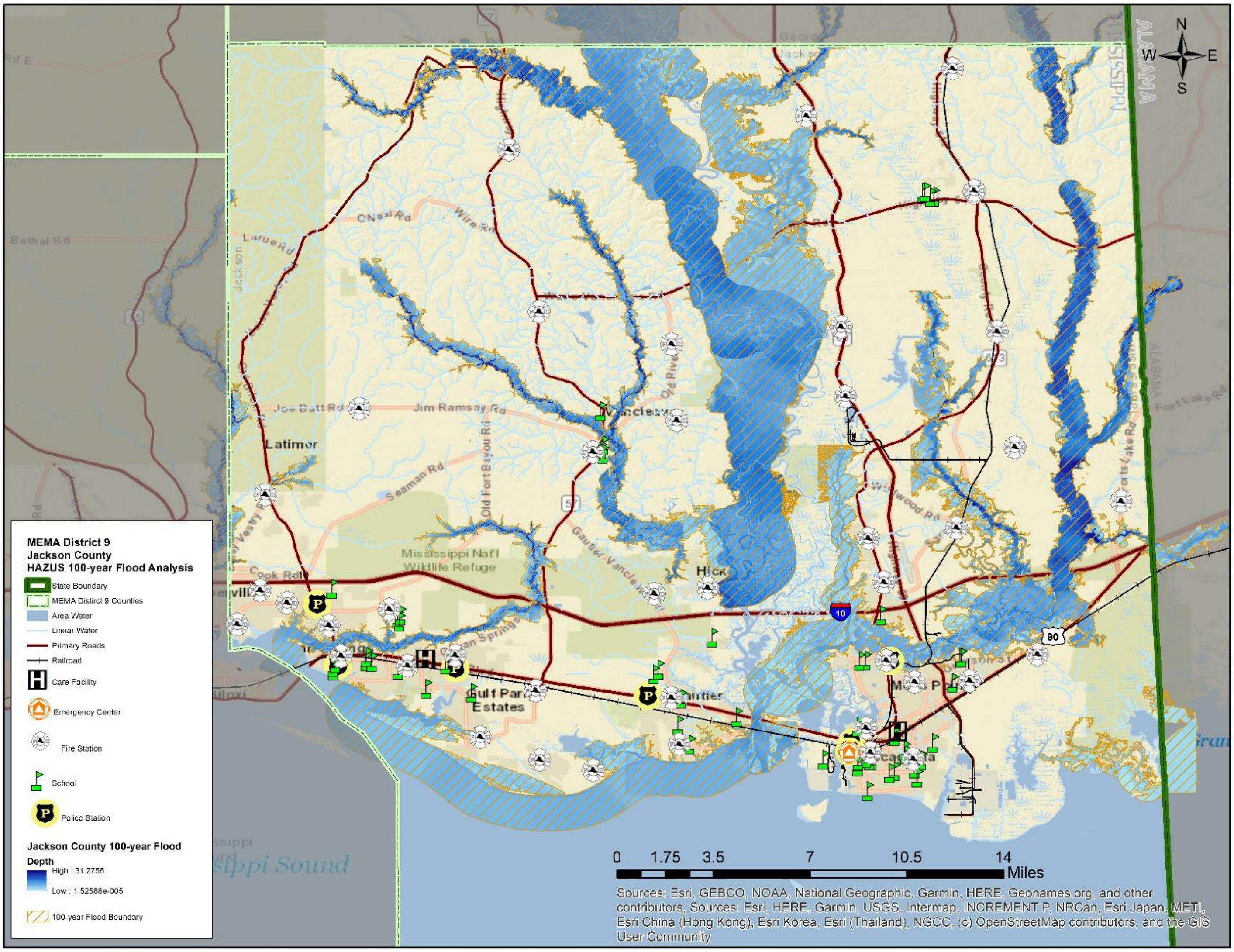


Figure D. 16: HAZUS 100-Year Flood Analysis


MEMA District 9
Jackson County
HAZUS 100-year Flood Analysis
State Boundary
MEMA Distirct 9 Counties
Area Water
Linear Water
Primary Roads
Railroad
Care Facility
Emergency Center
Fire Station
School
Police Station
Jackson County 100-year Flood Depth
High : 31.2756
Low : 1.52588e-005
100-year Flood Boundary
Latimer
Joe Batt Rd
Jim Ramsay Rd
Seaman Rd
Old Fort Bayou Rd
Mississippi Nat'l Wildlife Refuge
Cook Rd
Gulf Park Estates
Gautier
Hick
Vancleave
Wire Rd
ONeal Rd
Larue Rd
Bethel Rd
Fort Lake Rd
Wildwood Rd
Mississippi Sound
Biloxi
ALABAMA
MISSISSIPPI
10
90
57
N
S
E
W
0
1.75
3.5
7
10.5
14
Miles
Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

HISTORICAL OCCURRENCES

Floods were at least partially responsible for five disaster declarations in Jackson County in 1974, 1980, 1990, 1995 and 2009. Information from the National Climatic Data Center was used to ascertain additional historical flood events. The National Climatic Data Center reported a total of 25 events in Jackson County since 1996. These events accounted for almost $4.1 million in property damage. Based on recorded historic events through NCEI , Jackson County has experienced several events ranging up to 8'' of rainfall in single events. Such events have resulted in minor to major flooding throughout the county, no specific flood depths were reported, but based on damage estimates flood depths range from a few inches to feet of water within floodways, for specific flood depths additional analyses is required through hydrologic and hydraulic studies. A summary of these events is presented in Table D.12. Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in Table D.13.

TABLE D.12: SUMMARY OF FLOOD OCCURRENCES IN JACKSON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Gautier	1	0/0	$0	$0
Moss Point	2	0/0	$1,325,787	$55,241
Ocean Springs	3	0/0	$0	$0
Pascagoula	6	0/0	$128,387	$5,350
Unincorporated Area	20	0/0	$2,646,915	$110,288
JACKSON COUNTY TOTAL	32	0/0	$4,101,089	$170,879

Source: National Climatic Data Center

TABLE D.13: HISTORICAL FLOOD EVENTS IN JACKSON COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Gautier				
GAUTIER	4/15/2021	Flash Flood	0/0	$0
Moss Point				
MOSS PT	8/5/2002	Flash Flood	0/0	$66,941
JACKSON CO ARPT	8/30/2012	Flash Flood	0/0	$1,258,846
Ocean Springs				
OCEAN SPGS	4/6/2005	Flash Flood	0/0	$0
OCEAN SPGS	4/29/2014	Flash Flood	0/0	$0
OCEAN SPGS ARPT	6/22/2017	Flash Flood	0/0	0/0
Pascagoula				
PASCAGOULA	6/20/2002	Flood	0/0	$0
PASCAGOULA	8/9/2006	Heavy Rain	0/0	$0
PASCAGOULA	9/3/2011	Flash Flood	0/0	$26,769
PASCAGOULA	9/27/2015	Flash Flood	0/0	$101,618
PASCAGOULA	8/30/2017	Flash Flood	0/0	$0
PASCAGOULA	7/23/2019	Flash Flood	0/0	$0
Unincorporated Area				
PECAN	4/15/1996	Flash Flood	0/0	$0
SOUTH PORTION	7/8/1996	Flood	0/0	$153,507
COUNTYWIDE	1/7/1998	Flash Flood	0/0	$73,881

Location	Date	Type	Deaths/Injuries	Property Damage*
COUNTYWIDE	3/7/1998	Flash Flood	0/0	$0
JACKSON (ZONE)	3/8/1998	Flood	0/0	$0
COUNTYWIDE	6/11/2001	Flash Flood	0/0	$203,997
JACKSON (ZONE)	7/1/2003	Flood	0/0	$130,898
COUNTYWIDE	3/31/2005	Heavy Rain	0/0	$0
COUNTYWIDE	4/1/2005	Flash Flood	0/0	$246,649
JACKSON (ZONE)	4/1/2005	Flood	0/0	$246,649
ORANGE GROVE	3/28/2009	Flash Flood	0/0	$0
NORTH BILOXI ARPT	9/22/2009	Flash Flood	0/0	$0
OCEAN SPGS ARPT	9/5/2012	Flash Flood	0/0	$10,490
OCEAN SPGS ARPT	9/5/2012	Flash Flood	0/0	$0
ARENA	2/25/2013	Flash Flood	0/0	$0
VANCLEAVE	5/1/2013	Flash Flood	0/0	$1,550,842
JACKSON (ZONE)	10/25/2015	Coastal Flood	0/0	$0
WADE	6/29/2017	Flash Flood	0/0	$0
NORTH BILOXI ARPT	7/06/2021	Flash Flood	0/0	$30,000
ORANGE GROVE	8/30/2021	Flash Flood	0/0	$0

*Property damage is reported in 2022 dollars; all damage may not have been reported.
Source: National Climatic Data Center

HISTORICAL SUMMARY OF INSURED FLOOD LOSSES

According to FEMA flood insurance policy records as of October 2016, there have been 8,963 flood losses reported in Jackson County through the National Flood Insurance Program (NFIP) since 1978, totaling almost $699.3 million in claims payments. A summary of these figures for the county is provided in Table D.14. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Jackson County were either uninsured, denied claims payment, or not reported.

TABLE D.14: SUMMARY OF INSURED FLOOD LOSSES IN JACKSON COUNTY

Location	Number of Policies	Flood Losses	Claims Payments
Gautier	1,724	681	$59,663,535
Moss Point	1,131	886	$28,225,055
Ocean Springs	2,622	823	$86,224,366
Pascagoula	4,944	2,763	$221,292,452
Unincorporated Area	5,996	3,810	$303,874,274
JACKSON COUNTY TOTAL	16,417	8,963	$699,279,682

Source: National Flood Insurance Program

REPETITIVE LOSS PROPERTIES

According to the Mississippi Emergency Management Agency, there are 1,259 non-mitigated repetitive loss properties located in Jackson County, which accounted for 3,142 losses and over $175.6 million in claims payments under the NFIP. The average claim amount for these properties is $55,891. Of the 1,259 properties, 1,150 are single family, 9 are 2-4 family, 15 are assumed condominium, 23 are other residential, and 62 are non-residential. Without mitigation, these properties will likely continue to experience flood losses. Table D.9 presents detailed information on repetitive loss properties and NFIP claims and policies for Jackson County.

During the 2022 HMP update process updated NFIP/Repetitive Loss data was requested; however, no new data was made available. The 2016 data is considered the best available data for the plan update. With a lack of data provided via FEMA the National Resource Defense Council (NRDC) was utilized to provide unofficial NFIP/RL data. Based on data available via the (NRDC), Jackson County has experienced a total of 10,784 NFIP claims totaling $693,978,296 in payments. The total number of SRL properties is 190 totaling 48.044,517 claim payments.
[Losing Ground: Severe Repetitive Flooding in the United States (nrdc.org)]

TABLE D.15: REPETITIVE LOSS PROPERTIES IN JACKSON COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Gautier	147	135 single family; 4 assumed condo; 1 other residential; 7 non-residential	335	$16,568,956	$5,576,243	$22,145,199	$66,105
Moss Point	186	178 single family; 1 assumed condo; 7 non-residential	483	$12,142,035	$2,958,376	$15,100,411	$31,264
Ocean Springs	50	44 single family; 1 2-4 family; 1 assumed condo; 1 other residential; 3 other non-residential	135	$13,249,569	$2,042,105	$15,291,674	$113,272
Pascagoula	516	450 single family; 8 2-4 family; 7 assumed condo; 19 other residential; 32 other non-residential	1,219	$56,849,172	$18,164,235	$75,013,407	$61,537

Unincorporated Area	360	343 single family; 2 assumed condo; 2 other residential; 13 other non-residential	970	$37,493,776	$10,564,551	$48,058,327	$49,545
JACKSON COUNTY TOTAL	1,259		3,142	$136,303,508	$39,305,510	$175,609,018	$55,891

Source: Federal Emergency Management Agency, National Flood Insurance Program

PROBABILITY OF FUTURE OCCURRENCES

Flood events will remain a threat in Jackson County, and the probability of future occurrences will remain highly likely (100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figure above, which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain). Further, as described in other hazard profiles, it is highly likely that Jackson County will continue to experience inland flooding associated with large tropical storms and hurricanes.

It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county. For example, the eastern half of the county has more floodplain and thus a higher risk of flood than the rest of the county. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

It should also be noted that anticipated sea level rise will increase the probability and intensity of future tidal flooding events in years to come. Rising sea level over time will shorten the return period (increasing the frequency) of significant flood events. This hazard is discussed elsewhere in this section.

FEMA NRI Expected Annual Loss Estimates

Table D.16: Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR FLOODING EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1 event/year	0.44	$5,131,134	$303,00	$2,670	$5,436,806	94.1	Relatively Moderate

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table D.17: Jackson County Hazard Specific Risk Index Table

JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – FLOODING	
Risk Index Score	Risk Index Rating
94.3/100	Relatively Moderate

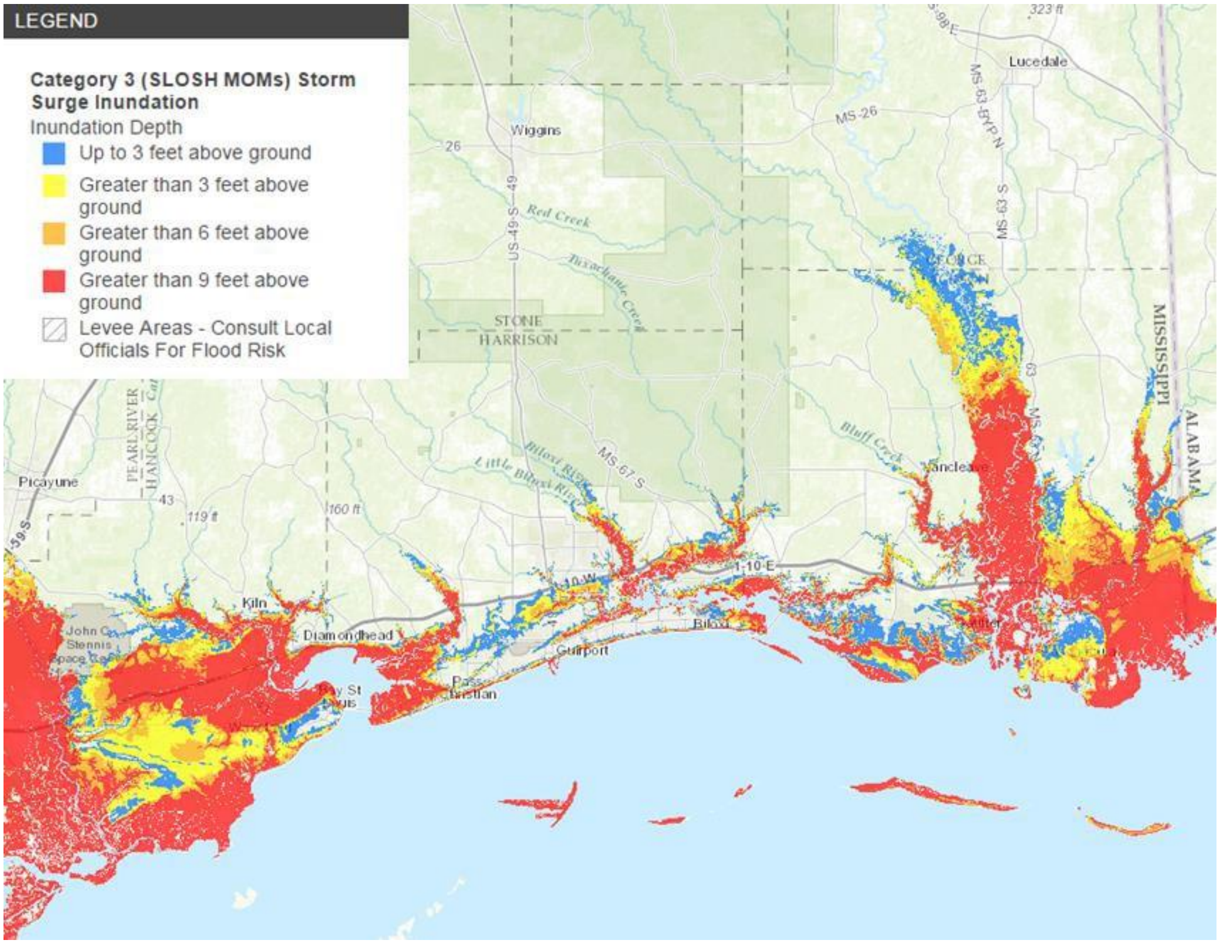
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*
Source: FEMA National Risk Index (2023)

Storm Surge

LOCATION AND SPATIAL EXTENT

There are many areas in Jackson County that are subject to potential storm surge inundation as modeled and mapped by the National Oceanic and Atmospheric Administration (NOAA). Figure D.17 illustrates hurricane storm surge inundation zones based on a Category 3 storm. The illustration is derived from geo- referenced SLOSH (Sea, Lake, and Overland Surge from Hurricanes) data produced by the USACE in coordination with NOAA. SLOSH is a modeling tool used to estimate storm surge for coastal areas resulting from historical, hypothetical, or predicted hurricanes taking into account maximum expected levels for pressure, size, forward speed, track, and winds. Therefore, the SLOSH data is best used for defining the potential maximum surge associated with various storm intensities for any particular location. As shown in the figure, the entire coast and central portion of Jackson County is at high risk to storm surge inundation. Inland areas may also experience substantial flooding during a storm event.

FIGURE D.17: STORM SURGE RISK AREAS IN THE MEMA DISTRICT 9 REGION



Source: NOAA

HISTORICAL OCCURRENCES

According to the National Climatic Data Center, nine storm surge events have been reported for Jackson County since 1998. These events accounted for almost $2.8 billion (2016 dollars) in property damage. A summary of these events is presented in Table D.18. Detailed information on the recorded storm surge events can be found in Table D.19.

TABLE D.18: SUMMARY OF STORM SURGE EVENTS IN JACKSON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Gautier	0	0/0	$0	$0
Moss Point	0	0/0	$0	$0
Ocean Springs	1	0/0	$369,406	$15,392
Pascagoula	0	0/0	$0	$0

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Unincorporated Area	8	0/0	$2,778,107,544	$115,754,481

JACKSON COUNTY TOTAL	9	0/0	$2,778,476,950	$115,769,873

Source: National Climatic Data Center

TABLE D.19: HISTORICAL STORM SURGE EVENTS IN JACKSON COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Gautier				
None reported	--	--	--	--
Moss Point				
None reported	--	--	--	--
Ocean Springs				
OCEAN SPGS	2/15/1998	2-4 feet above normal	0/0	$369,406
Pascagoula				
None reported	--	--	--	--
Unincorporated Area				
JACKSON (ZONE)	6/30/2003	--	0/0	$369,406
JACKSON (ZONE)	9/15/2004	3-5 feet above normal	0/0	$327,246
JACKSON (ZONE)	7/5/2005	3-5 feet above normal	0/0	$1,530,035
JACKSON (ZONE)	8/29/2005	17-21 feet	0/0	$246,649
JACKSON (ZONE)	9/1/2008	4.5-6 feet	0/0	$2,774,804,148
JACKSON (ZONE)	9/11/2008	2-4 feet above normal	0/0	$559,335
JACKSON (ZONE)	9/2/2011	2-4 feet above normal	0/0	$0
JACKSON (ZONE)	8/28/2012	5 feet	0/0	$10,707
JACKSON (ZONE)	10/25/2015	1-3 feet above normal	0/0	$0
JACKSON (ZONE)	6/20/2017	4 feet above normal	0/0	$0
JACKSON (ZONE)	10/07/2017	4-7 feet above normal	0/0	$0
JACKSON (ZONE)	10/09/2018	2-3 feet above normal	0/0	$0
JACKSON (ZONE)	7/11/2019	2-3 feet above normal	0/0	$0
JACKSON (ZONE)	9/15/2020	3-4 feet above normal	0/0	$0
JACKSON (ZONE)	9/22/2020	2-3 feet above normal	0/0	$0
JACKSON (ZONE)	10/28/2020	9-10 feet above normal	0/0	$0
JACKSON (ZONE)	6/19/2021	2-3 feet above normal	0/0	$0
JACKSON (ZONE)	8/28/2021	3-4 feet above normal	0/0	$0

*Property damage is reported in 2022 dollars; all damage may not have been reported.

Source: National Climatic Data Center

PROBABILITY OF FUTURE OCCURRENCES

It is highly likely (100 percent annual probability) that Jackson County will continue to experience storm surge associated with large tropical storms, hurricanes, and squalls combined with high tides. As noted in the preceding section (under Flood), anticipated sea level rise will increase the probability and intensity of future storm surge events in years to come. This rise in sea level will not only increase the probability and intensity of tidal flooding events, but will also contribute to the loss of coastal wetlands and erosion of sand beaches that act as protective buffers against storm surge events.

FEMA NRI Expected Annual Loss Estimates

Table D.20: Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR COASTAL FLOODING/STORM SURGE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
5.1 events/year	0.01	$106,284	$2,611,929	n/a	$2,718,212	87.4	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table D.21: Jackson County Hazard Specific Risk Index Table

JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – COASTAL FLOODING/STORM SURGE	
Risk Index Score	Risk Index Rating
87.1/100	Relatively Moderate
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

FIRE-RELATED HAZARDS

Drought

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that Jackson County would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment but may exacerbate wildfire conditions.

HISTORICAL OCCURRENCES

According to the U.S. Drought Monitor, Jackson County had drought levels of Severe or worse in 7 of the last 22 years (January 2000-October 2022). Table D.22 shows the most severe drought classification for each year, according to U.S. Drought Monitor classifications. It should be noted that the U.S. Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

TABLE D.22: HISTORICAL DROUGHT OCCURRENCES IN JACKSON COUNTY

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

	Jackson County
2000	EXCEPTIONAL
2001	MODERATE
2002	SEVERE
2003	ABNORMAL
2004	MODERATE
2005	ABNORMAL
2006	EXTREME
2007	MODERATE
2008	ABNORMAL
2009	MODERATE
2010	SEVERE
2011	EXCEPTIONAL
2012	SEVERE
2013	MODERATE
2014	SEVERE
2015	MODERATE
2016	MODERATE
2017	NONE
2018	NONE
2019	NONE
2020	NONE

2021	NONE
2022	NONE

Source: United States Drought Monitor

No anecdotal information was available from the National Climatic Data Center on droughts in Jackson County.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that Jackson County has a probability level of likely (between 10 and 100 percent annual probability) for future drought events. However, the extent (or magnitude) of drought and the amount of geographic area covered by drought, varies with each year. Historic information indicates that there is a much lower probability for extreme, long-lasting drought conditions.

FEMA NRI Expected Annual Loss Estimates

Table D.23: Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR DROUGHT EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
12.7 events/year	n/a	n/a	n/a	$53,699	$53,699	60.3	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table D.24: Jackson County Hazard Specific Risk Index Table

JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – DROUGHT	
Risk Index Score	Risk Index Rating
58.7/100	Relatively Low

*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.*

*FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*

Source: FEMA National Risk Index (2023)

Lightning

LOCATION AND SPATIAL EXTENT

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Jackson County is uniformly exposed to lightning.

HISTORICAL OCCURRENCES

According to the National Climatic Data Center, there have been 18 recorded lightning events in Jackson County since 1996. These events resulted in almost $336,000 (2016 dollars) in damages. Furthermore, lightning has caused one fatality and three injuries in the county. A summary of these events is presented in Table D.25. Detailed information on historical lightning events can be found in Table D.26.

It is certain that more than 18 events have impacted the county. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE D.25: SUMMARY OF LIGHTNING OCCURRENCES IN JACKSON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2022)	Annualized Property Losses
Gautier	0	0/0	$0	$0
Moss Point	1	0/0	$2,678	$103
Ocean Springs	4	0/0	$89,747	$3,452
Pascagoula	8	1/3	$30,557	$1,175
Unincorporated Area	5	0/0	$212,656	$8,179
JACKSON COUNTY TOTAL	18	1/3	$335,638	$12,909

Source: National Climatic Data Center

TABLE D.26: HISTORICAL LIGHTNING OCCURRENCES IN JACKSON COUNTY

Location	Date	Deaths/ Injuries	Property Damage*	Details
Gautier				
None reported	--	--	--	--
Moss Point				
MOSS PT	8/2/2002	0/0	$2,678	Lightning struck a power pole and
Ocean Springs				
OCEAN SPGS	4/29/1996	0/0	$6,140	Lightning struck an electric meter and caused a house fire.

Location	Date	Deaths/ Injuries	Property Damage*	Details
OCEAN SPGS	9/21/1996	0/0		Lightning damaged several transformers setting the utility poles on fire.
OCEAN SPGS	6/7/2001	0/0	$81,599	A lightning strike killed a 25 year old women in Gulfport shortly after lightning injured a 53 year old man in the nearby community of Pass Christian. Lightning also started a fire at a business in Oceans Springs which resulted in $60,000 damage.
OCEAN SPGS	8/2/2002	0/0	$2,008	A lightning strike caused a fire in an exterior wall of a house.
Pascagoula				
PASCAGOULA	3/5/1998	0/0	$0	Lightning struck and sheared off a 60-foot utility pole resulting in an extensive power outage, up to 7 hours, in Pascagoula, Ocean Springs and Gautier.
PASCAGOULA	5/6/1998	0/0	$29,553	Lightning struck a restaurant and office building causing damage to computers and other equipment.
PASCAGOULA	8/2/2002	0/0	$1,004	A lightning strike damaged some of the electrical outlets in a house.
PASCAGOULA	8/2/2002	0/0	$0	Lightning struck a gas meter.
PASCAGOULA	8/2/2002	0/0	$0	Lightning struck an antenna on a house.
PASCAGOULA	8/2/2003	0/0	$0	Lightning ignited a fire of a tank containing 350,000 barrels of crude oil at an oil refinery.
PASCAGOULA	6/28/2004	0/3	$0	Three people were struck by lightning at a ship yard. One person was transported to a hospital and suffered burns on his face and hands and a broken jaw.
PASCAGOULA	7/31/2011	1/0	$0	Broadcast media reported that a person was struck and killed by lightning while on the pier at Pascagoula Beach Pier.
Unincorporated Area				
ESCATAWPA	6/7/1996	0/0	$153,507	A lightning strike started a fire which destroyed a house.
ESCATAWPA	7/5/1998	0/0	$14,776	Lightning hit a church blowing out most of the lights, destroying the security system, and cracking windows.
VANCLEAVE	7/21/2003	0/0	$32,725	Lightning caused a fire that damaged the roof of a house.
VANCLEAVE	7/21/2003	0/0	$1,309	A lightning strike at a gas station caused minor damage.

HURLEY	7/12/2013	0/0	$10,339	Lightning strikes damaged 5 golf carts, 3 chargers and a sprinkler system at Whispering Pines Golf Course in Hurley.

*Property damage is reported in 2022 dollars; All damage may not have been reported.
Source: National Climatic Data Center

PROBABILITY OF FUTURE OCCURRENCES

Although there was not a high number of historical lightning events reported in Jackson County via NCDC data, it is a regular occurrence accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN), Jackson County is located in an area of the country that experienced an average of 4 to 12 and up lightning flashes per square kilometer per year between 2005 and 2014. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table D.27: Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR LIGHTNING EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
174.6 events/year	0.07	$807,149	$29,835	n/a	$836,984	94.0	Relatively High
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table D.28: Jackson County Hazard Specific Risk Index Table

JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – LIGHTNING	
Risk Index Score	Risk Index Rating
94.3/100	Relatively High
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other*	

communities at the same level, ranging from "Very Low" to "Very High."
Source: FEMA National Risk Index (2023)

Wildfire

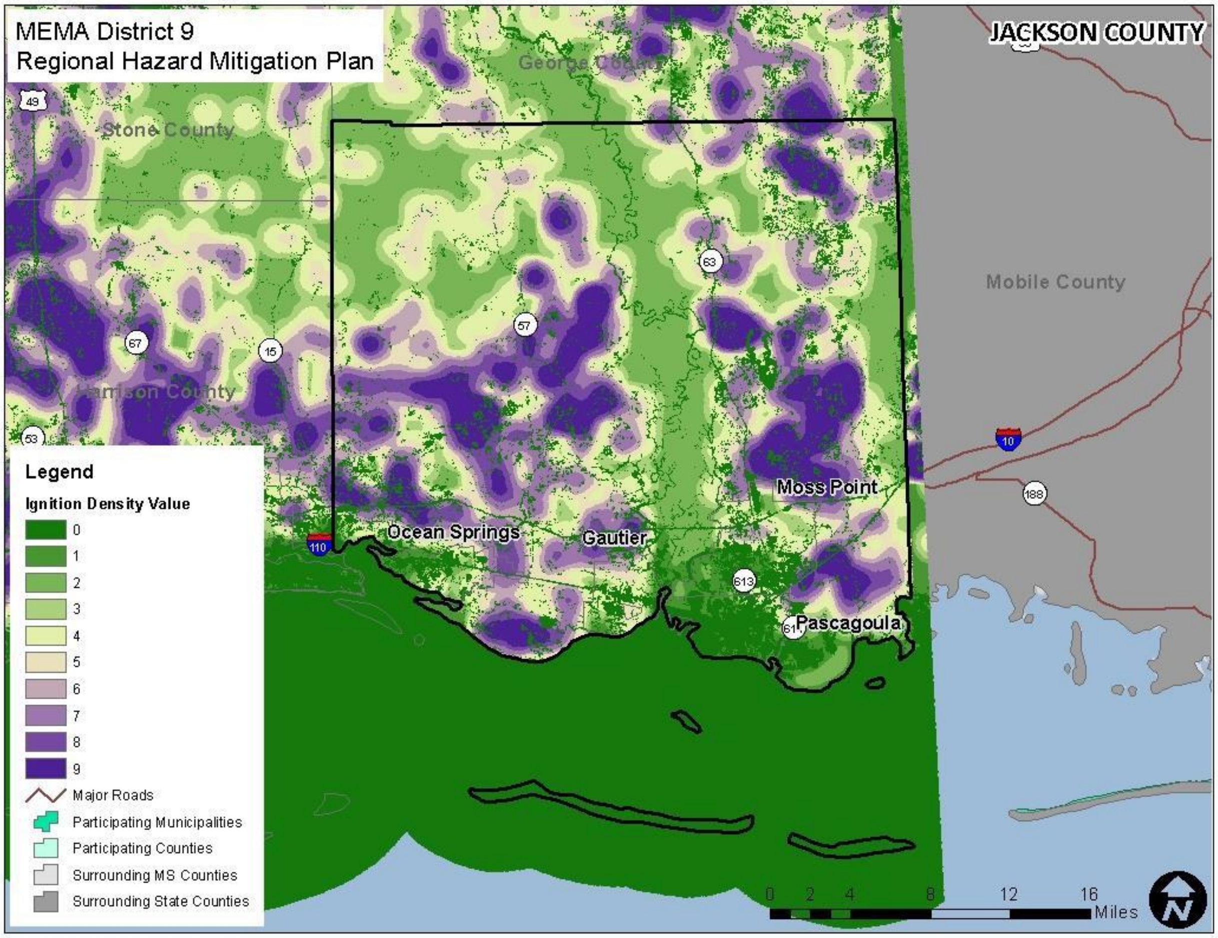
LOCATION AND SPATIAL EXTENT

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban- wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Wildfire Ignition Density data shown in the figure below give an indication of historic location.

HISTORICAL OCCURRENCES

Figure D.18 shows the Wildfire Ignition Density in Jackson County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.

FIGURE D.18: WILDFIRE IGNITION DENSITY IN JACKSON COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the Mississippi Forestry Commission from 2007 to 2022, Jackson County experiences an average of 62 wildfires annually which burn a combined 1,707 acres, on average per year. The data indicates that most of these fires are small, averaging 30 acres per fire. Table D.29 provides a summary of wildfire occurrences in Jackson County and Table D.30 lists the number of reported wildfire occurrences in the county between the years 2007 and 2022.

TABLE D.29: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2007 -2022)*

	Jackson County
Average Number of Fires per year	62.1
Average Number of Acres Burned per year	1,707
Average Number of Acres Burned per fire	30.4

*These values reflect averages since 2007.
Source: Mississippi Forestry Commission

TABLE D.30: HISTORICAL WILDFIRE OCCURRENCES IN JACKSON COUNTY

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Jackson County																
Number of Fires	107	73	79	47	161	67	71	44	88	50	42	23	40	35	23	44
Number of Acres Burned	1,863	1,742	1,441	418	3,660	776	1,272	621	1,754	5,020	1,998	444	1,742	1,034	537	2,995

Source: Mississippi Forestry Commission

PROBABILITY OF FUTURE OCCURRENCES

Wildfire events will be an ongoing occurrence in Jackson County. Figure D.14 shows that there is some probability a wildfire will occur throughout the county. However, the likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Jackson County for future wildfire events is highly likely (100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table D.31. Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WILDFIRE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.434% chance/year	0.05	$636,083	$5,100,014	$55	$5,736,151	96.6	Relatively Moderate

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

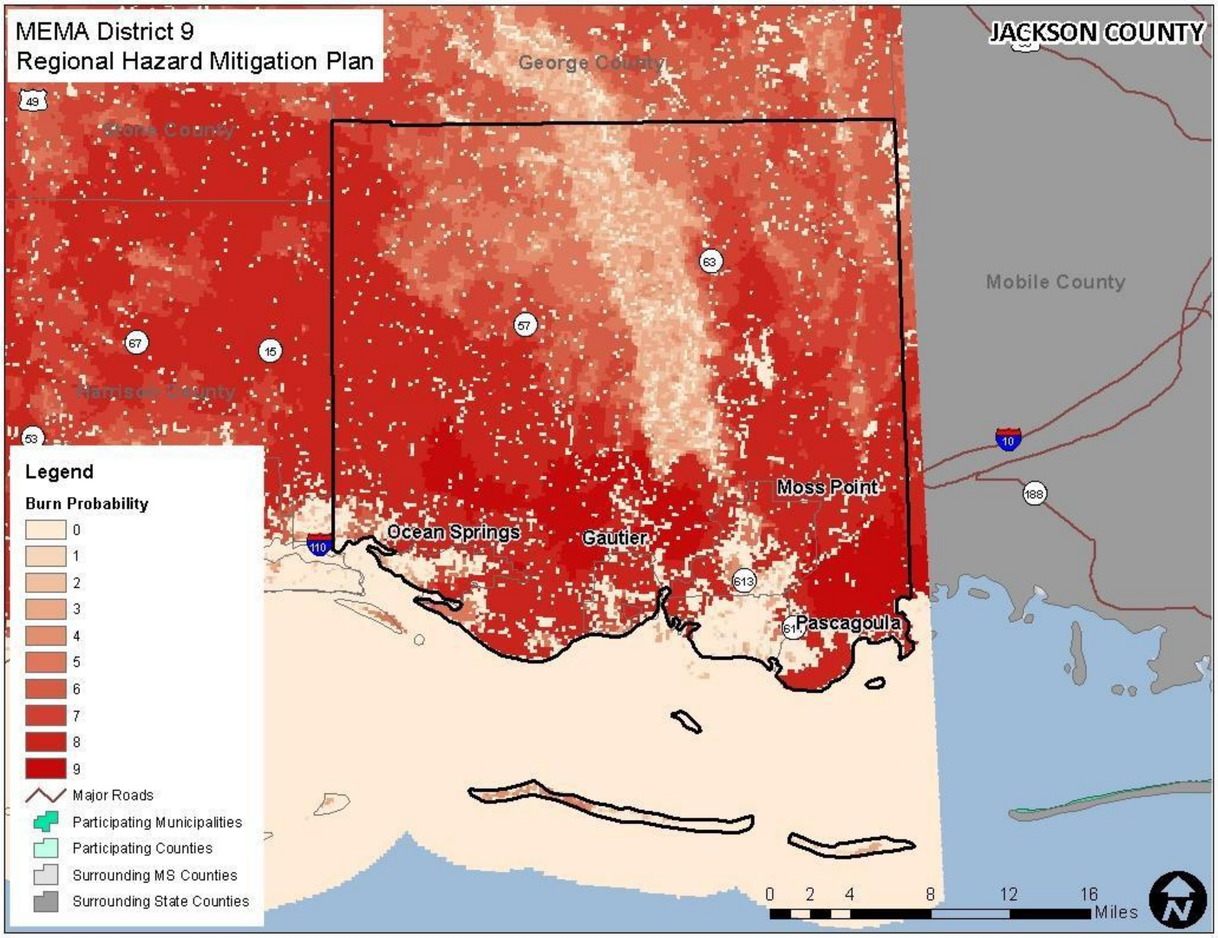
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table D.32: Jackson County Hazard Specific Risk Index Table

JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WILDFIRE	
Risk Index Score	**Risk Index Rating**
96.4/100	Relatively Moderate
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

FIGURE D.19: BURN PROBABILITY IN JACKSON COUNTY



Source: Southern Wildfire Risk Assessment

Figure D.20: Wildfire Hazard Potential

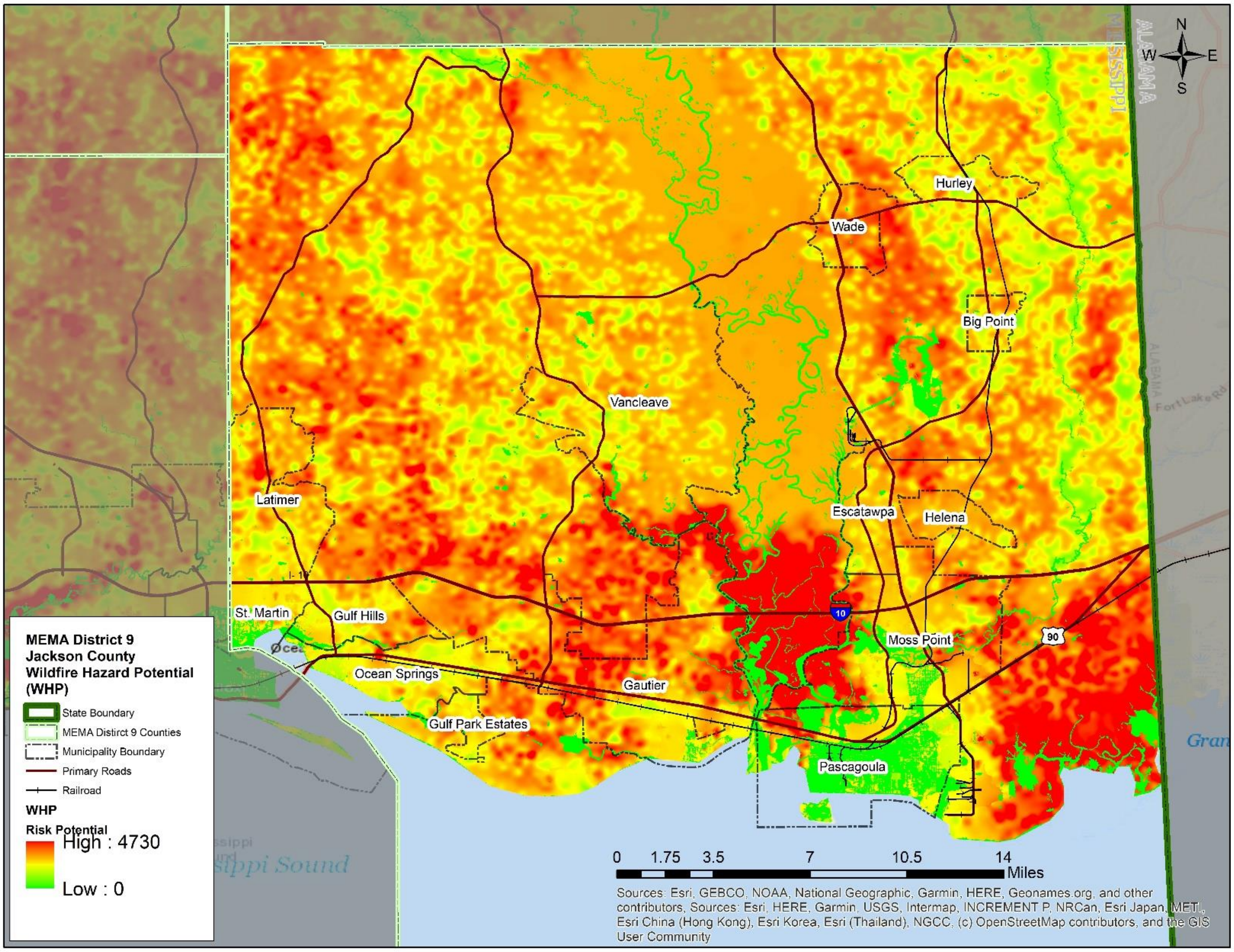
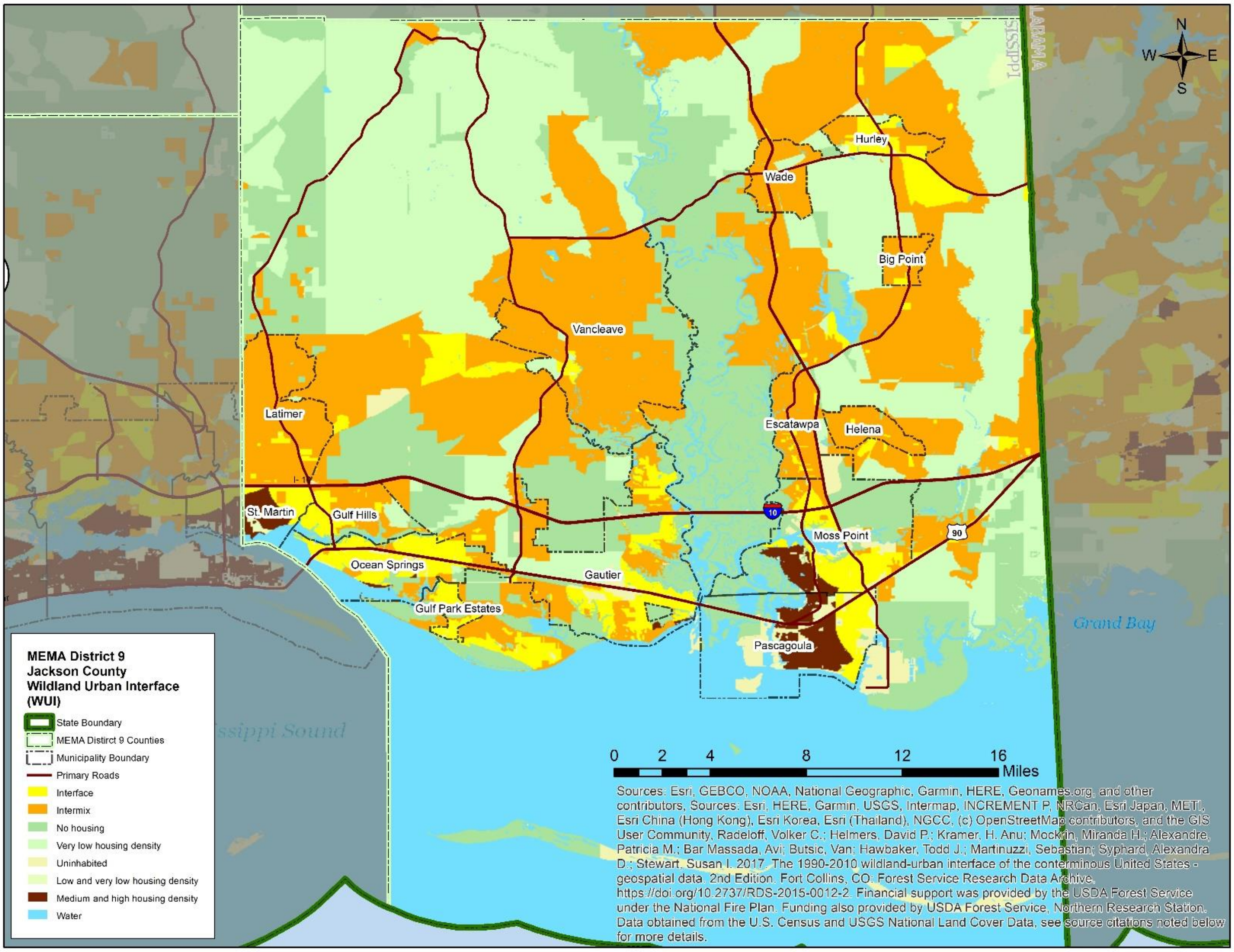


Figure D.21: Wildland Urban Interface



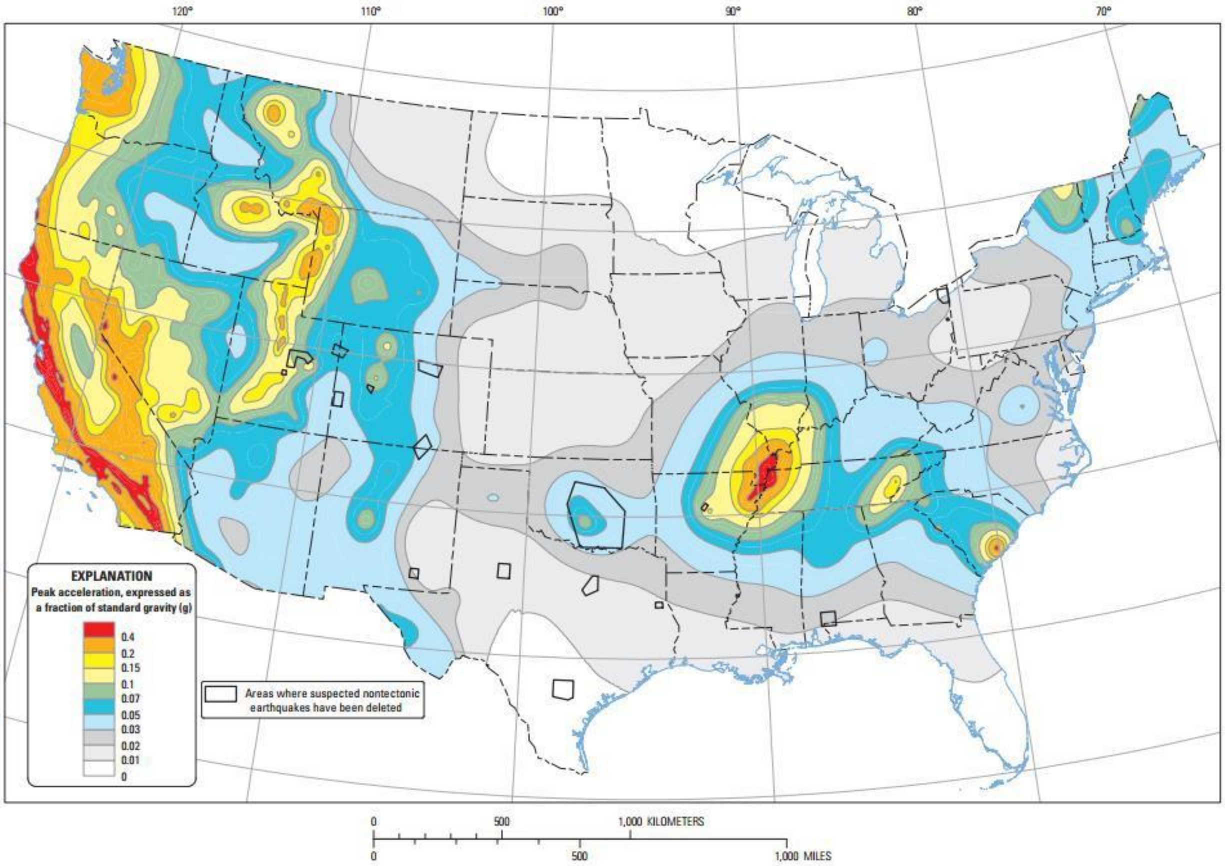
GEOLOGIC HAZARDS

Earthquake

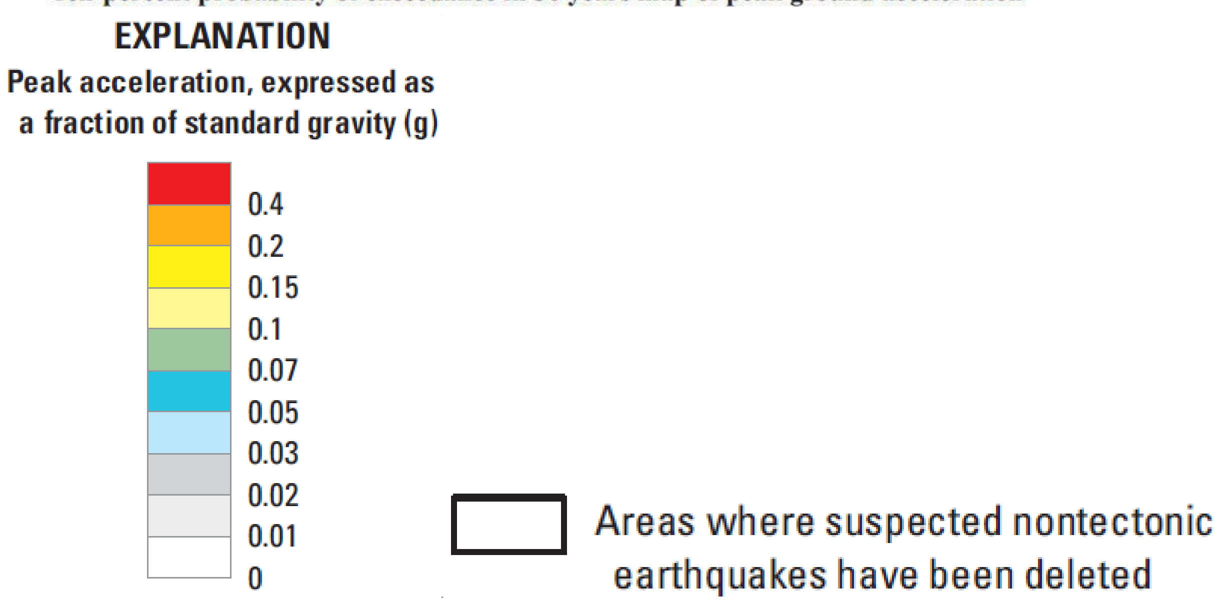
LOCATION AND SPATIAL EXTENT

Figure D.22 shows the intensity level associated with Jackson County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Jackson County lies within an approximate zone of level "1" to "2" ground acceleration. This indicates that the county exists within an area of low seismic risk.

FIGURE D.22: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



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



Source: United States Geological Survey, 2014

The primary source of potential damage to Jackson County from an earthquake is the New Madrid Seismic Zone (NMSZ). Historically, a series of earthquakes in 1811 and 1812 demonstrated that this fault zone can produce high magnitude seismic events, sometimes on the scale of a 7.5-8.0 on the Richter scale. The biggest challenge with earthquakes that occur in this area of seismic activity is predicting the recurrence of earthquakes emanating from this zone. Although the magnitude of earthquakes from the NMSZ can be large, they occur very irregularly and fairly infrequently. This makes it extremely difficult to project when they will occur.

It should also be noted that the State of Mississippi Hazard Mitigation Plan identifies certain areas of concern for liquefaction and lists the counties and corresponding zones within those counties that have the highest liquefaction potential. Jackson County does not have any identified liquefaction potential risk.

HISTORICAL OCCURRENCES

No earthquakes are known to have affected Jackson County since 1638. Table D.33 provides a summary of earthquake events reported by the National Centers for Environmental Information (formerly National Geophysical Data Center) between 1638 and 1985, and Figure D.23 presents a map showing earthquakes whose epicenters have occurred near the county between 1985 and 2022 (no earthquakes occurred within the county boundaries during this period). A detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known) can be found in Table D.34.

TABLE D.33: SUMMARY OF SEISMIC ACTIVITY IN JACKSON COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Gautier	0	--	--
Moss Point	0	--	--
Ocean Springs	0	--	--
Pascagoula	0	--	--
Unincorporated Area	0	--	--
JACKSON COUNTY TOTAL	0	--	--

Source: National Geophysical Data Center

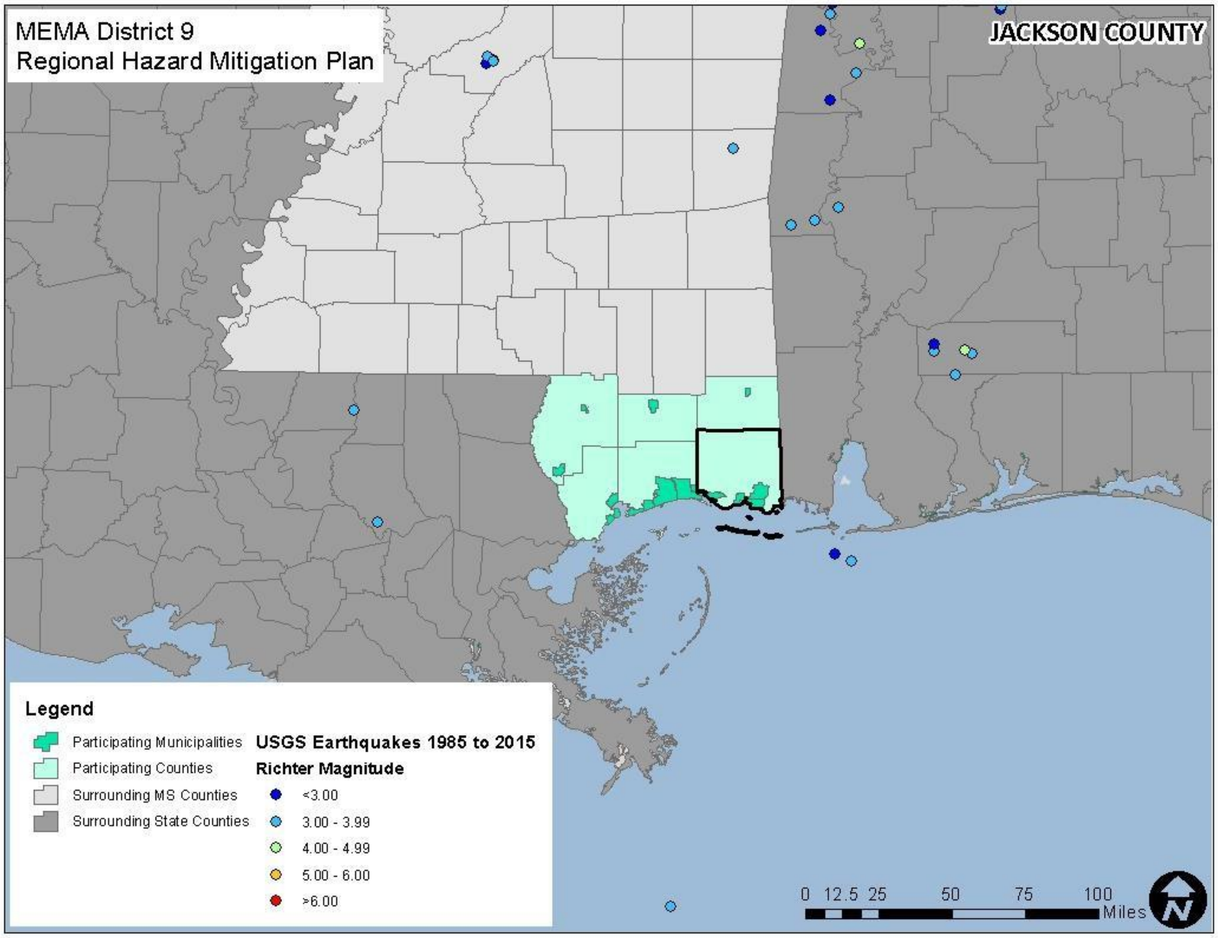
TABLE D.34: SIGNIFICANT SEISMIC EVENTS IN JACKSON COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Gautier				
None reported	--	--	--	--
Moss Point				
None reported	--	--	--	--
Ocean Springs				
None reported	--	--	--	--
Pascagoula				
None reported	--	--	--	--

Location	Date	Epicentral Distance	Magnitude	MMI
Unincorporated Area				
None reported	--	--	--	--

Source: National Geophysical Data Center

FIGURE D.23: HISTORIC EARTHQUAKES WITH EPICENTERS NEAR JACKSON COUNTY (1985-2022)



Source: United States Geological Survey

PROBABILITY OF FUTURE OCCURRENCES

The probability of significant, damaging earthquake events affecting Jackson County is unlikely. However, it is possible that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated to be between 1 and 10 percent (possible).

FEMA NRI Expected Annual Loss Estimates

Table D.35: Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR EARTHQUAKE EVENTS							
Annualized	Population	Population	Building	Agriculture	Total	Expected	Expected

Frequency		Equivalence	Value	Value	Value	Annual Loss Score	Annual Loss Rating
0.049% chance/year	0.01	$59,301	$223,517	n/a	$282,818	62.5	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table D.36: Jackson County Hazard Specific Risk Index Table

JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – EARTHQUAKE	
Risk Index Score	**Risk Index Rating**
63.6/100	Very Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

WIND-RELATED HAZARDS

Extreme Cold

Extreme cold typically impacts a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme cold conditions.

HISTORICAL OCCURRENCES

Data from the National Climatic Data Center was used to determine historical extreme cold events in Jackson County. Two events were reported:

February 2, 1996 – Cold/Wind Chill – An arctic airmass overspread much of south Mississippi bringing the longest extended period of cold weather since 1989. In Amite County, 4SW Gillsburg, a 67 year old man died from hypothermia on the 4th after the fire in a wood burning heater went out. Considerable property damage resulted from broken pipes due to the extended period of subfreezing temperatures. In Jackson County, Moss Point and Gautier had broken pipes in 100 and 147 houses, respectively.

December 18, 1996 – Cold/Wind Chill – An arctic airmass overspread south Mississippi resulting in three consecutive nights with subfreezing minimum temperatures. Temperatures lowered into the mid-teens over the southwest section of the state and near 20 degrees along the Gulf Coast.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of Jackson County has a probability level of possible (between 1 and 10 percent annual probability) for future extreme cold events to impact the county.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not anticipate any losses from an extreme cold event.

Extreme Heat

Heat waves typically impact a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme heat conditions.

HISTORICAL OCCURRENCES

The National Climatic Data Center was used to determine historical heat wave occurrences in the county.

July 2000 – July was a hot and dry month in Southeast Mississippi. In Beaumont the temperature was 100 degrees or higher eleven days during the month with the hottest being 105 degrees. In Richton the temperature was 100 degrees or higher three days during the month with the hottest being 102 degrees. In Waynesboro the temperature was 100 degrees or higher four days during the month with the hottest being 103 degrees. In Wiggins the temperature was 100 degrees or higher nine days during the month with 105 degrees being the hottest. In addition to being hot is was also a dry month across the area. Most stations ended up with below normal rainfall totals for the month. In Jackson County, a 68 year old man died from heat exhaustion while sitting in his pickup truck in a parking lot with the windows rolled up, and 10 days later, a 58 year old male was found dead from heat exhaustion while sitting in his truck in the driveway of his home with the windows rolled up.

August 2010 – Hot and humid conditions produced heat index values between 110 and 115 degrees over coastal Mississippi. A 48 year old construction worker collapsed and died while working on a highway construction project. Jackson County coroner classified the fatality as heat related with the cause of death as hyperthermia.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of Jackson County has a probability level of highly likely (100 percent annual probability) for future heat wave events.

FEMA NRI Expected Annual Loss Estimates

Table D.37: Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR EXTREME HEAT EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1.6 events/year	0.14	$1,590,084	$115	$77	$1,590,276	93.9	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table D.38: Jackson County Hazard Specific Risk Index Table

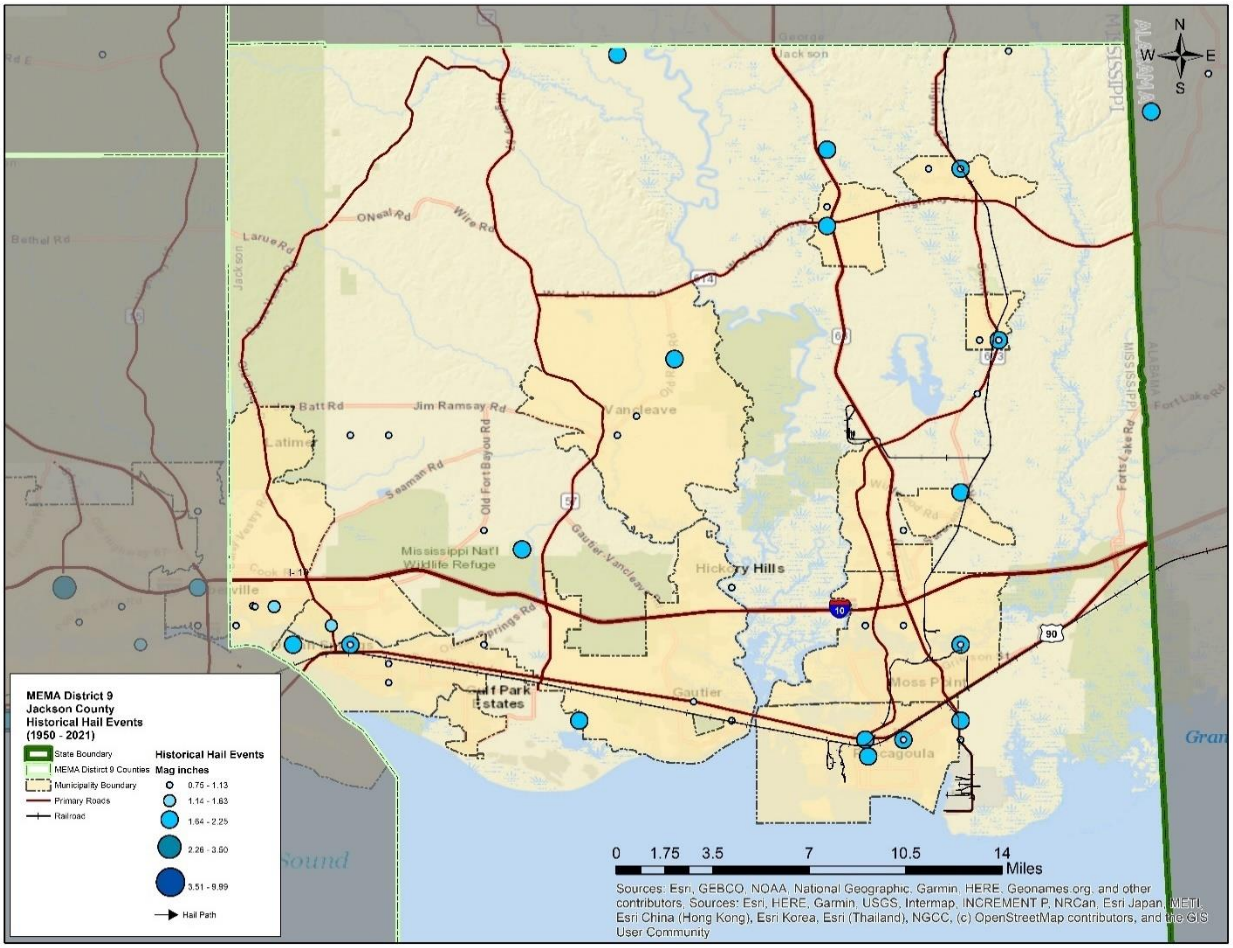
JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – EXTREME HEAT	
Risk Index Score	Risk Index Rating
93.9/100	Relatively Moderate
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Hailstorm

LOCATION AND SPATIAL EXTENT

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that Jackson County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms. With that in mind, Figure D.24 shows the location of hail events that have impacted the county between 1955 and 2021.

FIGURE D.24: HAILSTORM TRACKS IN JACKSON COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

According to the National Climatic Data Center, 64 recorded hailstorm events have affected Jackson County since 1965. In all, hail occurrences resulted in almost $300 in property damages. Hail ranged in diameter from 0.75 inches to 3.0 inches. Table D.39 provides a summary of the hail events in Jackson County. Detailed information about each event that occurred in the county is provided in Table D.40.

It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Climatic Data Center. Therefore, it is likely that damages are greater than the reported value.

TABLE D.39: SUMMARY OF HAIL OCCURRENCES IN JACKSON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2022)	Annualized Property Losses
Gautier	5	0/0	$289	$5
Moss Point	3	0/0	$0	$0
Ocean Springs	11	0/0	$0	$0
Pascagoula	7	0/0	$0	$0
Unincorporated Area	50	0/0	$0	$0
JACKSON COUNTY TOTAL	76	0/0	$289	$5

Source: National Climatic Data Center

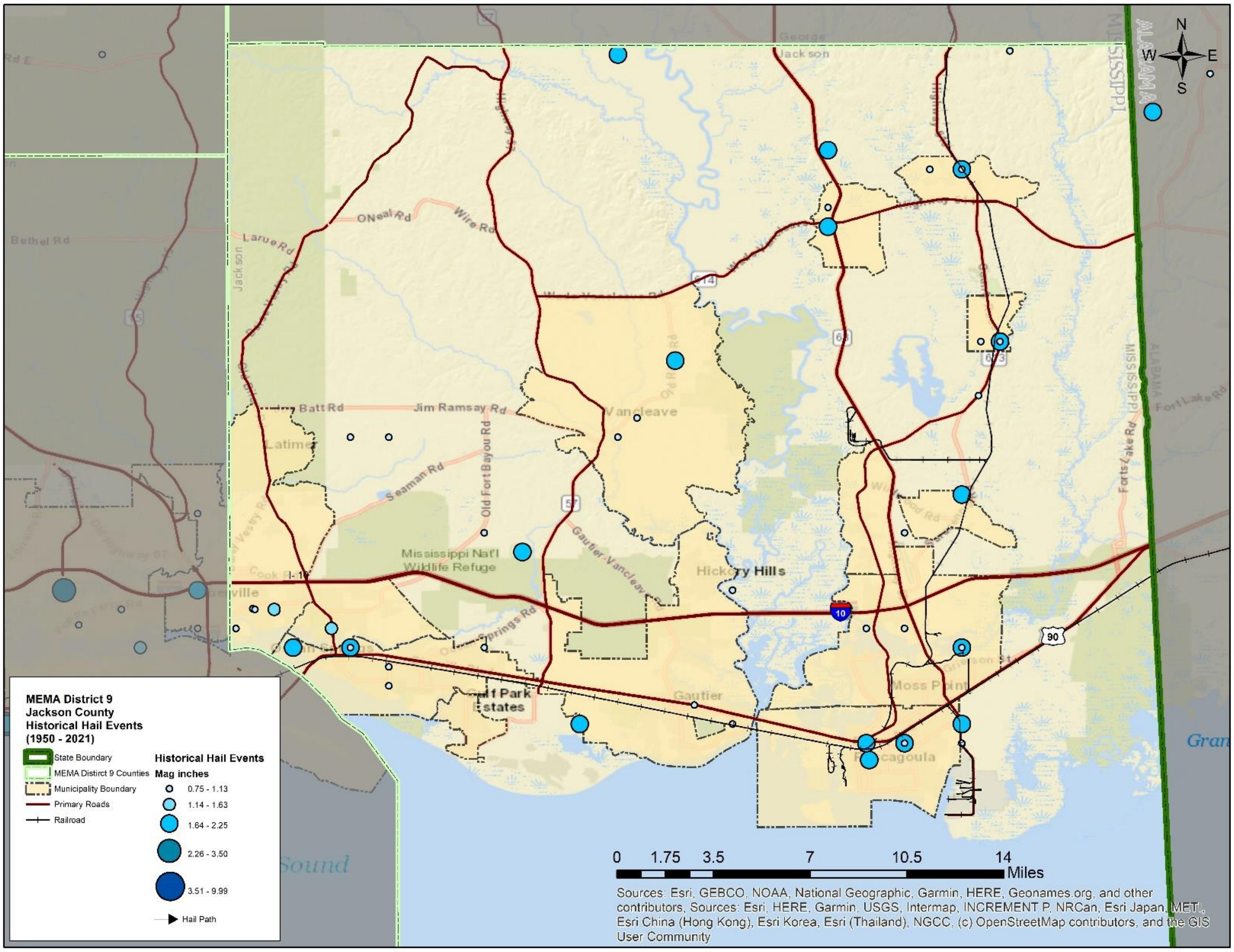
TABLE D.40: HISTORICAL HAIL OCCURRENCES IN JACKSON COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Gautier				
GAUTIER	4/29/1999	1.00 in.	0/0	$0
GAUTIER	4/29/1999	1.75 in.	0/0	$289
GAUTIER	5/1/2013	1.00 in.	0/0	$0
GAUTIER	4/25/2015	1.00 in.	0/0	$0
GAUTIER	1/21/2017	0.88 in.	0/0	$0
Moss Point				
Moss Point	6/2/1995	0.75 in.	0/0	$0
MOSS PT	4/29/1999	1.75 in.	0/0	$0
MOSS PT	7/17/2003	0.88 in.	0/0	$0
Ocean Springs				
OCEAN SPGS	4/14/1996	1.75 in.	0/0	$0
OCEAN SPGS	1/8/1997	0.75 in.	0/0	$0
OCEAN SPGS	5/28/1999	0.88 in.	0/0	$0
OCEAN SPGS	3/11/2001	1.75 in.	0/0	$0
OCEAN SPGS	4/29/2004	0.88 in.	0/0	$0
OCEAN SPGS	5/29/2005	1.25 in.	0/0	$0
OCEAN SPGS	6/23/2006	1.00 in.	0/0	$0
OCEAN SPGS	7/13/2007	1.00 in.	0/0	$0
OCEAN SPGS	4/28/2016	1.00 in.	0/0	$0
OCEAN SPGS	6/18/2022	1.75 in.	0/0	$0
OCEAN SPGS	6/18/2022	1.00 in.	0/0	$0
Pascagoula				
Pascagoula	5/3/1994	0.88 in.	0/0	$0
PASCAGOULA	5/6/1998	0.75 in.	0/0	$0
PASCAGOULA	4/29/1999	0.75 in.	0/0	$0
PASCAGOULA	7/25/2004	0.88 in.	0/0	$0
PASCAGOULA	6/23/2006	0.88 in.	0/0	$0
PASCAGOULA	4/25/2015	1.75 in.	0/0	$0
PASCAGOULA	4/09/2021	1.75 in.	0/0	$0
Unincorporated Area				
JACKSON CO.	4/19/1965	3.00 in.	0/0	$0

JACKSON CO.	4/23/1969	1.75 in.	0/0	$0
JACKSON CO.	5/24/1972	1.75 in.	0/0	$0
JACKSON CO.	3/31/1976	1.75 in.	0/0	$0
JACKSON CO.	5/19/1980	1.00 in.	0/0	$0
JACKSON CO.	7/7/1980	1.75 in.	0/0	$0
JACKSON CO.	3/22/1981	0.75 in.	0/0	$0
JACKSON CO.	6/11/1982	0.75 in.	0/0	$0
JACKSON CO.	3/24/1984	1.75 in.	0/0	$0
JACKSON CO.	3/24/1984	1.75 in.	0/0	$0
JACKSON CO.	7/15/1985	1.75 in.	0/0	$0
JACKSON CO.	4/18/1988	1.75 in.	0/0	$0
JACKSON CO.	4/18/1988	1.75 in.	0/0	$0
JACKSON CO.	5/23/1989	0.75 in.	0/0	$0
JACKSON CO.	6/30/1989	0.75 in.	0/0	$0
JACKSON CO.	4/22/1990	1.75 in.	0/0	$0
JACKSON CO.	1/30/1991	0.75 in.	0/0	$0
JACKSON CO.	5/26/1992	0.75 in.	0/0	$0
Oxford	5/18/1993	1.75 in.	0/0	$0
Hurley	7/2/1995	1.00 in.	0/0	$0
Van Cleave	7/9/1995	0.75 in.	0/0	$0
HURLEY	3/18/1996	0.75 in.	0/0	$0
HURLEY	3/30/1996	1.75 in.	0/0	$0
WADE	9/1/1997	0.75 in.	0/0	$0
VANCLEAVE	5/6/1998	0.75 in.	0/0	$0
HURLEY	3/29/2000	2.00 in.	0/0	$0
VANCLEAVE	7/21/2000	0.75 in.	0/0	$0
HURLEY	3/31/2002	1.00 in.	0/0	$0
ESCATAWAPA	8/2/2002	1.00 in.	0/0	$0
HURLEY	5/3/2003	1.75 in.	0/0	$0
ESCATAWPA	3/31/2005	1.00 in.	0/0	$0
VANCLEAVE	4/1/2005	0.75 in.	0/0	$0
WADE	12/28/2007	0.75 in.	0/0	$0
HURLEY	5/25/2008	1.00 in.	0/0	$0
VANCLEAVE	4/2/2009	0.75 in.	0/0	$0
WADE	5/15/2009	0.88 in.	0/0	$0
WADE	7/26/2009	1.00 in.	0/0	$0
WADE	5/26/2011	1.75 in.	0/0	$0
HURLEY	6/5/2011	1.00 in.	0/0	$0
BIG PT	7/12/2013	1.00 in.	0/0	$0
WADE	2/23/2016	1.75 in.	0/0	$0
NORTH BILOXI ARPT	4/28/2016	1.25	0/0	$0
GAUTIER	1/21/2017	0.88 in.	0/0	$0
ESCATAWPA	1/21/2017	1.00 in.	0/0	$0
VANCLEAVE	5/17/2018	1.00 in.	0/0	$0
BIG PT	5/17/2018	1.75 in.	0/0	$0
BIG PT	5/17/2018	1.00 in.	0/0	$0
HELENA	5/17/2018	1.75 in.	0/0	$0
NORTH BILOXI ARPT	6/27/2019	1.00 in.	0/0	$0
FONTAINBLEAU	6/18/2022	1.25 in.	0/0	$0

*Property damage is reported in 2022 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Figure D.25: Historical Hail Events (1950-2021)



PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely

(100 percent annual probability). Since hail is an atmospheric hazard, it is assumed that Jackson County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table D.41: Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HAIL EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1.8 events/year	0.01	$92,694	$25	$3	$92,722	51.6	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table D.42: Jackson County Hazard Specific Risk Index Table

JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HAIL	
Risk Index Score	Risk Index Rating
50.0/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Hurricane and Tropical Storm

LOCATION AND SPATIAL EXTENT

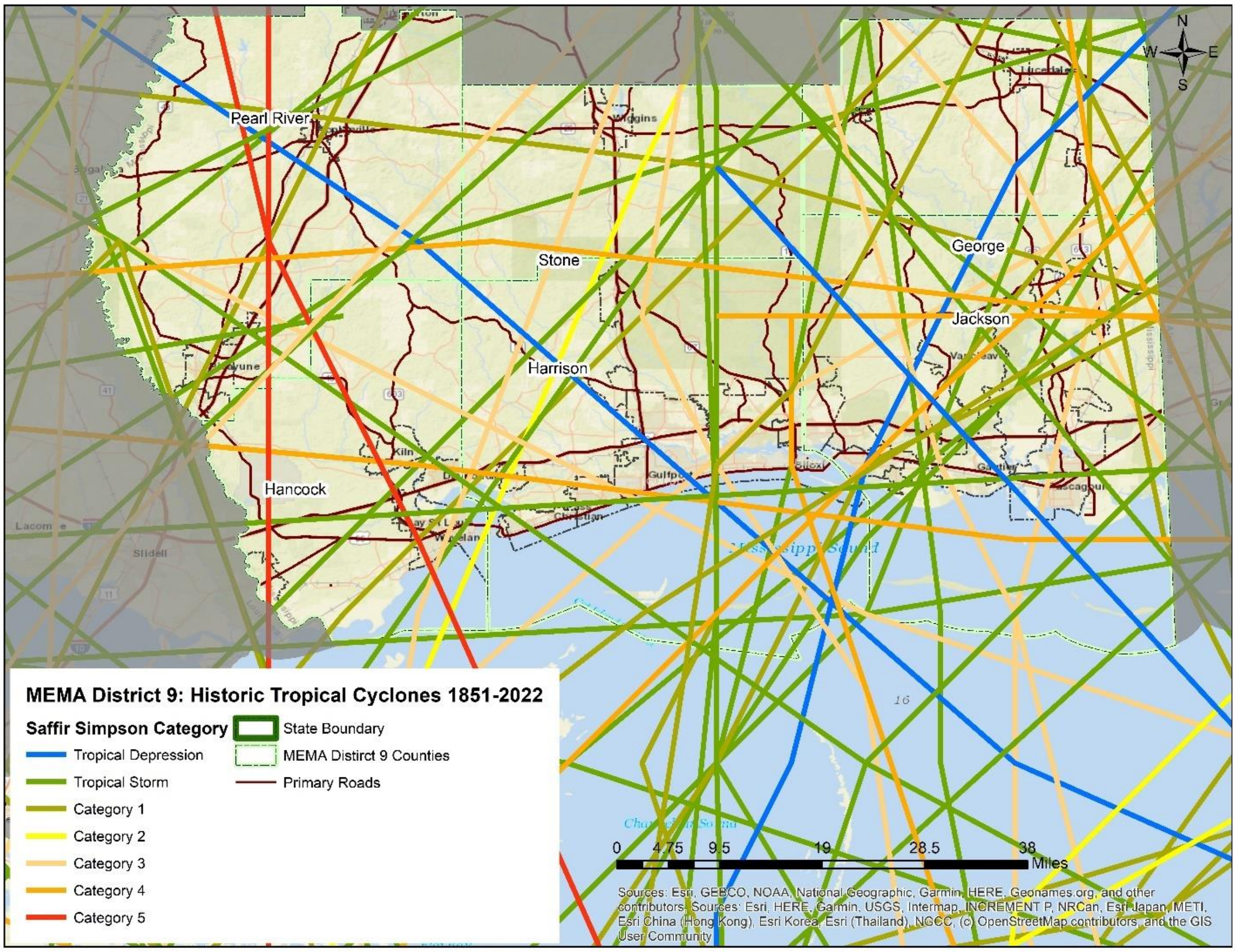
Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States, and while coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland. Jackson County is located in a region of the country that is susceptible to all of the hazards wrought by hurricanes and tropical storms. All areas throughout Jackson County are susceptible to the accompanying hazard effects of extreme wind, flooding, and tornadoes, and coastal areas are also extremely susceptible to the added effects of storm surge, wave action, coastal erosion, and tidal flooding.

HISTORICAL OCCURRENCES

According to the National Hurricane Center's historical storm track records, 119 hurricane or tropical storm/depression tracks have passed within 100 miles of the MEMA District 9 Region since 1855.15 This includes: 4 Category 3 hurricanes, 15 Category 2 hurricanes, 28 Category 1 hurricanes, 29 tropical storms, and 43 tropical depressions. Additionally, four other major storms had large-scale impacts on the region and are not included in these totals. These storms are listed below and range in Category from 1 to 4.

Of the recorded storm events, 58 hurricane or tropical storm/depression events traversed directly through the region as shown in Figure D.26. Notable storms include Hurricane Camille (1969), Hurricane Frederic (1979), and Hurricane Katrina (2005). Table 43 provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 100 miles of the MEMA District 9 Region) and category of the storm based on the Saffir-Simpson Scale.

FIGURE D.26: HISTORICAL HURRICANE STORM TRACKS WITHIN 100 MILES OF THE MEMA DISTRICT 9 REGION



Source: National Oceanic and Atmospheric Administration, National Hurricane Center

TABLE D.43: HISTORICAL STORM TRACKS WITHIN 100 MILES OF THE MEMA 9 DISTRICT REGION (1842–2022)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/25/1852	UNNAMED	93	Category 2
8/3/1855	NOT NAMED	--	Tropical Depression
9/16/1855	UNNAMED	96	Category 2
6/24/1857	NOT NAMED	--	Tropical Depression
9/15/1859	UNNAMED	79	Category 1
8/11/1860	UNNAMED	96	Category 2
9/15/1860	UNNAMED	89	Category 2
8/17/1861	NOT NAMED	--	Tropical Depression
11/1/1861	NOT NAMED	--	Tropical Depression
9/15/1862	NOT NAMED	--	Tropical Depression
9/16/1862	NOT NAMED	--	Tropical Depression
10/1/1863	UNNAMED	43	Tropical Storm

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
6/3/1866	NOT NAMED	--	Tropical Depression
9/16/1867	NOT NAMED	--	Tropical Depression
10/5/1867	UNNAMED	89	Category 2
10/3/1868	NOT NAMED	--	Tropical Depression
9/5/1869	UNNAMED	79	Category 1
7/30/1870	NOT NAMED	--	Tropical Depression
7/11/1872	UNNAMED	59	Tropical Storm
9/18/1875	UNNAMED	18	Tropical Depression
9/18/1877	UNNAMED	79	Category 1
9/1/1879	UNNAMED	89	Category 2
10/7/1879	UNNAMED	59	Tropical Storm
8/31/1880	UNNAMED	70	Category 1
8/2/1881	NOT NAMED	--	Tropical Depression
8/3/1881	UNNAMED	59	Tropical Storm
8/30/1885	UNNAMED	59	Tropical Storm
9/26/1885	UNNAMED	70	Category 1
6/15/1886	UNNAMED	50	Tropical Storm
6/14/1887	UNNAMED	33	Tropical Depression
10/19/1887	UNNAMED	82	Category 1
6/27/1888	NOT NAMED	--	Tropical Depression
9/23/1889	UNNAMED	79	Category 1
8/27/1890	UNNAMED	43	Tropical Storm
9/21/1891	NOT NAMED	--	Tropical Depression
9/12/1892	UNNAMED	59	Tropical Storm
9/7/1893	UNNAMED	79	Category 1
10/2/1893	UNNAMED	97	Category 3
8/7/1894	UNNAMED	59	Tropical Storm
8/15/1895	UNNAMED	59	Tropical Storm
9/13/1900	UNNAMED	43	Tropical Storm
8/14/1901	UNNAMED	82	Category 1
10/9/1905	UNNAMED	43	Tropical Storm
9/27/1906	UNNAMED	93	Category 2
9/21/1907	UNNAMED	43	Tropical Storm
8/11/1911	UNNAMED	79	Category 1
6/13/1912	UNNAMED	59	Tropical Storm
7/17/1912	UNNAMED	5	Tropical Depression
9/13/1912	UNNAMED	82	Category 1
9/18/1914	UNNAMED	33	Tropical Depression
9/29/1915	UNNAMED	96	Category 2
7/5/1916	UNNAMED	95	Category 2
10/17/1922	UNNAMED	18	Tropical Depression
6/26/1923	UNNAMED	43	Tropical Storm
10/17/1923	UNNAMED	59	Tropical Storm
9/20/1926	UNNAMED	93	Category 2
9/1/1932	UNNAMED	82	Category 1

10/15/1932	UNNAMED	59	Tropical Storm

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
7/27/1936	UNNAMED	43	Tropical Storm
8/22/1936	UNNAMED	5	Tropical Depression
6/16/1939	UNNAMED	59	Tropical Storm
9/26/1939	UNNAMED	50	Tropical Storm
9/24/1940	UNNAMED	18	Tropical Depression
9/10/1944	UNNAMED	64	Category 1
9/5/1945	UNNAMED	18	Tropical Depression
9/19/1947	UNNAMED	92	Category 2
9/4/1948	UNNAMED	79	Category 1
9/4/1949	UNNAMED	43	Tropical Storm
8/31/1950	BAKER	82	Category 1
8/1/1955	BRENDA	70	Category 1
8/27/1955	UNNAMED	50	Tropical Storm
9/24/1956	FLOSSY	82	Category 1
9/18/1957	ESTHER	64	Category 1
10/8/1959	IRENE	43	Tropical Storm
9/15/1960	ETHEL	85	Category 2
9/26/1960	FLORENCE	1	Tropical Depression
10/4/1964	HILDA	70	Category 1
9/10/1965	BETSY*	117	Category 4
9/29/1965	DEBBIE	33	Tropical Depression
8/18/1969	CAMILLE	100	Category 3
8/8/1971	UNNAMED	5	Tropical Depression
9/4/1971	FERN	5	Tropical Depression
9/16/1971	EDITH	70	Category 1
7/29/1975	UNNAMED	18	Tropical Depression
10/17/1975	UNNAMED	5	Tropical Depression
9/24/1976	UNNAMED	5	Tropical Depression
7/19/1977	UNNAMED	18	Tropical Depression
9/6/1977	BABE	18	Tropical Depression
10/25/1977	UNNAMED	18	Tropical Depression
8/10/1978	UNNAMED	5	Tropical Depression
7/11/1979	BOB	74	Category 1
9/12/1979	FREDERICK	97	Category 3
7/20/1980	UNNAMED	5	Tropical Depression
10/27/1984	UNNAMED	18	Tropical Depression
9/2/1985	ELENA	95	Category 2
10/31/1985	JUAN	64	Category 1
8/12/1987	UNNAMED	5	Tropical Depression
8/8/1988	BERYL	5	Tropical Depression
8/9/1988	BERYL	50	Tropical Storm
9/10/1988	FLORENCE	79	Category 1
8/3/1995	ERIN	82	Category 1
7/19/1997	DANNY	79	Category 1
9/27/1998	GEORGES	92	Category 2

9/20/1998	HERMINE	33	Tropical Depression

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
6/11/2001	ALLISON	43	Tropical Storm
8/5/2002	BERTHA	33	Tropical Depression
9/14/2002	HANNA	59	Tropical Storm
9/26/2002	ISIDORE	64	Category 1
6/30/2003	BILL	59	Tropical Storm
7/1/2003	BILL	18	Tropical Depression
9/16/2004	IVAN	96	Category 2
6/11/2005	ARLENE	59	Tropical Storm
7/6/2005	CINDY	74	Category 1
7/10/2005	DENNIS*	100	Category 3
8/29/2005	KATRINA	98	Category 3
9/22/2007	TEN	5	Tropical Depression
8/24/2008	FAY	18	Tropical Depression
9/1/2008	GUSTAV*	87	Category 2
11/10/2009	IDA	70	Category 1
7/25/2010	BONNIE	5	Tropical Depression
8/12/2010	FIVE	5	Tropical Depression
9/5/2011	LEE	43	Tropical Storm
8/28/2012	ISAAC*	70	Category 1
10/07/2017	NATE	71	Category 1
10/28/2020	ZETA	90	Category 2

*It should be noted that the track of several major hurricanes that impacted the region fell outside of the 100-mile buffer. These storms were included in the table due to their significant impact (Betsy, 1965; Dennis, 2005; Gustav, 2008; and Isaac, 2012), but it should be noted that wind speed and storm category are estimated based on anecdotal information.

Source: National Hurricane Center

Federal records indicate that 12 disaster declarations were made in 1965 (Hurricane Betsy), 1969 (Hurricane Camille), 1979 (Hurricane Frederic), 1985 (Hurricane Elena), 1998 (Hurricane Georges), 2001 (Tropical Storm Allison), 2002 (Tropical Storm Isidore), 2004 (Hurricane Ivan), 2005 (Hurricane Dennis and Hurricane Katrina), 2008 (Hurricane Gustav), and 2012 (Hurricane Isaac). Hurricane and tropical storm events can cause substantial damage in the area due to high winds and flooding.

Flooding and high winds from hurricanes and tropical storms can cause damage throughout the county. Anecdotes are available from NCDC for the major storms that have impacted the county as found below:

Hurricane Georges – September 25-29, 1998

Hurricane Georges, a strong Category 2 hurricane moved slowly northwest across the Gulf of Mexico toward southeast Louisiana and coastal Mississippi on the September 25 and September 26. As the hurricane approached the mouth of the Mississippi River on September 27, it slowly turned toward the north making landfall along the Mississippi Coast just to the east of Biloxi, MS at 0400 CST on September 28. The hurricane moved only slowly north during the morning hours, at times becoming nearly stationary. The hurricane finally was downgraded to a tropical storm at 1500CST on September 28 when it was located north of Biloxi. The tropical storm then moved very slowly eastward into southern Alabama on September 29.

The greatest affect from the hurricane occurred over Jackson County which experienced the intense eastern portion of the hurricanes eyewall and highest storm surge.

Due to the slow forward speed of the hurricane very heavy rainfall occurred over eastern Harrison County and Jackson County leading to record flooding on streams and rivers. The barrier islands in the Mississippi Sound were also heavily damaged by wind and storm surge. A new three quarter mile cut developed in the east portion of Ship Island. Total insured property damage in Mississippi was estimated at near 310 million dollars by insurance industry sources. When uninsured losses and public property damage considered, total damages in Mississippi will likely approach $620 million.

Jackson County - Jackson County bore the brunt of Hurricane Georges with the area experiencing the strong right front quadrant of the hurricane's circulation. A storm surge of 8 to 11 feet caused storm surge flooding along low lying coastal areas. This was the greatest storm surge flooding in Jackson County in nearly 30 years. In the east beach section of the Bellefontaine area, 23 of 27 homes were heavily damaged or destroyed by storm surge. Many businesses and industries located in low lying coastal areas were flooded causing considerable property damage and loss of revenue. The U.S. Navy facility at Pascagoula suffered $2.2 million in property damage, primarily roof and water damage.

Several unofficial anemometers recorded gusts between 85 and 100 mph in the Pascagoula area. Moderate wind damage was reported across the parish. Numerous commercial signs were destroyed, trees downed, roofs damaged, and power lines and poles downed.

Approximately 4600 people sought refuge in public hurricane evacuation shelters in Jackson County. Two shelters, one in Gautier and one in Pascagoula, suffered wind damage to the roof at the height of the storm.

Due to the slow forward speed of Hurricane Georges, widespread heavy rainfall occurred over Jackson County and over the watershed of the Pascagoula and Escatawpa Rivers. Rainfall of 10 to 15 inches was common over Jackson County. River flooding developed over much of the county by September 28. A record flood crest of 20.82 feet was established on Red Creek at Vestry. On the Escatawpa River, a record flood crest of 22.70 feet was established at Agricola. Approximately 3,000 people were evacuated from flooded areas, primarily in the Escatawpa River basin, with hundreds of structures flooded in the county.

Hurricane Katrina – August 24-30, 2005

Hurricane Katrina was one of the strongest and most destructive hurricanes on record to impact the coast of the United States. It will likely be recorded as one the worst natural disaster in the history of the United States to date resulting in catastrophic damage and numerous casualties in southeast Louisiana and along the Mississippi coast. Damage and casualties resulting from Hurricane Katrina extended as far east as Alabama and the panhandle of Florida. Katrina developed from a tropical depression southeast of the Bahamas on August 24th. After moving through the Bahamas as a tropical storm, Katrina strengthened to a category 1 hurricane prior to landfall in south Florida around the Miami area on the 25th of August. Katrina crossed south Florida and entered the Gulf of Mexico and began to strengthen. Hurricane Katrina strengthened to a category 5 storm on August 28th about 250 miles south southeast of the mouth of the Mississippi River with winds reaching their peak intensity of 175 mph and a central pressure of 902 mb. Post event analysis by the National Hurricane Center indicates that Katrina weakened slightly before making landfall as a strong category 3 storm in initial landfall in lower Plaquemines Parish. Maximum sustained winds were estimated at 110 knots or 127 mph and a central pressure of 920 mb around 610 AM CDT on August 29th in southeast Louisiana just south of Buras in Plaquemines Parish. The storm continued on a north northeast track with the center passing about 40 miles southeast of New Orleans with a second landfall occurring near the Louisiana and Mississippi border around 945 AM CDT as a category 3 storm with maximum sustained winds estimated around 105 knots or 121 mph. Katrina continued to weaken as it moved north northeast across Mississippi during the day, but remained at hurricane strength 100 miles inland near Laurel, Mississippi. Katrina weakened to a tropical depression near Clarksville, Tennessee on August 30th.

Damage across coastal Mississippi was catastrophic. The storm surge associated with Hurricane Katrina approached or exceeded the surge associated with Hurricane Camille and impacted a much more extensive area. Almost total destruction was observed along the immediate coast in Hancock and Harrison Counties with storm surge damage extending north along bays and bayous to Interstate 10. Thousands of homes and businesses were destroyed by the storm surge. Hurricane force winds also caused damage to roofs, power lines, signage, downed trees, and some windows were broken by wind and wind driven debris in areas away from storm surge flooding, wind damage was widespread with fallen trees taking a heavy toll on houses and power lines. Damage was less extensive in southwest Mississippi. Excluding losses covered by the Federal Flood Insurance Program, insured property losses in Mississippi were estimated at 9.8 billion dollars. Uninsured and insured losses combined were estimated to exceed 100 billion dollars across the Gulf Coast.

As of late October, the following fatality figures were reported in the Mississippi coastal counties; Hancock- 52, Harrison - 83, Jackson - 17. Additional details on fatalities will be given in later updates to storm data.

Due to the failure of power and equipment prior to the peak of the storm, data for wind, storm surge, pressure, and rainfall are incomplete. The lowest pressure on the Mississippi coast was estimated to be 928 mb where the hurricane made landfall near the Louisiana Mississippi border. A pressure of 976 mb was recorded at 0951 CDT by a university weather station deployed in Pascagoula, well east of the landfall location. At approximately the same time, the pressure at the NWS office in Slidell, just to the west of landfall location, recorded a pressure of 934.1 mb at 0938 AM CDT.

The highest wind gusts recorded in Mississippi and the adjacent coastal waters were 117 knots (134 mph) at the Pearl River County EOC office in Poplarville and 102 knots (118 mph) at 1000AM CDT by a university wind tower deployed at the Stennis Space Center in Hancock County. Maximum sustained winds in Mississippi were estimated around 105 knots (121 mph) near the storm's second landfall along the Mississippi and Louisiana border. Unofficial wind observations before the gage failed included a wind gust of 106 kt, (122 mph) at 0615 CDT by an amateur radio operator in Long Beach and a wind gust of 108 kt (124 mph) at the EOC in Pascagoula.

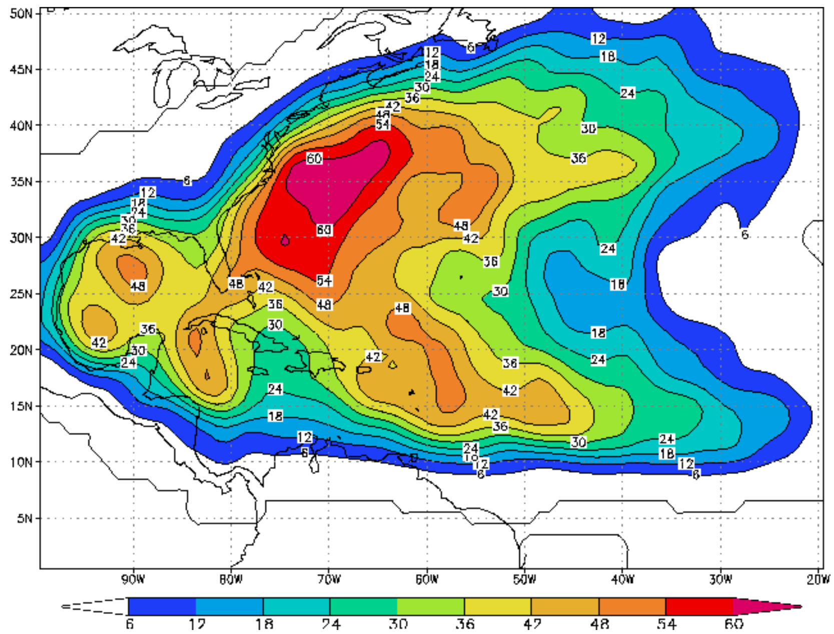
Most tide gages were destroyed by the storm surge so storm surge was determined primarily by post storm high water mark surveys conducted by FEMA. An estimated storm surge of approximately 23.0 feet occurred at the Hancock County EOC operations area in Waveland, and the high water mark measured on the Jackson County EOC building in Pascagoula was 16.1 feet. Preliminary estimates of storm surge along the Mississippi Coast include Hancock County 19-25 feet, Harrison County 19-25 feet, Jackson County 17- 21 ft. All storm surge heights are still water elevations referenced to NAVD88 datum.

Storm total rainfall amounts generally ranged from 10 to 16 inches across coastal and south Mississippi with much lower amounts observed over southwest Mississippi. The highest observed storm total rainfall was 11 inches at Stennis Space Center and near Picayune.

PROBABILITY OF FUTURE OCCURRENCES

According to NOAA statistical data, the region is located in an area with an annual probability of a named storm between 30 and 42 percent as presented in Figure D.27. This illustration was created by the National Oceanic and Atmospheric Administration's Hurricane Research Division using data from 1944 to 1999 and counting hits when a storm or hurricane was within approximately 100 miles (165 km) of each location. As a reference point, the tip of Florida's outline can be found near the 25N, 80W intersection, and the MEMA District 9 Region is near the 30N, 90W intersection. This empirical probability is fairly consistent with other scientific studies and observed historical data made available through a variety of federal, state, and local sources.

FIGURE D.27: EMPIRICAL PROBABILITY OF A NAMED HURRICANE OR TROPICAL STORM



Source: National Oceanic and Atmospheric Administration

The probability of storm occurrences will vary significantly based on the return interval for different categories of magnitude. The probability of less intense storms (lower return periods) is higher than more intense storms (higher return periods). Table D.44 profiles the potential peak gust wind speeds that can be expected in the MEMA District 9 Region during a hurricane event for various return periods according to FEMA's HAZUS-MH®.

TABLE D.44: POTENTIAL PEAK GUST WIND SPEEDS PER RETURN PERIOD

50-Year	100-Year	500-Year	1,000-Year
119.4 mph	133.9 mph	160.3 mph	170.0

Source: Federal Emergency Management Agency (Hazus-MH 3.2)

Overall, the probability level of future hurricane and tropical storm occurrence for Jackson County is highly likely (100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table D.45: Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HURRICANE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.3 events/year	0.38	$4,433,565	$79,786,687	$115,071	$84,335,323	97.4	Relatively High
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table D.46: Jackson County Hazard Specific Risk Index Table

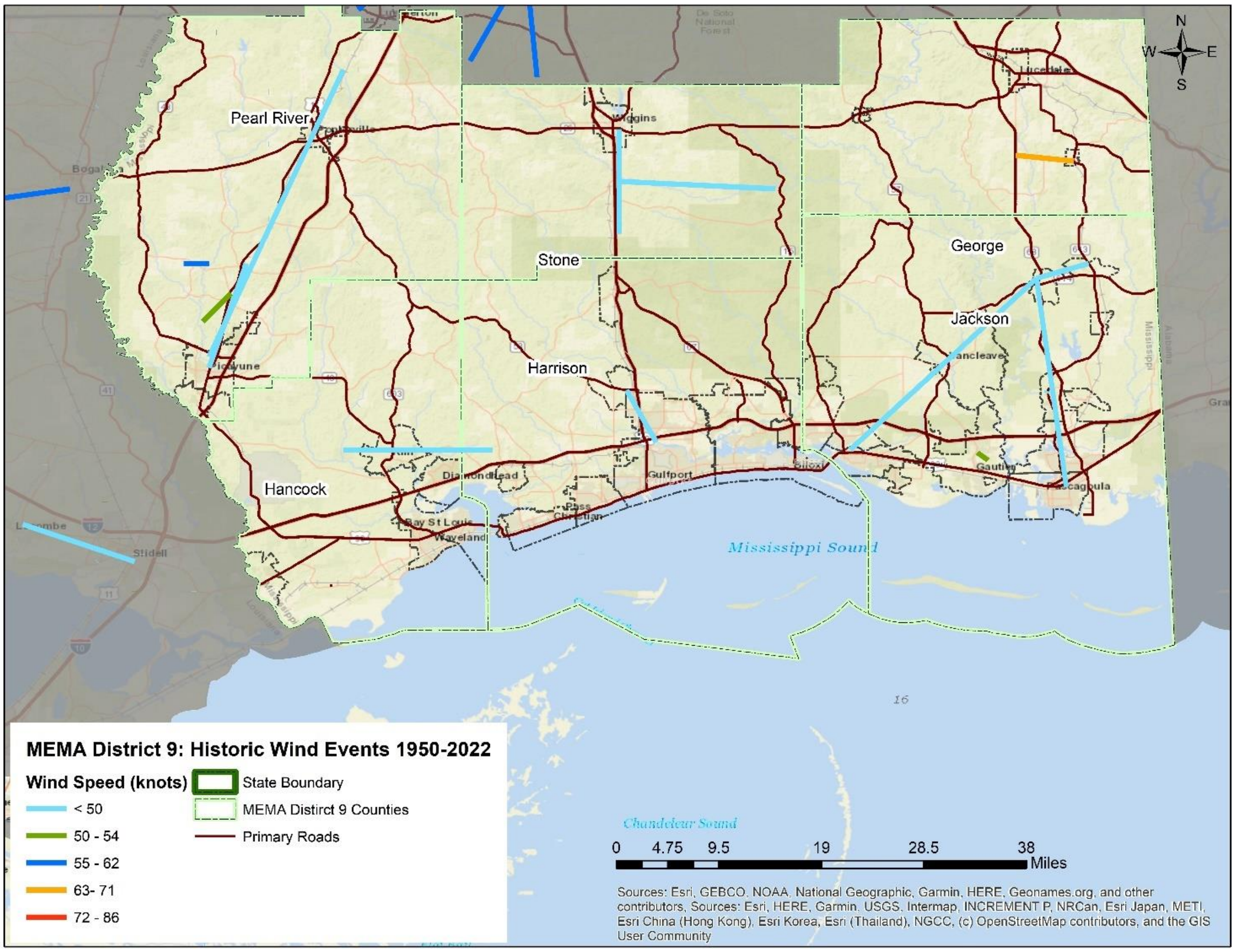
JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HURRICANE	
Risk Index Score	Risk Index Rating
97.5/100	Relatively High
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Severe Thunderstorm/High Wind

LOCATION AND SPATIAL EXTENT

A thunderstorm event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. It is assumed that Jackson County has uniform exposure to an event and the spatial extent of an impact could be large. With that in mind, Figure D.28 shows the location of wind events that have impacted the county between 1955 and 2021.

FIGURE D.28: SEVERE THUNDERSTORM TRACKS IN JACKSON COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Severe storms were at least partially responsible for four disaster declarations in Jackson County in 1980, 1990, 1995, and 2009. According to NCDC, there have been 127 reported thunderstorm and high wind events since 1959 in Jackson County. These events caused over $459,000 (2016 dollars) in damages. There were also reports of three injuries. Table D.47 summarizes this information. Detailed thunderstorm and high wind event reports including date, magnitude, and associated damages for each event are presented in Table D.48.

TABLE D.47: SUMMARY OF THUNDERSTORM/HIGH WIND OCCURRENCES IN JACKSON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2022)	Annualized Property Losses
Gautier	5	0/2	$109,389	$1,736
Moss Point	4	0/0	$10,226	$162
Ocean Springs	15	0/0	$34,120	$542
Pascagoula	17	0/0	$118,805	$1,886
Unincorporated Area	104	0/1	$200,828	$3,188
JACKSON COUNTY TOTAL	145	0/3	$473,368	$7,514

Source: National Climatic Data Center

TABLE D.48: HISTORICAL THUNDERSTORM/HIGH WIND OCCURRENCES IN JACKSON COUNTY

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
Gautier					
GAUTIER	6/2/2004	Thunderstorm Wind	50 kts. EG	0/0	$7,650
GAUTIER	4/14/2014	Thunderstorm Wind	65 kts. EG	0/2	$101,739
GAUTIER	4/25/2015	Thunderstorm Wind	52 kts. EG	0/0	$0
GAUTIER	6/24/2020	Thunderstorm Wind	50 kts. EG	0/0	$0
GAUTIER	10/29/2022	Thunderstorm Wind	50 kts. EG	0/0	$0
Moss Point					
MOSS PT	6/2/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,275
MOSS PT	8/30/2006	Thunderstorm Wind	50 kts. EG	0/0	$597
MOSS PT	8/24/2011	Thunderstorm Wind	52 kts. EG	0/0	$5,354
MOSS PT	10/27/2021	Thunderstorm Wind	50 kts. EG	0/0	$3,000
Ocean Springs					
OCEAN SPGS	9/21/1996	Thunderstorm Wind	--	0/0	$1,535
OCEAN SPGS	1/4/2000	Thunderstorm Wind	--	0/0	$1,399
OCEAN SPGS	5/28/2000	Thunderstorm Wind	--	0/0	$699
OCEAN SPGS	7/21/2000	Thunderstorm Wind	--	0/0	$699
OCEAN SPGS	11/5/2002	Thunderstorm Wind	--	0/0	$2,008
OCEAN SPGS	4/29/2004	Thunderstorm	50 kts. EG	0/0	$1,275

		Wind			
OCEAN SPGS	6/2/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,275
OCEAN SPGS	7/13/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,913
OCEAN SPGS	7/13/2004	Thunderstorm Wind	50 kts. EG	0/0	$3,825
OCEAN SPGS	6/19/2007	Thunderstorm Wind	55 kts. MG	0/0	$13,939
OCEAN SPGS	5/28/2010	Thunderstorm Wind	52 kts. EG	0/0	$552
OCEAN SPGS	6/17/2016	Thunderstorm Wind	55 kts. EG	0/0	$0
OCEAN SPGS	7/25/2017	Thunderstorm Wind	52 kts. EG	0/0	$0
OCEAN SPGS	6/27/2019	Thunderstorm Wind	50 kts. EG	0/0	$0
OCEAN SPGS	6/24/2022	Thunderstorm Wind	50 kts. EG	0/0	$5,000

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
Pascagoula					
Pascagoula	5/9/1995	Thunderstorm Wind	60 kts.	0/0	$0
PASCAGOULA	1/26/1996	Thunderstorm Wind	--	0/0	$768
PASCAGOULA	1/24/1997	Thunderstorm Wind	--	0/0	$1,501
PASCAGOULA	4/5/1997	Thunderstorm Wind	--	0/0	$3,001
PASCAGOULA	6/5/1998	Thunderstorm Wind	--	0/0	$739
PASCAGOULA	7/16/1998	Thunderstorm Wind	--	0/0	$7,388
PASCAGOULA	12/4/1998	Thunderstorm Wind	--	0/0	$7,388
PASCAGOULA	7/21/2000	Thunderstorm Wind	--	0/0	$1,049
PASCAGOULA	8/10/2000	Thunderstorm Wind	--	0/0	$699
PASCAGOULA	9/5/2000	Thunderstorm Wind	--	0/0	$2,797
PASCAGOULA	11/9/2000	Thunderstorm Wind	--	0/0	$55,947
PASCAGOULA	6/11/2001	Thunderstorm Wind	52 kts. M	0/0	$0
PASCAGOULA	10/13/2001	Thunderstorm Wind	--	0/0	$34,000

PASCAGOULA	6/17/2005	Thunderstorm Wind	50 kts. EG	0/0	$1,850
PASCAGOULA	5/15/2008	Thunderstorm Wind	50 kts. EG	0/0	$1,678
PASCAGOULA	6/16/2017	Thunderstorm Wind	63 kts. EG	0/0	$0
PASCAGOULA	8/30/2017	Thunderstorm Wind	55 kts. EG	0/0	$0
Unincorporated Area					
JACKSON CO.	4/20/1959	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	5/9/1960	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	1/11/1963	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	7/10/1965	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	10/30/1967	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	6/12/1968	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	7/29/1968	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	12/27/1968	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	2/1/1970	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	3/2/1971	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	3/2/1972	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	6/22/1972	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	3/24/1973	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	5/8/1973	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	5/8/1973	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	5/27/1973	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	5/26/1974	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	1/10/1975	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	5/13/1976	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	5/24/1976	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	6/1/1977	Thunderstorm	0 kts.	0/0	$0

		Wind			
JACKSON CO.	7/2/1977	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	7/15/1977	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	7/15/1977	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	3/3/1979	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	4/23/1979	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	7/24/1979	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	4/13/1980	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	4/13/1980	Thunderstorm Wind	0 kts.	0/0	$0

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
JACKSON CO.	7/7/1980	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	7/7/1980	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	2/10/1981	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	3/22/1981	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	5/19/1981	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	6/11/1982	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	7/5/1982	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	7/6/1982	Thunderstorm Wind	57 kts.	0/0	$0
JACKSON CO.	1/31/1983	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	2/1/1983	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	2/1/1983	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	4/14/1983	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	5/3/1983	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	8/5/1983	Thunderstorm Wind	52 kts.	0/0	$0
JACKSON CO.	12/11/1983	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	12/11/1983	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	2/26/1984	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	2/26/1984	Thunderstorm Wind	52 kts.	0/0	$0
JACKSON CO.	2/26/1984	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	6/19/1986	Thunderstorm Wind	56 kts.	0/0	$0
JACKSON CO.	10/6/1986	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	7/26/1987	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	3/4/1988	Thunderstorm Wind	0 kts.	0/0	$0

JACKSON CO.	7/25/1988	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	7/31/1988	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	5/6/1989	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	6/8/1989	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	7/20/1989	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	2/10/1990	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	3/15/1990	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	12/22/1990	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	4/14/1991	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	4/29/1991	Thunderstorm Wind	0 kts.	0/0	$0
JACKSON CO.	4/20/1992	Thunderstorm Wind	58 kts.	0/0	$0
JACKSON CO.	6/15/1992	Thunderstorm Wind	64 kts.	0/0	$0
JACKSON CO.	11/3/1992	Thunderstorm Wind	0 kts.	0/0	$0
Hurley	3/7/1995	Thunderstorm Wind	0 kts.	0/0	$4,741
VANCLEAVE	3/18/1996	Thunderstorm Wind	--	0/0	$1,535
VANCLEAVE	7/6/1997	Thunderstorm Wind	--	0/0	$750
BIG PT	1/7/1998	Thunderstorm Wind	--	0/0	$443
HELENA	3/3/1999	Thunderstorm Wind	--	0/0	$36,142
WADE	8/2/1999	Thunderstorm Wind	--	0/0	$36,142
ESCATAWPA	8/14/1999	Thunderstorm Wind	--	0/0	$14,457
ESCATAWPA	8/20/2000	Thunderstorm Wind	--	0/0	$699
VANCLEAVE	9/1/2000	Thunderstorm Wind	52 kts. E	0/0	$0
COUNTYWIDE	6/11/2001	Thunderstorm Wind	--	0/0	$13,600

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
COUNTYWIDE	6/11/2001	Thunderstorm Wind	--	0/0	$34,000
VANCLEAVE	12/31/2002	Thunderstorm Wind	--	0/0	$2,008
VANCLEAVE	7/21/2003	Thunderstorm Wind	50 kts. EG	0/0	$5,236
WADE	4/29/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,913
WADE	7/25/2004	Thunderstorm Wind	50 kts. EG	0/0	$638
COUNTYWIDE	8/15/2006	Thunderstorm Wind	50 kts. EG	0/1	$1,195
WADE	11/6/2006	Thunderstorm Wind	50 kts. EG	0/0	$2,389
WADE	3/1/2007	Thunderstorm Wind	50 kts. EG	0/0	$1,742
VANCLEAVE	2/12/2008	Thunderstorm Wind	50 kts. EG	0/0	$2,797
VANCLEAVE	6/29/2008	Thunderstorm Wind	50 kts. EG	0/0	$1,678
HILDA	3/9/2011	Thunderstorm Wind	52 kts. MG	0/0	$0
WADE	3/9/2011	Thunderstorm Wind	60 kts. EG	0/0	$0
VANCLEAVE	5/26/2011	Thunderstorm Wind	55 kts. EG	0/0	$10,707
HILDA	2/18/2012	Thunderstorm Wind	52 kts. EG	0/0	$15,736
VANCLEAVE	7/3/2012	Thunderstorm Wind	55 kts. EG	0/0	$5,245
VANCLEAVE	12/20/2012	Thunderstorm Wind	61 kts. EG	0/0	$0
HURLEY	7/12/2013	Thunderstorm Wind	52 kts. EG	0/0	$1,034
NORTH BILOXI ARPT	4/1/2016	Thunderstorm Wind	60 kts. EG	0/0	$0
VANCLEAVE	5/19/2016	Thunderstorm Wind	60 kts. EG	0/0	$0
NORTH BILOXI ARPT	3/30/2017	Thunderstorm Wind	55 kts. EG	0/0	$0
VESTRY	4/14/2018	Thunderstorm Wind	55 kts. EG	0/0	$0
NORTH BILOXI ARPT	5/17/2018	Thunderstorm Wind	50 kts. EG	0/0	$0
NORTH BILOXI ARPT	6/27/2019	Thunderstorm Wind	60 kts. EG	0/0	$0
NORTH BILOXI ARPT	6/27/2019	Thunderstorm	55 kts. EG	0/0	$0

VESTRY	4/19/2020	Wind Thunderstorm Wind	55 kts. EG	0/0	$0
HURLEY	4/24/2021	Thunderstorm Wind	50 kts. EG	0/0	$5,000
COLL TOWN	8/17/2022	Thunderstorm Wind	50 kts. EG	0/0	$0
BIG PT	8/17/2022	Thunderstorm Wind	50 kts. EG	0/0	$1,000
EASTSIDE	8/17/2022	Thunderstorm Wind	50 kts. EG	0/0	$0

*Property damage is reported in 2022 dollars; all damage may not have been reported.
†E = estimated; EG = estimated gust; ES = estimated sustained; MG = measured gust; MS = measured sustained
Source: National Climatic Data Center

PROBABILITY OF FUTURE OCCURRENCES

Given the high number of previous events, it is certain that thunderstorm events, including straight-line wind events, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for the entire county.

FEMA NRI Expected Annual Loss Estimates

Table D.49: Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HIGH WIND EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1.5 events/year	0.01	$115,345	$25,137	$19	$140,500	29.2	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table D.50: Jackson County Hazard Specific Risk Index Table

JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HIGH WIND

Risk Index Score	Risk Index Rating
26.5/100	Relatively Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

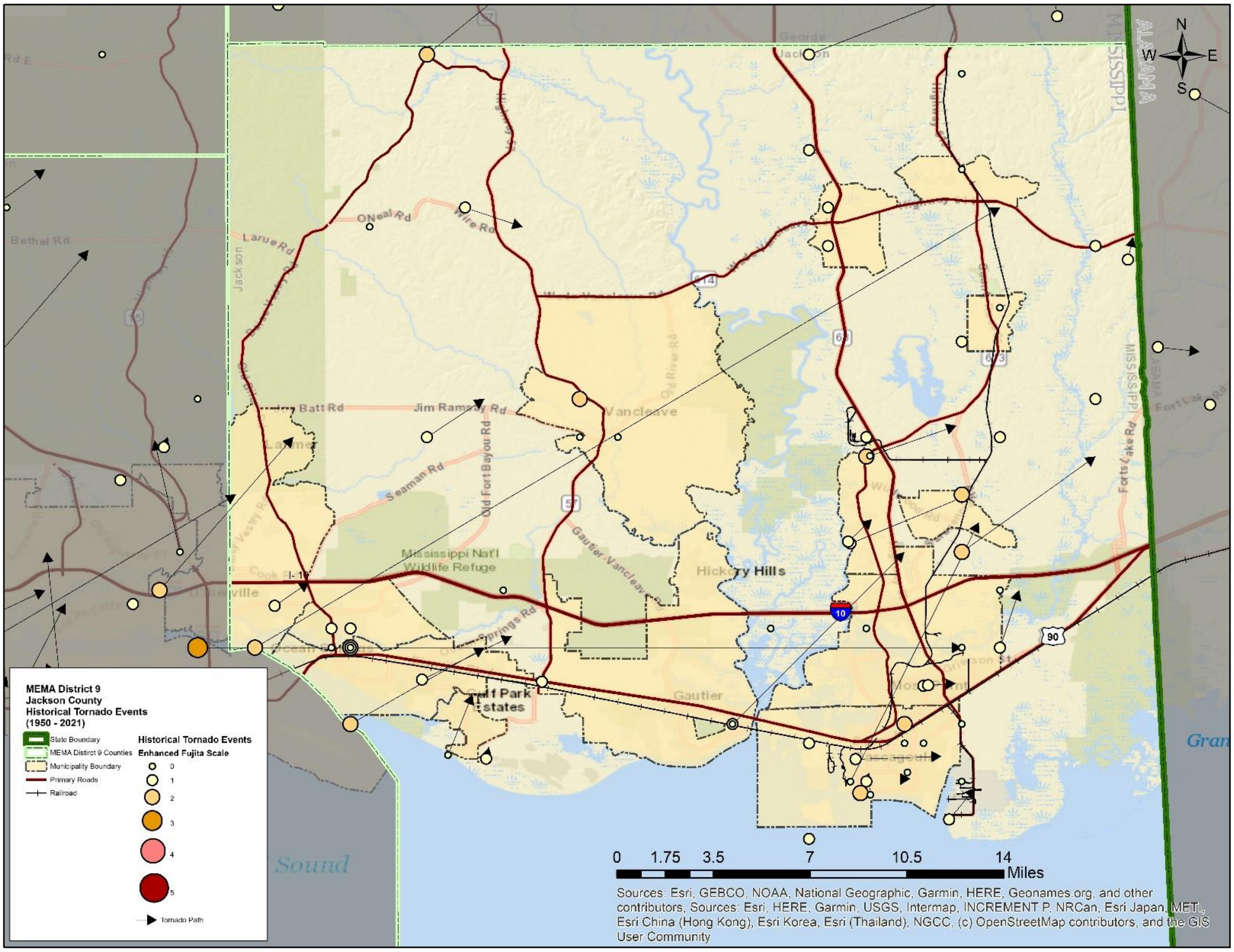
Tornado

LOCATION AND SPATIAL EXTENT

Tornadoes occur throughout the state of Mississippi, and thus in Jackson County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Jackson County is uniformly exposed to this hazard. With that in mind, Figure D.29 shows tornado track data for many of the major tornado events that have impacted the county between 1950 and 2015. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE D.29: HISTORICAL TORNADO TRACKS IN JACKSON COUNTY

Source: National Weather Service Storm Prediction Center



HISTORICAL OCCURRENCES

Tornadoes were at least partially responsible for four disaster declarations in Jackson County in 1980, 1990, 1995, and 2009. According to the National Climatic Data Center, there have been a total of 60 recorded tornado events in Jackson County since 1958, resulting in over $7.9 million in property damages.In addition, 19 injuries were reported. The magnitude of these tornadoes ranged from F0 to F2 and EF0 to EF2 in intensity. A summary of these events is presented in Table D.51. Detailed information on historic tornado events can be found in Table D.52.

TABLE D.51: SUMMARY OF TORNADO OCCURRENCES IN JACKSON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Gautier	2	0/0	$153,507	$2,399
Moss Point	5	0/0	$0	$0
Ocean Springs	8	0/0	$118,939	$1,858
Pascagoula	9	0/1	$347,885	$5,436
Unincorporated Area	58	1/19	$7,930,682	$123,917
JACKSON COUNTY TOTAL	82	1/20	$8,551,011	$133,610

Source: National Climatic Data Center

TABLE D.52: HISTORICAL TORNADO IMPACTS IN JACKSON COUNTY

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Gautier					
GAUTIER	4/29/1996	F0	0/0	$153,507	A waterspout moved on shore and caused damage at a small airport. Two light aircraft were destroyed, two others were damaged, and aircraft hangar was slightly damaged and several trees were downed.
GAUTIER	7/2/1999	Waterspout	0/0	$0	Two waterspouts were observed off the Jackson County coast south of Gautier.
Moss Point					
Moss Point	5/9/1995	F1	0/0	$0	Several houses were damaged when a tornado touched down. Path length and width estimated.
PASCAGOULA JCKSN ARP	7/16/2000	F0	0/0	$0	A small tornado briefly touched down near the Pascagoula Jackson Airport resulting in no damage.
MOSS PT	8/10/2000	Funnel Cloud	0/0	$0	A funnel cloud was observed.
MOSS PT	10/6/2000	Funnel Cloud	0/0	$0	A funnel cloud was observed in the Moss Point and Pascagoula areas.
MOSS PT	8/5/2001	Funnel Cloud	0/0	$0	A funnel cloud was observed near the Mississippi and Alabama state line.
Ocean Springs					
Ocean Springs	5/9/1995	F1	0/0	$0	A tornado touched down briefly with only minor damage reported.
OCEAN SPGS	4/29/1996	Waterspout	0/0	$3,070	A waterspout damaged several small sailboats.
OCEAN SPGS	6/17/2005	Funnel Cloud	0/0	$0	A funnel cloud was reported near a school on Government Street.
					Roof damage occurred to an elementary school, and power lines

OCEAN SPGS	11/15/2006	F1	0/0	$59,735	were blown down when a weak tornado touched down.
OCEAN SPGS	2/13/2007	EF0	0/0	$0	A weak tornado briefly touched down near mile marker 56 on Interstate 10 causing no significant damage.
OCEAN SPGS	4/2/2009	EF0	0/0	$56,133	Several homes received damage in the Pinehurst subdivision just outside of Ocean
OCEAN SPGS ARPT	8/30/2017	Waterspout/ EF0	0/0	$0	**A large waterspout moved onshore as a tornado near Seacliff Boulevard and produced mainly tree damage to hardwoods and softwoods. Minor awning and shingle damage was observed and light objects were tossed. Tin sheeting was observed in trees and several fences were blown down. Damage was consistent with EF-0 damage with an estimated wind speed of 85 mph. Damage width was about 2 blocks wide where the waterspout moved onshore and about 100 yards wide upon lifting near Old Spanish Trail near 9th Avenue.**
OCEAN SPGS	11/01/2018	EF1	0/0	$0	**An EF-1 tornado touched down along Government Street near Whitney Oaks Drive. As it moved northeast, it downed 2 wooden power poles and 3 small traffic warning lights on Highway 90 in front of the Ocean Springs Police and Fire Departments. As it continued to move northeast, it damaged several cars and broke 7 windows at a large retail store. It snapped several more trees in the Parktown East subdivision behind the store, and also caused minor structural damage, mainly to shingles and fascia of homes. The storm continue to move eastward and lifted just northeast of Tapp Road. Estimated peak wind was 105 mph, path length 3.2 miles, path width 100 yards.**

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details

					Springs. Fourteen homes received minor damage while two homes had their roofs partially lifted off. A National Weather Service storm survey determined that the damage was the result of a high end EF0 tornado with an estimated 3 second wind gust speed of 75 to 85 mph.
Pascagoula					
PASCAGOULA	3/13/1999	F0	0/0	$0	A tornado briefly touched down but caused no damage one mile east of Pascagoula south of Interstate 10.
PASCAGOULA	8/7/2001	F0	0/0	$34,000	A waterspout moved onshore and caused minor damage at the U.S. Navy Station just south of Pascagoula. The weak tornado damaged several cars, a recreational vehicle, a power pole, and the roof of the fire station. Eyewitness said the tornado/waterspout traveled north up the Pascagoula River for a short distance then dissipated.
PASCAGOULA	3/26/2009	EF0	0/0	$20,208	A weak tornado briefly touched down causing damage around Tucker Street and 8th Street and on Taylor Street. Pascagoula High School experienced light damage when the scoreboard on the football field was blown down and numerous sections of fence were knocked down with debris littering the field. Traffic lights around the area were knocked down and several trees were blown down. Maximum winds associated with this tornado were estimated around 75 mph with a path length around 250 yards and a maximum width of 50 yards.
PASCAGOULA	8/30/2012	EF2	0/0	$78,678	A tornado touched down in the south portion of Pascagoula. Most of the damage was consistent with EF-1 scale damage consisting of downed trees and light structural damage to a few houses. A small area of significant damage...EF-2...occurred where nearly all of the roof of a large house was blown off. Path length 0.7 miles. Path width 40 yards.

PASCAGOULA	6/16/2017	EF1	0/0	$0	**NWS Storm Survey indicated a tornado started near the corner of Dupont Ave. and Pascagoula Ave, moved eastward and ended near Bayou Casotte Parkway. Mostly EF0 damage occurred with one location receiving EF1 damage with estimated 90 mph winds. A small commercial building experienced major structural damage. Estimated path length 2.7 miles, maximum path width 100 yards. Most damage was minor EF0 with tree limbs blown down and a few pockets of stronger winds resulting in minor roof damage.**
PASCAGOULA	8/30/2017	Waterspout/ EF0	0/0	$0	**An apparent waterspout came onshore near Market Street, producing light to moderate damage for several blocks inland before dissipating. Damage included several downed trees and downed fencing. Two homes were damaged by falling trees. Maximum estimated wind speed 85 mph, damage path 0.25 miles and path width 200 yards.**
PASCAGOULA	10/22/2017	Waterspout/ EF1	0/1	$0	**A waterspout moved onshore and passed across an industrial plant on the east side of Pascagoula. Significant damage was reported to the roof and walls of a large metal building, along with some damage to trailers on the east side of the facility. One minor injury was reported that was treated at the scene. Maximum estimated wind near 100 mph, path length of 1.4 miles and path width of 100 yards.**
PASCAGOULA	6/19/2021	EF0	0/0	$15,000	**The EF0, 70 MPH tornado touched down near Dellwood Drive and Westwood Drive, where a 12 tree top was broken off the main trunk. The tornado moved northeast to Northwood Ave where it knocked an entire section of a wooden privacy fence down and broke a few 8-10 branches and damaged the roof of a detached garage. Continuing NNEward, there were small branches down along Woodhaven Ave and the final area of damage was a 16-18 tree**

					top broken/twisted in the 1800th block of 22nd St, and a few additional smaller treetops behind these houses. Lastly, a large tree (base 28 inches x 22 inches) on the corner of 22nd St and Ingalls Ave was partially uprooted and was leaning toward the north at about a 20 degree angle.
PASCAGOULA	8/30/2021	Waterspout/ EF0	0/0	$200,000	**A waterspout came onshore south of Ingalls Ave. Damage was observed as large tree limbs down on property on General Lee St. The weak tornado continued northwest crossing US Hwy 90, and causing damage to a home on Amonett St. More clustered damage was noted through Moss Point as the tornado continued northwest. This damage consisted of homes with roofing, fence, siding and window damage. The tornado crossed MS Hwy 63 and eventually I-10. It also caused light roof damage to homes along Coda Rd. The tornado likely dissipated north of Poppy Drive. Survey conducted remotely via high-res satellite imagery. Estimated peak winds of 75 mph.**
Unincorporated Area					
JACKSON CO.	2/26/1958	F2	0/1	$208,350	--
JACKSON CO.	4/6/1963	F1	0/3	$196,775	--
JACKSON CO.	4/27/1966	F2	0/1	$185,843	--
JACKSON CO.	5/8/1969	F1	0/1	$0	--
JACKSON CO.	8/9/1969	--	0/0	$0	--
JACKSON CO.	12/21/1969	F1	0/0	$16,407	During cloudy and rainy weather with thunderstorms, a small twister (funnel not observed) move northeastward. There was scattered wind damage along a 3-mile path, "east on west end of Choctaw St., from intersection of Church St. and east on Mayo St., and in a northeast direction over

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					downtown Moss Point" where the storm "was aloft" and "at the time of the storm the clouds turned black and windy." Most of the damage was confined to a 3-block area in northwest section of Moss Point (lat. 30.4° N, long. 88.5° W). Two houses shifted from foundation blocks and received extensive roof damage, a church lost some shingles, several homes lost parts of roofs, a boat house at end of Choctaw lifted from foundation and deposited destroying boat house and heavily damaging boat. A number of trees were blown down, power and gas lines out for a while. Police Department reported no deaths or injuries, damages $5,000.
JACKSON CO.	2/12/1971	F1	0/2	$14,867	Civil Defense Director reported storm moved from SW towards NE. During cloudy weather a small funnel dipped down at 9:30 a.m. in the Wade community where a trailer was overturned, a woman and small girl were injured, and several trees blown over. Damages estimated above $500.
					Storms moved from west towards east. During a period of thunderstorms with hail, a funnel cloud was observed by owners of Kamp Grounds of America, State Highway 57 and I-20. The damage "track was a lazy 'S' oriented from west to east, destroyed one barn - 20% of residential roof and destroyed mobile home (owned by John Bush) " Report of "sounds like a fast-moving train." The damage area was 1/2 mile E and S of the intersection off Highway 57. Newspaper noted woman "at the Tommy Reed residence nearby the trailer notified the (Ocean Springs) police when she saw the debris outside her house." Civil Defense

JACKSON CO.	5/8/1971	F2	0/0	$148,675	Director Pascagoula estimated damages $8,500. Hail at 12 noon, 1/4 inch to pea size, covered half the ground for about 5 square miles in the Fontainebleau area.
JACKSON CO.	5/8/1971	F1	0/0	$14,867	Storm moved from W to E. During rainy weather, one small funnel (not observed) unroofed barn and house. About 8 N Moss Point, Highway 63 and 613, north of Escatawpa (lat. 30.5º N, long. 88.5º W). County Civil Defense Director estimated damages $2,000.
JACKSON CO.	2/13/1973	F1	0/1	$13,562	Newspaper noted, "A twister touched down near Old Highway 90 and Seaman Road around midnight Tuesday (13th)…and damaged the camper…owned by A. V. Duda of Shore Drive in Gulf Hills." At this time, movement was reported towards the NW.

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					About 1/2 mile away on south side of Solomon Road, halfway between E. Cedar and S. Seaman roads, roof taken off greenhouse and damaged pile of building material on east side of Harry Barnett's house. The tornado reportedly started making a turn to NE as it crossed Solomon Road, and passed on the west side of Charles Tonner's house on the north corner of Solomon and Seaman roads. Mr. Tonner stated, "I was awake and I could hear it roaring. I opened two doors, on the south and the other on the east side. All of a sudden it sopped lightning and raining, then it passed over to the west of my house, then it started raining again. To the north of my house about 20 yards, the bushes 8 to 10 feet tall were twisted and tied in knots. Then it turned NE; a big sycamore tree was split and chewed up about 400 yards away on Solomon Road in Wesley Ladnier's yard." Jackson County Patroman stated, "The trees were in different directions...it appeared that the tornado traveled about a third of a mile before lifting. It cut a path about 30 yards wide." The length of the destructive path believed under 1 1/4 miles and the width from 30 to 80 yards with the average about 40 yards. A small house just north of the Tonner's house was heavily damaged and man inside was pinned under debris; he received small cuts on right arm. Damages estimated over $1,000 to house.
JACKSON CO.	6/13/1974	F0	0/0	$147	--
JACKSON CO.	6/20/1974	F0	0/0	$1,221	--
JACKSON CO.	9/8/1974	F0	0/0	$147	Slight timber damage resulted during the brief tornado touch down.
JACKSON CO.	11/4/1974	F1	0/0	$147	--
JACKSON CO.	1/10/1975	F1	0/0	$1,119	--
JACKSON CO.	1/10/1975	F2	0/0	$1,119,205	--
JACKSON CO.	5/2/1977	F2	0/0	$99,362	--

JACKSON CO.	6/1/1977	F0	0/0	$994	A small tornado briefly touched down 3 1/2 mi. E of the intersection of Highway 63 & 613 or about 7 mi. NNE of Moss Point. Damage was mainly to trees and power lines.
JACKSON CO.	7/15/1977	F0	0/1	$993,618	High winds from an intensifying thunderstorm caused widespread damage throughout the Pascagoula, Moss Point, and Gautier communities. Most of the damage was to boats and marine facilities but also included house trailers, storage sheds, and automobiles. Total damage $80,000. This was believed to be a small tornado.

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
JACKSON CO.	7/29/1978	--	0/0	$9,235	A waterspout moved inland at Gautier, near Pascagoula. It blew a few backyard buildings around, knocked a tree onto some power lines, did minor damage to one home, a mobile home, and one automobile in the 2 to 4 minutes it lasted.
JACKSON CO.	4/23/1979	F0	0/0	$8,294	--
JACKSON CO.	5/19/1980	F2	0/0	$730,743	--
JACKSON CO.	2/10/1981	F2	0/2	$662,412	--
JACKSON CO.	4/25/1982	F2	0/3	$623,972	A small tornado touched down briefly in the southern area of Moss Point destroying a used furniture store and taking the roof off of a new super market. Minor damage was also reported at several residences. Three people were injured by flying glass. One woman was seriously when her mobile home was overturned. About 1,500 residences were without power from downed power lines.
JACKSON CO.	2/1/1983	F1	0/3	$604,551	A small tornado touched down briefly along Highway 614 three miles southeast of Hurley. The tornado turned over a mobile home.
JACKSON CO.	5/21/1985	F2	0/0	$559,603	--
JACKSON CO.	5/21/1985	F1	0/1	$559,603	--
JACKSON CO.	9/16/1988	F0	0/0	$50,899	A very small tornado touched down briefly in Moss Point. The tornado damaged a roof, ripped the hood off of a car and scattered garbage around.
JACKSON CO.	2/10/1990	F1	0/0	$460,698	A tornado touched down briefly in the Franklin Creek community. It damaged a roof on a commercial business. It damaged several houses and blew down numerous sheds.
Vancleave	3/1/1994	F0	0/0	$8,126	--
JACKSON CO.	12/3/1994	F0	0/0	$0	A tornado briefly touched down near intersection of I 10 and Hwy 613. The tornado was over swamp grass and no damage was reported.

Springs	5/9/1995	--	0/0	$0	A waterspout moved onshore then traveled northeast across Keesler Air Force Base. Trees were knocked down, several cars damaged, and commercial signs damaged. The tornado moved into extreme west Jackson County damaging a mobile home and a couple of storage buildings.
HURLEY	1/18/1996	F0	0/0	$0	The public reported that a tornado touched down momentarily without causing any damage.
VANCLEAVE	8/10/2000	Funnel Cloud	0/0	$0	Several funnel clouds were sighted just north of Vancleave.
ESCATAWPA	8/20/2000	F0	0/0	$2,797	Several trees were knocked down and some homes had windows blown out.

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
HURLEY	6/11/2001	F0	0/0	$6,800	A weak tornado snapped off tree tops.
VANCLEAVE	8/30/2003	Funnel Cloud	0/0	$0	A funnel cloud was observed.
VANCLEAVE	6/6/2005	Funnel Cloud	0/0	$0	A funnel cloud was observed.
VANCLEAVE	10/18/2007	EF1	0/0	$104,546	A tornado destroyed one mobile home and heavily damaged at least ten others in the Lucasville community just west of Vancleave. In addition, the tornado destroyed several outbuildings, snapped trees, and knocked down power lines.
VANCLEAVE	12/24/2009	EF0	0/0	$2,245	A weak tornado briefly touched down knocking down numerous trees along its path.
FONTAINEBLEAU	4/4/2011	EF1	0/0	$37,476	Roofing was peeled off of a couple of metal commercial buildings in the Fountainbleau area. Windows were blown out of two houses. Large sections of two fences were blown down. Several medium trees were blown down and large tree limbs were snapped. Damage path was approximately 0.1 mile long and 75 yards wide. Estimated strength of tornado was low end EF1.

COLL TOWN	5/26/2011	EF0	0/0	$21,415	A weak tornado touched down about 1/4 mile southwest of the intersection of Mississippi Highway 63 and Mississippi Highway 613, and travelled intermittently for approximately 3 miles to the northeast. A portable office building was flipped over, power lines were blown down, and several trees were knocked down.
OCEAN SPGS ARPT	8/29/2012	EF1	0/0	$41,962	A tornado touched down in the Gulf Park Estates area causing damage to roofs on several houses and blowing out windows. A few trees were downed and large tree branches snapped. Path length approximately 0.4 miles. Path width 40 yards.
VESTRY	4/14/2018	EF1	0/0	$0	**A storm survey indicated a narrow path about 30 to 50 yards wide of sporadic oak and pine trees snapped near the base over a 1.7 mile long easterly track. One shed was damaged or destroyed on private property. Estimated maximum winds of 95 mph. Event time was based on NWS Mobile radar.**
NORTH BILOXI ARPT	4/14/2018	EF1	0/0	$0	**An EF-1 tornado touched down in the community of St. Martin, just south of Lemoyne Boulevard, and tracked northeast on an intermittent path ending near the intersection of Interstate 10 and Mississippi Highway 609. The most significant damage occurred at a strip shopping center. Plate glass windows were blown out and a portion of the roof was removed along with a portion of the wall. Several cars were overturned and rolled into the parking lot. Maximum winds were estimated at 105 mph with a path width of 75 yards.**
WADE	4/14/2018	EF1	0/0	$0	**A storm survey found a very confined area of EF-1 damage where several pines and a large oak tree were snapped near the base. Peak winds estimated at 95 mph with a path width of 25 yards. Track may have been longer to the west, but that area was inaccessible due to water and**

					wetlands. Event time was estimated by NWS Mobile radar imagery.
ESCATAWPA	11/012018	EF1	0/0	$0	**An EF-1 tornado touched down over the Pascagoula River and caused damage as it moved across Riverlodge Drive, where it tore the porch roof off of one home and also caused minor roof damage on two adjacent homes. As it moved northeast, it snapped numerous hard and soft wood trees and caused minor structural damage to a few homes. It also caused roof and fascia damage to the Four Mile Creek Baptist Church. The tornado continued to cause tree damage and minor structural damage to homes as it moved through the Wildwood area, before lifting as it crossed Black Creek.**
COLL TOWN	4/14/2019	EF1	0/0	$0	**A NWS storm survey found that a high end EF-1 tornado touched down near the Pascagoula River. Where it touched down, three camps received damage. The most extensive damage was roof damage greater than 30 percent. A back wall was moved 3 inches due to the force of the wind, but remained structurally intact. The tornado moved northeast to Windrow Road, where it caused more roof damage. The storm then moved across Prescott Road where it briefly lifted the roof off of a home, causing roof and siding damage and blown out windows. The tornado then continued northeast, causing tree damage along Foxshire and Sheffield Roads before lifting along Sheffield Road. The path length was 1.1 miles and path width 50 yards. Maximum estimated wind was 110 mph.**
NORTH BILOXI ARPT	6/24/2020	EF1	0/0	$0	**A National Weather Service Damage Assessment Team has surveyed the storm damage near Wookmarket, MS. It has been determined the damage was the result of a tornado. The**

					tornado has been rated an EF-1 on the Enhanced Fujita Scale. Damage estimates were consistent with winds of 100 mph. **A short track of damage was noted in the area of Big John Road and Krohn Lane. Most notable was a large hardwood tree uprooted along with several pine trees twisted and snapped.**
BIG PT	6/24/2020	EF0	0/0	$0	**Jackson County Emergency Management has surveyed the storm damage near Escatawpa, MS. It has been determined the damage was the result of a tornado. The tornado has been rated an EF-0 on the Enhanced Fujita Scale. Damage estimates were consistent with winds of 60 mph. Emergency Manager surveyed minor damage on Goff Farms Road where several small limbs were snapped and a pool liner was lifted and carried about 40 yards. No structural damage was observed.**
ARENA	6/19/2021	EF1	0/0	$5,000	**The short-lived tornado touched down just east of State Line Road south of State Highway 614. The tornado then crossed State Line Road snapping several softwood pine trees. There were a few snapped/leaning power poles along State Line Road but may have been caused by trees falling on lines. Minor property damage was reported at the residence on the west side of State Line Road which included a bent front driveway gate and gutter damage the back of the home. The tornado damaged several small trees as it continued across a pond on the property before dissipating near the adjacent property to the north.**
EASTSIDE	10/27/2021	EF1	1/0	$150,000	**A tornado touched down near the intersection of Billy and 1st streets where it did some minor tree damage. It proceeded northeast where it removed a large section of the roof of a well-built home on Charles Street. It continued northeast where it did some minor roof and tree**

					damage. It crossed Highway 63 near Rock Creek Road where it interacted with a southbound vehicle. The driver loss control of their vehicle and died after being ejected. The tornado continued northeast where it damaged parked vehicles and the roof of homes along Gregory and Edna Streets. The tornado proceeded northeast where it did additional minor roof and tree damage before lifting near Mary Avenue.
NORTH BILOXI ARPT	3/30/2022	EF1	0/0	$250,000	**A tornado touched down just southwest of the south end of Jim Ramsey Road moving northeast with minor damage on Fox Run Dr. The majority of the damage was on Fox Ridge Drive. Multiple manufactured homes had undercarriage and roof damage and were shifted off their foundation but none of the straps broke. One was split down the middle but after looking at it in detail, the part that split off was an addition to the home and was not anchored to the main home. This addition then pulled the rest of the home off with it. Uprooted and snapped trees were also noted in this area, many in a convergent pattern. The tornado ended near the intersection of Jim Ramsay Road and John Smith Road with minor roof damage to a well built home and damage to a nearby barn, along with two large trees uprooted.**
ARENA	3/30/2022	EF0	0/0	$0	**NWS Storm survey confirmed a brief EF-0 tornado with estimated winds of 75 mph. The tornado touched down near Harry Pierce Road and moved northeast into Alabama and lifted just east of State Line Road. This was mostly due to tree damage and seeing a debris signature on radar. This did**

					continue into NWS Mobile's area of responsibility for approximately 1 additional mile.
KREOLE	10/29/2022	EF1	0/0	$0	**An NWS Storm Survey of the Moss Point tornado found damage representative of an EF-1. The tornado touched near Grierson St and Hwy 63 in Jackson County, MS, where it snapped hardwood tree trunks. It then crossed Hwy 63 and Marvin Ave moving NE and moved northward over the marsh area and crossed Elder Ferry Rd, where it snapped a few tree trunks. It crossed I-10 and broke some branches off of nearby trees, in addition to damaging a road sign. It then lifted shortly after crossing I-10.**
THREE RIVERS	10/29/2022	EF1	0/0	$5,000	**Tornado touched down snapping numerous small branches on trees near the intersection of River Place Dr and River Walk Dr. It moved northwestward and snapped two oak trees as it crossed River Bluffs Dr. The most concentrated damage was found near the east end of Polly Lake Rd. In this area numerous large pine trees were snapped. It also caused damage to a home near the end of the road, tearing facia from both the front and back of the home near the eaves, tossing a small metal shelter and rolling a small out building. Based on the large snapped pine trees, the tornado is given a maximum rating of EF-1 with estimated peak winds of 104 mph. The tornado then turned more toward the north-northwest and crossed Wade-Vancleave Rd before turning more northward. It lifted as it approached the intersection of Old River Rd and Moungers Rd. Numerous large branches were snapped from several oak trees on a property just south of the intersection, but no damage was found beyond this point.**

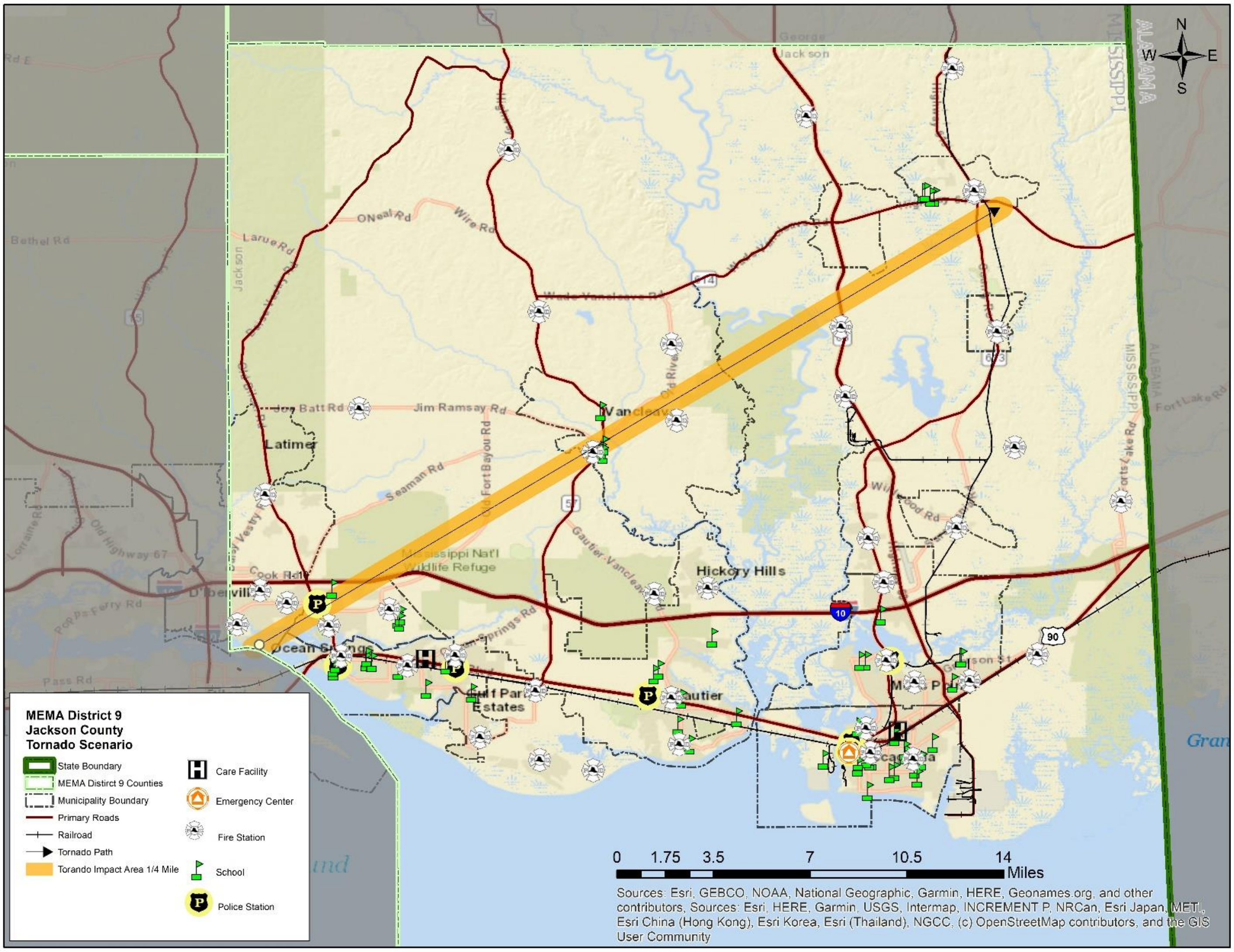
BIG PT	10/29/2022	EF1	0/0	$10,000	**An NWS Storm Survey Team found damage consistent with an EF- 1 tornado in Jackson County, MS. The tornado touched down at the Soccer Fields at Lum Cumbest Park, where it bent freestanding metal light poles. It progressed northward into the Park Ridge Estates community, where it broke branches and snapped several trees. It then progressed northward into an open field and then lifted.**
WADE	10/29/2022	EFU	0/0	$0	**A tornado of unknown strength touched down in rural portions of northern Jackson County near or along Mississippi Highway 63. This was confirmed by a storm spotter video of a tornado received in the area. Due to no damage being reported, the tornado will be rated as unknown strength. If damage information is received, this report will be updated.**

*Property damage is reported in 2022 dollars; all damage may not have been reported.
Source: National Climatic Data Center

PROBABILITY OF FUTURE OCCURRENCES

According to historical information, tornado events pose a significant threat to Jackson County. The probability of future tornado occurrences affecting Jackson County is highly likely (100 percent annual probability). The following graphic demonstrates a potential scenario.

Figure D.30: Tornado Scenario



FEMA NRI Expected Annual Loss Estimates

Table D.53: Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR TORNADO EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.5 events/year	0.31	$3,572,992	$1,808,533	$274	$5,381,799	88.3	Relatively Moderate

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table D.54: Jackson County Hazard Specific Risk Index Table

JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – TORNADO	
Risk Index Score	Risk Index Rating
88.1/100	Relatively Moderate
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Winter Weather

LOCATION AND SPATIAL EXTENT

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. Jackson County is not accustomed to severe winter weather conditions and rarely receives severe winter weather, even during the winter months. Events tend to be mild in nature; however, even relatively small accumulations of snow, ice, or other wintery precipitation can lead to losses and damage due to the fact that these events are not commonplace. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

HISTORICAL OCCURRENCES

According to the National Climatic Data Center, there have been a total of four recorded winter storm events in Jackson County since 1996. These events did not result in any property damage. A summary of these events is presented in Table D.55. Detailed information on the recorded winter storm events can be found in Table D.56.

TABLE D.55: SUMMARY OF WINTER STORM EVENTS IN JACKSON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2022)	Annualized Property Losses
Jackson County	6	0/0	$0	$0

Source: National Climatic Data Center

TABLE D.56: HISTORICAL WINTER STORM IMPACTS IN JACKSON COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Gautier				
None reported	--	--	--	--
Moss Point				
None reported	--	--	--	--
Ocean Springs				
None reported	--	--	--	--
Pascagoula				
None reported	--	--	--	--
Unincorporated Area				
JACKSON (ZONE)	12/18/1996	Heavy Snow	0/0	$0
JACKSON (ZONE)	12/25/2004	Winter Storm	0/0	$0
JACKSON (ZONE)	1/24/2014	Winter Weather	0/0	$0
JACKSON (ZONE)	12/08/2017	Winter Weather	0/0	$0
JACKSON (ZONE)	1/16/2018	Winter Weather	0/0	$0

Location	Date	Type	Deaths/Injuries	Property Damage*
JACKSON (ZONE)	1/28/2014	Sleet	0/0	$0

*Property damage is reported in 2022 dollars; all damage may not have been reported.
Source: National Climatic Data Center

There have been several severe winter weather events in Jackson County. The text below describes one of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

December 2004

A mixture of sleet and snow fell off and on during much of Christmas day resulting in a dusting to one half inch of accumulation across much of southwest, south, and coastal Mississippi. Although not heavy, accumulation of ice and snow in coastal Mississippi is unusual and the winter weather impacted transportation. The mixture of sleet and snow caused a number of bridges and overpasses to become icy which resulted in some traffic accidents and closure of some the elevated roadways.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

PROBABILITY OF FUTURE OCCURRENCES

Winter storm events will continue to occur in Jackson County. Based on historical information, the probability is likely (between 10 and 100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table D.57: Jackson County Expected Annual Loss Table

JACKSON COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WINTER WEATHER EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss	Expected Annual

						Score	Loss Rating
0.3 events/year	0.00	$52,093	$43	$6	$52,141	52.0	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table D.58: Jackson County Hazard Specific Risk Index Table

JACKSON COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WINTER WEATHER	
Risk Index Score	**Risk Index Rating**
50.0/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

OTHER HAZARDS

Climate Change/Sea Level Rise

LOCATION AND SPATIAL EXTENT

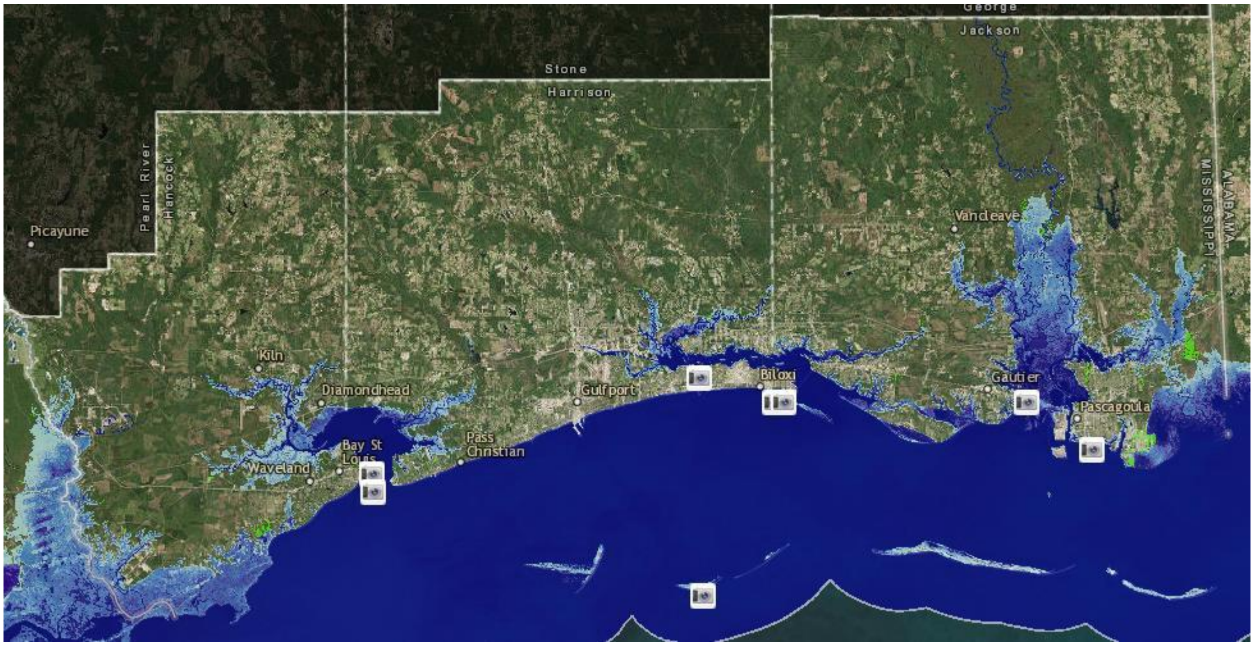
Climate Change

Climate change can have direct implications on many of the other hazards addressed in this plan since it has the potential to alter the nature and frequency of hazards, including increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, strong storms (wind, hurricane). Therefore, it is assumed that Jackson County is uniformly exposed to this hazard.

Sea Level Rise

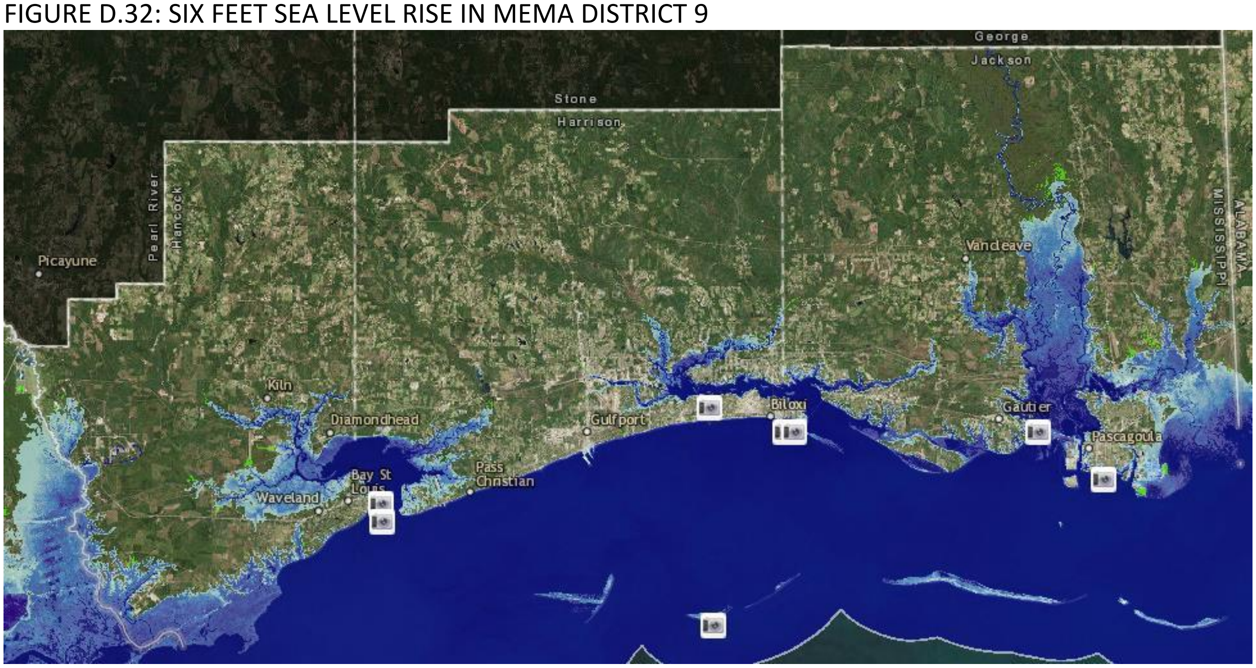
Sea level rise is occurring at a global scale. However, it does not affect areas uniformly and will be more severe in some places. Figure D.31 identifies areas in MEMA District 9 that would be inundated by water as a result of three feet in sea level rise as per projections by NOAA. The highest level of sea level rise projected by NOAA is shown in Figure D.32. This figure shows the inundation areas in the case of six feet of sea level rise. This demonstrates the additional areas that would be impacted beyond the three feet scenario.

FIGURE D.31: THREE FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

FIGURE D.32: SIX FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

HISTORICAL OCCURRENCES

Climate Change

According to the National Climate Assessment, there have been increasing numbers of days above 95°F and nights above 75°F, and decreasing numbers of extremely cold days since 1970 in the Southeast. Daily and five-day rainfall intensities have also increased and summers have been either increasingly dry or extremely wet. The number of Category 4 and 5 hurricanes in the Atlantic basin has increased substantially since the early 1980s compared to the historic record that dates back to the mid-1880s. This can be attributed to both natural variability and climate change.

Sea Level Rise
Sea level rise is a slow-onset hazard and specific events/occurrences are not possible to determine.

PROBABILITY OF FUTURE OCCURRENCES

Climate Change
According to the National Climate Assessment, temperatures across the Southeast are expected to increase during this century, with shorter-term (year-to-year and decade-to-decade) fluctuations over time due to natural climate variability. Major consequences of warming include significant increases in the number of hot days (95^{o}F or above) and decreases in freezing events. Regional average increases are in the range of 4^{o}F to 8^{o}F by the year 2100.

Projections of future precipitation patterns are less certain than projections for temperature increases. Because the Southeast is located in the transition zone between projected wetter conditions to the north and drier conditions to the southwest, many of the model projections show only small changes relative to natural variations. Additionally, projections further suggest that warming will cause tropical storms to be fewer in number globally, but stronger in force, with more Category 4 and 5 storms, and substantial further increases in extreme precipitation are projected as this century progresses.

Overall, future climate change is considered likely (between 10 and 100 percent annual probability).

Sea Level Rise
There is still much debate regarding the probability of future occurrence of sea level rise. This section will be updated as more information becomes available. Future sea level rise is considered likely (between 10 and 100 percent annual probability).

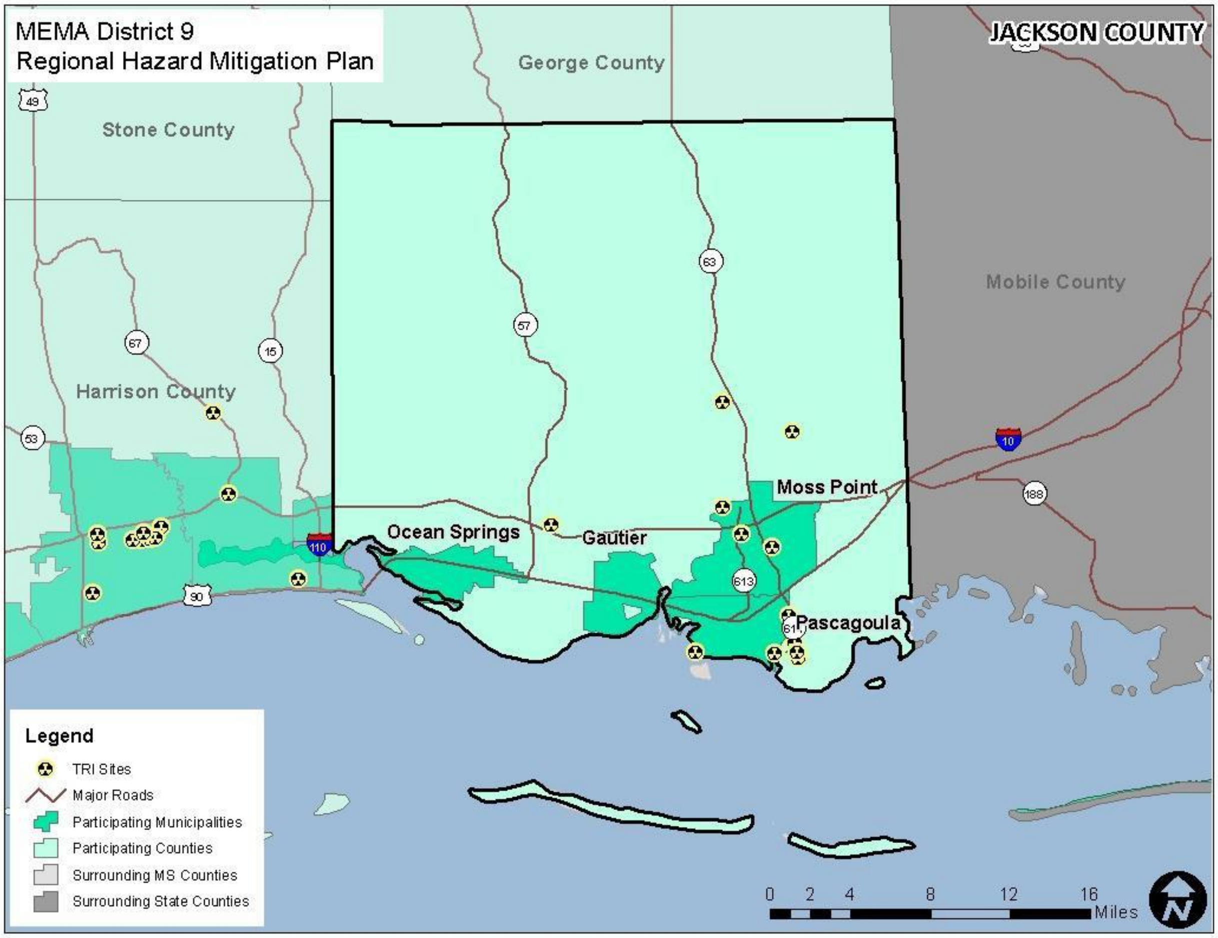
FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess climate change or sea level rise.

Hazardous Materials Incident/Train Derailment

LOCATION AND SPATIAL EXTENT

Jackson County has 11 TRI sites. These sites are shown in Figure D.33.

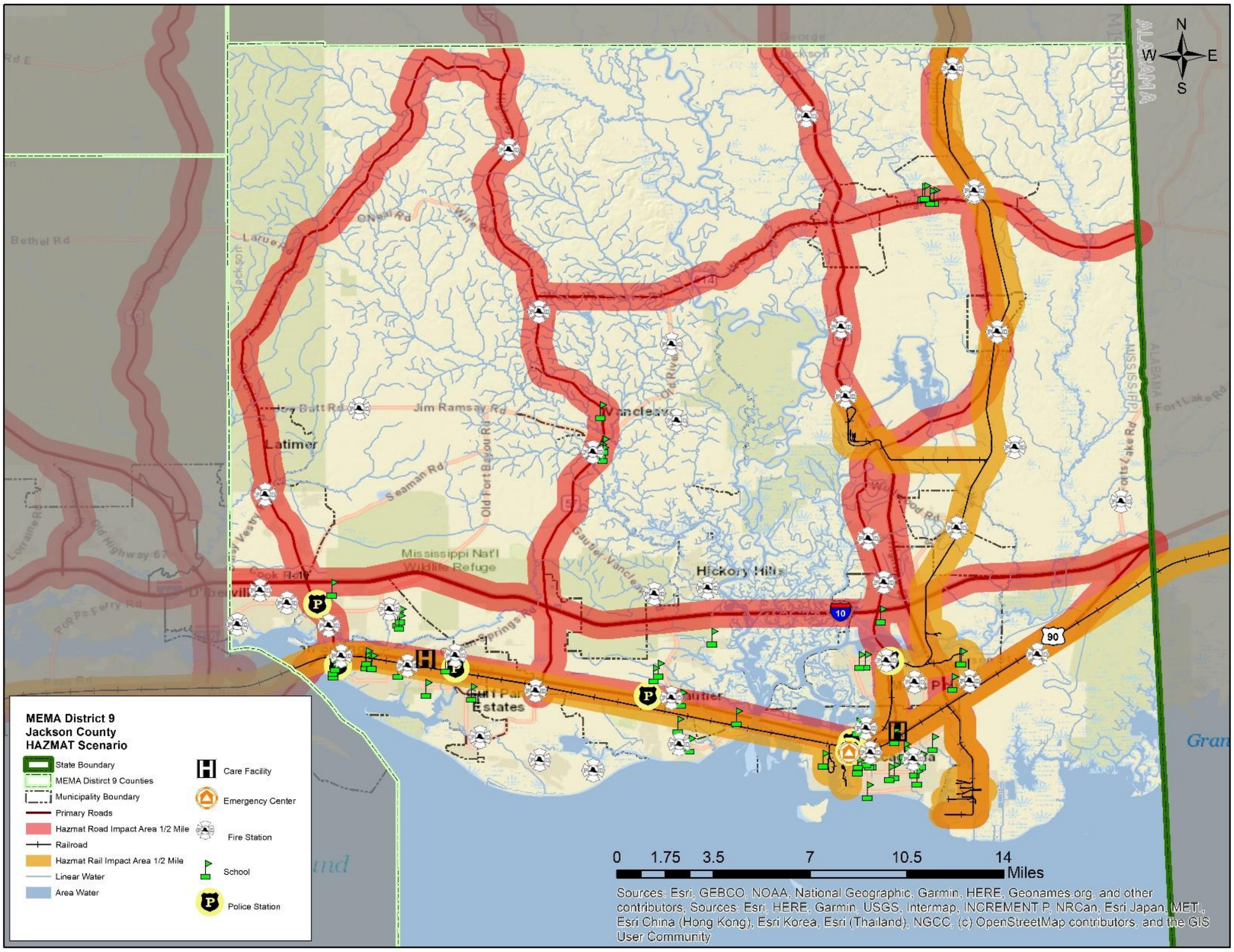
FIGURE D.33: TOXIC RELEASE INVENTORY (TRI) SITES IN JACKSON COUNTY



Source: Environmental Protection Agency

In addition to “fixed” hazardous materials locations, hazardous materials may also impact the county via roadways and railways. Many roads and railways in the county are subject to hazardous materials transport and all roads and railways that permit hazardous material transport are considered potentially at risk to an incident.

Figure D.34: HAZMAT Scenario



HISTORICAL OCCURRENCES

There have been a total of 176 recorded HAZMAT incidents in Jackson County since 1971. These events resulted in over $1.0 million (2016 dollars) in property damage as well as 15 injuries. Table D.59 summarizes the HAZMAT incidents in Jackson County as reported by PHMSA. Detailed information on these events is presented in Table D.60.

TABLE D.59: SUMMARY OF HAZMAT INCIDENTS IN JACKSON COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2016)	Annualized Property Losses
Gautier	10	0/0	$5,556	$142
Moss Point	31	0/3	$509,186	$13,762
Ocean Springs	13	0/5	$231,373	$5,509
Pascagoula	119	0/7	$284,357	$6,319
Unincorporated Area	3	0/0	$1,535	$45
JACKSON COUNTY TOTAL	176	0/15	$1,032,007	$25,777

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE D.60: HAZMAT INCIDENTS IN JACKSON COUNTY

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
Gautier							
I-1977030472	2/22/1977	GAUTHIER	Highway	No	0/0	$0	0
I-1981010388	12/8/1980	GAUTIER	Highway	No	0/0	$0	55 LGA
I-1985060052	5/20/1985	GAUTIER	Highway	No	0/0	$0	10 LGA
I-1997120989	12/5/1997	GAUTIER	Highway	No	0/0	$2,078	100 LGA
I-1998050760	2/24/1998	GAUTIER	Highway	No	0/0	$59	0.5 LGA
I-1998071333	6/19/1998	GAUTIER	Highway	No	0/0	$185	2.6 LGA
I-2004061465	6/9/2004	GAUTIER	Highway	No	0/0	$0	0
I-2011030410	2/24/2011	GAUTIER	Highway	No	0/0	$3,234	50 LGA
Moss Point							GA
I-2014060126	5/23/2014	GAUTIER	Highway	No	0/0	$0	0.007812 LGA
I-1979030340	2/1/1979	MOSS POINT	Highway	No	0/0	$0	100 LGA
I-1980070813	6/27/1980	MOSS POINT	Highway	No	0/0	$0	20 LGA
I-1982040264	3/26/1982	MOSS POINT	Highway	No	0/0	$0	20 LGA
I-1982120264	12/9/1982	MOSS POINT	Rail	No	0/0	$0	1 SLB
I-1983060152	5/27/1983	MOSS POINT	Highway	Yes	0/0	$0	0
I-1983060152	5/27/1983	MOSS POINT	Highway	Yes	0/0	$0	1,700 SLB
I-1985020262	2/7/1985	MOSS POINT	Highway	No	0/0	$0	12,692 GCF
I-1988020519	2/11/1988	MOSS POINT	Rail	No	0/0	$0	0.12 LGA
I-1989060133	5/18/1989	MOSS POINT	Highway	No	0/0	$0	0.25 LGA
I-1990080718	7/25/1990	MOSS POINT	Highway	No	0/0	$10,489	55 LGA
I-1990120212	11/3/1990	MOSS POINT	Highway	No	0/0	$37	2 LGA
I-1990120213	11/3/1990	MOSS POINT	Highway	No	0/1	$0	1 LGA
I-1995081086	7/25/1995	MOSS POINT	Highway	No	0/0	$435	30 LGA
I-1995091387	9/8/1995	MOSS POINT	Rail	No	0/1	$0	1 LGA
I-1996030760	3/12/1996	MOSS POINT	Highway	No	0/0	$0	5 LGA
I-1997020237	7/8/1996	MOSS POINT	Highway	No	0/1	$0	160 SLB

I-1997060725	5/23/1997	MOSS POINT	Highway	No	0/0	$35,715	60 LGA
I-1999091811	9/17/1999	MOSS POINT	Highway	No	0/0	$0	1 LGA
I-2000120388	9/3/2000	MOSS POINT	Highway	No	0/0	$0	2 LGA
I-2001030532	3/3/2001	MOSS POINT	Highway	No	0/0	$0	2 LGA

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
I-2001060219	5/29/2001	MOSS POINT	Highway	No	0/0	$0	0.25 LGA
I-2001080529	7/16/2001	MOSS POINT	Highway	No	0/0	$0	0
I-2005040358	4/16/2004	MOSS POINT	Highway	Yes	0/0	$143,618	1,643 LGA
I-2006101616	9/19/2006	MOSSPOINT	Highway	No	0/0	$15,053	98 LGA
I-2007050473	1/4/2007	MOSS POINT	Highway	Yes	0/0	$256,486	1,290 LGA
I-2013040017	3/21/2013	MOSS POINT	Highway	No	0/0	$0	0.01671 GCF
E-2013100210	7/17/2013	MOSS POINT	Rail	No	0/0	$46,525	0.13368 GCF
I-2013100011	9/20/2013	MOSS POINT	Rail	No	0/0	$827	0.6684 GCF
E-2014080019	7/21/2014	MOSS PONT	Highway	No	0/0	$0	0.004178 GCF
I-2014120269	11/12/2014	MOSS POINT	Rail	No	0/0	$0	0.01671 GCF
E-2014120220	11/30/2014	MOSS POINT	Highway	No	0/0	$0	0.25 LGA
Ocean Springs							
I-1974060025	5/26/1974	OCEAN SPRINGS	Highway	No	0/0	$0	0
I-1975080280	7/28/1975	OCEAN SPRINGS	Highway	No	0/0	$0	0
I-1990120636	11/20/1990	OCEAN SPRINGS	Highway	Yes	0/4	$130,838	5,000 LGA
I-1991040453	3/23/1991	OCEAN SPRINGS	Highway	No	0/0	$141	75 LGA
I-1993030215	1/30/1993	OCEAN SPRINGS	Highway	Yes	0/0	$16,083	150 LGA
I-1996090555	8/5/1996	OCEAN SPRINGS	Rail	No	0/0	$7,675	100 LGA
I-1996121072	11/20/1996	OCEAN SPRINGS	Rail	Yes	0/1	$0	15 LGA
I-2000050942	2/4/2000	OCEAN SPRINGS	Highway	Yes	0/0	$17,134	320 SLB
I-2004091344	2/2/2004	OCEAN SPRINGS	Highway	No	0/0	$0	0.001308 LGA
I-2008030153	8/31/2007	OCEAN SPRINGS	Highway	Yes	0/0	$0	80 LGA
E-2008120026	11/14/2008	OCEAN SPRINGS	Highway	No	0/0	$0	3 LGA
I-2010050392	4/21/2009	OCEAN SPRINGS	Highway	No	0/0	$59,501	10 LGA
I-2010060210	7/21/2009	OCEAN SPRINGS	Highway	No	0/0	$0	3 LGA

Pascagoula							
I-1971110168	11/9/1971	PASEAGOULA	Highway	No	0/0	$0	0
I-1973060159	5/31/1973	PASCAGOULA	Highway	No	0/0	$0	0
I-1974050542	1/31/1974	PASCAGOULA	Highway	No	0/0	$0	0
I-1974090345	8/13/1974	PASCAGOULA	Highway	No	0/1	$0	0
I-1974120237	11/20/1974	PASCAGOULA	Rail	No	0/1	$0	0
I-1975040178	3/24/1975	PASCAGOULA	Highway	No	0/0	$0	0
I-1975060436	5/15/1975	PASCAGOULA	Highway	No	0/0	$0	0
I-1975060062	5/22/1975	PASCAGOULA	Highway	No	0/0	$0	0
I-1976040745	4/15/1976	PASCAGOULA	Rail	No	0/1	$0	5 LGA
I-1976091099	9/21/1976	PASCAGOULA	Highway	Yes	0/0	$0	1,500 LGA
I-1977010383	11/1/1976	PASCAGOLA	Highway	No	0/0	$0	0
I-1976110815	11/3/1976	PASCAGOULA	Highway	No	0/0	$0	0
I-1977071609	6/20/1977	PASCAGOULA	Highway	No	0/0	$0	2 LGA
I-1977070910	7/5/1977	PASCAGOULA	Highway	No	0/0	$0	0
I-1978051546	5/22/1978	PASCOUGLA	Highway	No	0/0	$0	5 LGA
I-1978061053	5/30/1978	PASCAGOULA	Rail	No	0/0	$0	0
I-1978061054	5/30/1978	PASCAGOULA	Rail	No	0/0	$0	0
I-1978090515	8/16/1978	PASCAGOULA	Rail	No	0/0	$0	1 LGA
I-1978090080	8/20/1978	PASCAGOULA	Highway	Yes	0/0	$0	4,246 LGA
I-1978110271	10/6/1978	PASCAGOULA	Highway	No	0/0	$0	2 LGA

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
I-1978101450	10/12/1978	PASCAGOULA	Rail	No	0/1	$0	5 LGA
I-1979051170	3/30/1979	PASCAGOULA	Highway	No	0/0	$0	5 LGA
I-1979051067	5/15/1979	PASCAGOULA	Highway	No	0/0	$0	1 LGA
I-1979110452	9/19/1979	PASCAGOULA	Highway	No	0/0	$0	25 LGA
I-1979110453	10/18/1979	PASCAGOULA	Highway	No	0/0	$0	105 LGA
I-1979110454	10/22/1979	PASCAGOULA	Highway	No	0/0	$0	25 LGA
I-1979110455	10/24/1979	PASCAGOULA	Highway	No	0/0	$0	10 LGA
I-1979110178	10/31/1979	PASCAGOULA	Highway	Yes	0/0	$0	413 LGA
I-1979110456	11/1/1979	PASCAGOULA	Highway	No	0/0	$0	50 LGA
I-1979110457	11/2/1979	PASCAGOULA	Highway	No	0/0	$0	20 LGA
I-1979110458	11/5/1979	PASCAGOULA	Highway	No	0/0	$0	5 LGA
I-1979120327	11/21/1979	PASCAGOULA	Highway	No	0/0	$0	10 LGA
I-1980011216	12/14/1979	PASCAGOULA	Highway	No	0/0	$0	25 LGA
I-1980050559	3/6/1980	PASCAGOULA	Highway	No	0/0	$0	2 LGA
I-1980050189	3/22/1980	PASCAGOULA	Highway	No	0/0	$0	3 LGA
I-1980040503	4/9/1980	PASCAGOULA	Highway	No	0/0	$0	1 LGA
I-1980041669	4/15/1980	PASCAGOULA	Rail	No	0/0	$0	1 LGA
I-1980061490	7/7/1980	PASCAGOULA	Rail	No	0/0	$0	3 LGA
I-1981030030	2/18/1981	PASCAGOULA	Rail	No	0/1	$0	0
I-1981070008	4/29/1981	PASCAGOULA	Highway	No	0/0	$0	1 LGA
I-1981070889	7/9/1981	PASCAGOULA	Rail	No	0/0	$0	0
I-1981100341	9/26/1981	PASCAGOULA	Rail	No	0/0	$0	0
I-1982060113	5/12/1982	PASCAGOULA	Rail	No	0/0	$0	10 LGA
I-1982110279	10/28/1982	PASCAGOULA	Rail	No	0/0	$0	0
I-1983020294	1/28/1983	PASCAGOULA	Rail	No	0/0	$0	1 SLB
I-1983030288	3/9/1983	PASCAGOULA	Rail	No	0/0	$0	1 SLB
I-1983050365	4/29/1983	PASCAGOULA	Highway	No	0/0	$0	20 LGA
I-1984020061	2/1/1984	PASCAGOULA	Rail	No	0/0	$0	0
I-1984110294	11/7/1984	PASCAGOULA	Rail	No	0/0	$0	0
I-1986020308	2/21/1986	PASCAGOULA	Rail	No	0/0	$0	0
I-1987010215	12/31/1986	PASCAGOULA	Highway	Yes	0/0	$0	2,000 LGA
I-1987040267	4/9/1987	PASCAGOULA	Rail	No	0/0	$0	1 LGA
I-1987040267	4/9/1987	PASCAGOULA	Rail	No	0/0	$0	1 LGA
I-1987100269	9/15/1987	PASCAGOULA	Highway	No	0/0	$0	1 LGA
I-1988080379	4/25/1988	PASCAGOULA	Highway	No	0/0	$0	5 LGA
I-1989100554	9/5/1989	PASCAGOULA	Highway	No	0/0	$0	1 LGA
I-1989100448	10/1/1989	PASCAGOULA	Highway	No	0/0	$0	10 LGA
I-1989110451	11/19/1989	PASCAGOULA	Highway	No	0/0	$0	4 LGA
I-1990020627	2/16/1990	PASCAGOULA	Highway	No	0/0	$160	50 LGA

I-1990050152	4/24/1990	PASCAGOULA	Rail	No	0/0	$0	1 LGA
I-1990090136	8/26/1990	PASCAGOULA	Highway	No	0/0	$282	10 LGA
I-1991020701	1/2/1991	PASCAGOULA	Highway	No	0/0	$451	0.0625 LGA
I-1991020648	1/22/1991	PASCAGOULA	Highway	No	0/0	$345	0.0625 LGA
I-1991090834	9/13/1991	PASCAGOULA	Highway	No	0/0	$690	5 LGA
I-1992040474	3/12/1992	PASCAGOULA	Highway	No	0/0	$618	0.5 SLB
I-1992070667	6/8/1992	PASCAGOULA	Highway	No	0/0	$60	0.25 SLB

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
I-1993030066	1/26/1993	PASCAGOULA	Highway	No	0/0	$575	0.03125 LGA
I-1994040825	3/22/1994	PASCAGOULA	Highway	No	0/0	$3,429	0.25 LGA
I-1994070002	6/15/1994	PASCAGOULA	Highway	No	0/0	$0	0.000528 LGA
I-1994070081	6/30/1994	PASCAGOULA	Highway	No	0/0	$0	0.003906 LGA
I-1995050823	4/19/1995	PASCAGOULA	Highway	No	0/0	$0	0
I-1995080711	7/13/1995	PASCAGOULA	Highway	No	0/0	$0	15 LGA
I-1996010997	1/19/1996	PASCAGOULA	Highway	No	0/0	$31	20 LGA
I-1996030874	3/5/1996	PASCAGOULA	Highway	No	0/0	$0	1 LGA
I-1996050207	4/10/1996	PASCAGOULA	Highway	No	0/0	$0	0.5 LGA
I-1996080687	5/22/1996	PASCAGOULA	Highway	No	0/0	$0	0.125 LGA
I-1996120520	9/10/1996	PASCAGOULA	Highway	Yes	0/0	$0	1,000 LGA
I-1996100255	9/27/1996	PASCAGOULA	Highway	No	0/0	$0	1 LGA
I-1997030890	3/3/1997	PASCAGOULA	Highway	No	0/0	$56	37 LGA
I-1997081026	7/30/1997	PASCAGOULA	Highway	No	0/2	$0	3 LGA
I-1997100740	9/17/1997	PASCAGOULA	Highway	No	0/0	$705	1 LGA
I-1999010819	1/8/1999	PASCAGOULA	Highway	Yes	0/0	$1,590	350 LGA
I-1999050081	2/12/1999	PASCAGOULA	Highway	No	0/0	$7	5 LGA
I-1999040504	3/3/1999	PASCAGOULA	Highway	No	0/0	$145	100 LGA
I-1999061431	5/6/1999	PASCAGOULA	Highway	No	0/0	$14	10 LGA
I-1999082065	7/13/1999	PASCAGOULA	Highway	No	0/0	$2,891	0
I-2000050946	5/5/2000	PASCAGOULA	Highway	No	0/0	$21	15 LGA
I-2000061173	5/23/2000	PASCAGOULA	Highway	No	0/0	$16,651	10 LGA
I-2000080290	7/10/2000	PASCAGOULA	Highway	No	0/0	$0	0.5 LGA
I-2000110079	10/18/2000	PASCAGOULA	Rail	No	0/0	$0	0.25 LGA
I-2001010960	1/13/2001	PASCAGOULA	Rail	No	0/0	$0	1 LGA
I-2001081278	8/14/2001	PASCAGOULA	Highway	No	0/0	$0	5 LGA
I-2001081198	8/16/2001	PASCAGOULA	Highway	No	0/0	$2,720	2 LGA
I-2002011771	11/2/2001	PASCAGOULA	Highway	No	0/0	$0	0.125 LGA
I-2002020962	11/28/2001	PASCAGOULA	Highway	No	0/0	$0	1 LGA
I-2002020961	12/3/2001	PASCAGOULA	Highway	No	0/0	$0	2 LGA
I-2002020632	12/28/2001	PASCAGOULA	Rail	No	0/0	$0	0.125 GCF

I-2002060158	4/10/2002	PASCAGOULA	Highway	No	0/0	$134	20 LGA
I-2002061440	5/17/2002	PASCAGOULA	Highway	No	0/0	$0	1 LGA
I-2002100644	9/11/2002	PASCAGOULA	Rail	No	0/0	$0	0.25 LGA
I-2002100020	9/24/2002	PASCAGOULA	Highway	Yes	0/0	$201	146 LGA
I-2003020680	2/10/2003	PASCAGOULA	Highway	No	0/0	$0	0.020625 LGA
I-2003100595	9/9/2003	PASCAGOULA	Highway	No	0/0	$0	8 LGA
I-2004090557	9/2/2004	PASCAGOULA	Highway	No	0/0	$0	0.125 LGA
I-2005020749	1/3/2005	PASCAGOULA	Rail	No	0/0	$3,700	2 LGA
I-2006071418	7/9/2006	PASCAGOULA	Rail	No	0/0	$2,987	10 LGA
E-2007050096	4/12/2007	PASCAGOULA	Highway	No	0/0	$0	0.000654 LGA
I-2008070479	12/24/2007	PASCAGOULA	Highway	Yes	0/0	$68,382	5 LGA
X-2008060157	5/23/2008	PASCAGOULA	Rail	No	0/0	$5,593	0.08355 GCF
I-2008090770	8/24/2008	PASLAGOULA	Highway	Yes	0/0	$145,660	2 LGA
X-2011100149	9/22/2011	PASCAGOULA	Rail	No	0/0	$2,142	0.1 LGA
X-2011100149	9/22/2011	PASCAGOULA	Rail	No	0/0	$2,142	0.1 LGA

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
X-2011100149	9/22/2011	PASCAGOULA	Rail	No	0/0	$2,142	0.1 LGA
X-2011100149	9/22/2011	PASCAGOULA	Rail	No	0/0	$2,142	0.1 LGA
X-2012030191	3/3/2012	Pascagoula	Rail	No	0/0	$1,574	0.06684 GCF
X-2013060347	6/18/2013	Pascagoula	Rail	Yes	0/0	$3,102	0.2 LGA
X-2013080210	7/30/2013	Pascagoula	Rail	No	0/0	$2,585	1 LGA
X-2014080049	7/23/2014	Pascagoula	Rail	No	0/0	$1,933	1 LGA
X-2016070541	7/15/2016	Pascagoula	Rail	Yes	0/0	$8,500	1.3368 GCF
Unincorporated Area							
I-1982090508	9/4/1982	ESCATAWPA	Highway	No	0/0	$0	10 LGA
I-1996050948	5/17/1996	EAST MOSS POINT	Highway	Yes	0/0	$0	300 LGA
I-1996080916	7/16/1996	ESCATAWPA	Highway	No	0/0	$1,535	1 LGA

*Property damage is reported in 2016 dollars; all damage may not have been reported.
Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

PROBABILITY OF FUTURE OCCURRENCES

Given the location of 11 toxic release inventory sites in Jackson County and prior roadway and railway incidents, it is highly likely (100 percent annual probability) that a hazardous material incident may occur in the county. County and city officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

The FEMA NRI does not assess HAZMAT events.

Infectious Disease

LOCATION AND SPATIAL EXTENT

Due to the nature of a public health/emerging disease threat, it is difficult to identify a precise location where this type of event would occur. Moreover, a large-scale event would have impacts that spread throughout the county. Therefore, all areas in Jackson County are considered equally susceptible to infectious diseases.

HISTORICAL OCCURRENCES

Mosquito-borne illness in Mississippi include West Nile virus, Chikungunya virus, and Zika virus. These illnesses affect birds, animals, and humans, causing flu-like symptoms in people who are bitten by infected mosquitoes. Occasionally illness can be severe, leading to meningitis or encephalitis. According to the Mississippi State Department of Health (MSDH), there has been one reported case of West Nile Virus in Jackson County as of November 2016. Table D.61 summarizes the mosquito-borne illnesses in humans reported in the county.

TABLE D.61: SUMMARY OF MOSQUITO-BORNE ILLNESSES IN JACKSON COUNTY

Location	West Nile Virus	Chikungunya	Zika	Other*	Deaths
Jackson County	1	0	0	0	0

*Other mosquito-borne illnesses include La Crosse encephalitis, St. Louis encephalitis, and Eastern Equine encephalitis.
Source: Mississippi State Department of Health

Diseases like influenza and norovirus are regularly occurring health issues in Jackson County. These conditions are not legally reportable to county or state public health agencies, so data on disease incidence is not readily available. MSDH relies upon selected sentinel health practitioners across the state to report the percentage and total patient visits consistent with an influenza-like illness (ILI): fever of 100ºF or higher and cough or sore throat. Reports are used to estimate the state's ILI rate and the magnitude of state's influenza activity on a weekly basis. Reports represent only the distribution of flu in the state, not an actual count of all flu cases statewide.

PROBABILITY OF FUTURE OCCURRENCES

Due to some recent incidents that have been recorded across the State of Mississippi and in Jackson County, future occurrences are considered possible (between 1 and 10 percent annual probability).

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess infectious diseases.

Conclusions on Hazard Risk

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

HAZARD EXTENT

Table D.62 describes the extent of each hazard identified for Jackson County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE D.62: EXTENT OF JACKSON COUNTY HAZARDS

Flood-related Hazards	
Dam and Levee Failure	Dam failure extent is defined using the Mississippi Division of Environmental Quality classifications which include Low, Significant, and High. One dam is classified as high-hazard in Jackson County.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. Some areas of the barrier islands are eroding at 6 to 8 meters per year in Jackson County according to the USGS Coastal and Marine Geology Program's U.S. Gulf of Mexico Interactive Map.
Flood	Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest flood recorded for the county was at Pascagoula River at Graham Ferry. The maximum historic crest was recorded at 20.10 feet, or 0.1 feet above the major flood stage (reported on February 28, 1961). Additional historic crest heights and the corresponding flood categories are in the table below.

Location/ Jurisdiction	Date	Maximum Historic Crest (ft)	Flood categories			
			Action Stage (ft)	Flood Stage (ft)	Moderate Flood Stage (ft)	Major Flood Stage (ft)
Jackson County						
PASCAGOULA RIVER AT GRAHAM FERRY	2/28/1961	20.10	15	16	18	20
ESCATAWPA RIVER ABOVE ORANGE GROVE	9/28/1998	11.90	6	8	12	15

Storm Surge	Storm surge can be defined by the depth of inundation which is defined by the category of hurricane/tropical storm. Since Jackson County could easily be impacted by a Category 3 storm, depth of inundation could be at least 9 feet in many areas.
Fire-related Hazards	

Drought	Drought extent is defined by the U.S. Drought Monitor classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought. According to the U.S. Drought Monitor classifications, the most severe drought condition is Exceptional. Jackson County has received this ranking twice over the 17-year reporting period.
Lightning	According to the Vaisala's flash density map, Jackson County is located in an area that experiences 4 to 12 and up lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Wildfire	Wildfire data was provided by the Mississippi Forestry Commission and is reported annually by county from 2007-2022. The greatest number of fires to occur in Jackson County in any year 161 in 2011. The greatest number of acres to burn in the county in a single year occurred in 2016 when 5,020 acres were burned. Information on specific occurrences of wildfire and the most severe fires in each jurisdiction is not available. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale, the Modified Mercalli Intensity (MMI) scale, and the distance of the epicenter from Jackson County. According to data provided by the National Centers for Environmental Information, no earthquakes were reported in Jackson County.
Wind-related Hazards	
Extreme Cold	The extent of extreme cold can be defined by the minimum temperature reached. Official long term temperature records are not kept for any areas in Jackson County. However, the temperature has previously ranged from 15 to 20 degrees Fahrenheit in southwest and coastal Mississippi (reported on December 18, 1996).
Extreme Heat	The extent of extreme heat can be measured by the record high temperature recorded. Official long term temperature records are not kept for any areas in Jackson County. However, the highest recorded temperature in Beaumont (northwest of the county) was 105°F and heat index values were recorded as high as 115°F (reported in July 2000).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Jackson County was 3.00 inches (reported on April 19, 1965). It should be noted that future events may exceed this.

Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5. The greatest classification of hurricane to traverse directly through Jackson County was Hurricane Frederic, a Category 3 storm which carried tropical force winds of 97 knots upon arrival in the county.
Severe Thunderstorm/High Wind	Thunderstorm extent is defined by wind speeds reported. The strongest recorded wind event in Jackson County was 65 knots (reported on April 14, 2014). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by the Fujita/Enhanced Fujita. The greatest magnitude reported in Jackson County was an EF2 (reported on August 30, 2012).
Winter Weather	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest snowfall reported in Jackson County was 1-2 inches (reported on December 18, 1996).
Other Hazards	
Climate Change/Sea Level Rise	It is still uncertain what the extent of climate change will be in the future. However, increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, stronger storms (wind, hurricanes) can be expected. Sea level rise is defined by the areas impacted, but is more often associated with the amount of sea level rise that is expected to take place. Although it is difficult to predict an exact amount of rise, the Climate Change Surging Seas Report intermediate high sea level rise scenario projects 1 foot of rise locally by 2050 and 3.7 feet by 2100.
Hazardous Materials Incident/Train Derailment	According to USDOT PHMSA, the largest hazardous materials incident reported in Jackson County was 12,692 GCF released on the highway (reported on February 7, 1985). It should be noted that larger events are possible.
Infectious Disease	An infectious disease threat could have large-scale effects throughout the county and may cause illness in many people. Possible impacts from a disease threat depend largely on the impacted population, but might include anything from absenteeism and loss of productivity in the workplace to death or serious illness to humans or livestock. A serious disease threat could affect many thousands of people.

PRIORITY RISK INDEX RESULTS

In order to draw some meaningful planning conclusions on hazard risk for Jackson County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a “Priority Risk Index” (PRI). More information on the PRI and how it was calculated can be found in Section 5.21.2.

Table D.63 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this subsection, as well as input from the Regional Hazard Mitigation Council. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE D.63: SUMMARY OF PRI RESULTS FOR JACKSON COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Flood-related Hazards						

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Dam and Levee Failure	Possible	Critical	Small	Less than 6 hours	Less than 6 hours	2.4
Erosion	Likely	Limited	Small	More than 24 hours	More than 1 week	2.4
Flood	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 24 hours	3.2
Storm Surge	Highly Likely	Critical	Moderate	More than 24 hours	Less than 24 hours	3.0
Fire-related Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Lightning	Highly Likely	Limited	Negligible	6 to 12 hours	Less than 6 hours	2.4
Wildfire	Highly Likely	Minor	Small	Less than 6 hours	Less than 1 week	2.6
Geologic Hazards						
Earthquake	Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	2.0
Wind-related Hazards						
Extreme Cold	Possible	Minor	Large	More than 24 hours	Less than 1 week	2.1
Extreme Heat	Highly Likely	Minor	Large	More than 24 hours	More than 1 week	2.8
Hailstorm	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	2.8
Hurricane and Tropical Storm	Highly Likely	Critical	Large	More than 24 hours	Less than 24 hours	3.2
Severe Thunderstorm/ High Wind	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	3.1
Tornado	Highly Likely	Critical	Small	Less than 6 hours	Less than 6 hours	3.0
Winter Weather	Likely	Minor	Moderate	More than 24 hours	Less than 24 hours	2.1
Other Hazards						
Climate Change/Sea Level Rise	Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Hazardous Materials Incident/ Train Derailment	Highly Likely	Limited	Small	Less than 6 hours	Less than 24 hours	2.8
Infectious Disease	Possible	Limited	Large	More than 24 hours	More than 1 week	2.5

Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Jackson County, including the PRI results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (Table D.64). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Jackson County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: Vulnerability Assessment and below in Section D.3. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

Some priorities have changed since the previous plans were adopted due to the merging of multiple local plans to form this regional plan; however, most priorities remain the same.

TABLE D.64: CONCLUSIONS ON HAZARD RISK FOR JACKSON COUNTY

HIGH RISK	Hurricane and Tropical Storm Flood Severe Thunderstorm/High Wind Storm Surge Tornado
MODERATE RISK	Hailstorm Hazardous Materials Incident/Train Derailment Extreme Heat Wildfire Drought Climate Change/Sea Level Rise Infectious Disease
LOW RISK	Lightning Dam and Levee Failure Erosion Winter Weather Extreme Cold Earthquake

SECTION 20 JACKSON COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Jackson County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: Vulnerability Assessment.

Asset Inventory

Table D.65 lists the estimated number of buildings, parcels, and the total value of improvements for Jackson County and its participating jurisdictions (study area of vulnerability assessment). Because digital parcel data was not available for every community, data obtained from Hazus-MH 3.2 inventory was utilized to supplement the analysis where gaps existed.

TABLE D.65: IMPROVED PROPERTY IN JACKSON COUNTY

Location	Counts of Buildings	Counts of Parcels	Total Value of Improvements
Gautier	7,194	5,573	$397,918,520
Moss Point	10,825	8,690	$405,337,190
Ocean Springs	10,325	8,072	$905,620,110

Location	Counts of Buildings	Counts of Parcels	Total Value of Improvements
Pascagoula	14,967	9,886	$852,583,870
Unincorporated Area	56,987	48,414	$2,431,927,960
JACKSON COUNTY TOTAL	100,298	80,635	$4,993,387,650

Source: MDEQ, Hazus-MH 3.2

Table D.66 lists the critical facilities located in Jackson County by type according to data provided by local government officials.

In addition, Figure D.35 shows the locations of critical facilities in Jackson County. Table D.83, at the end of this subsection, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. Further, it should be noted that the table below may show that some communities do not have any critical facilities of in certain type, when in reality, that particular type of facility may actually be located within the community. This may occur because spatial data for that facility type was not available or because the facility may have been classified under a different category type for that particular community.

TABLE D.66: CRITICAL FACILITY INVENTORY IN JACKSON COUNTY

Location	Communications	EOC	Fire Stations	Medical	Police Station	Power/ Gas	Private/Non-Profit
Gautier	0	0	3	0	1	0	0
Moss Point	0	0	4	0	1	0	0
Ocean Springs	0	1	4	2	3	0	2
Pascagoula	1	1	3	2	2	1	17
Unincorporated Area	4	1	31	0	1	0	1
JACKSON COUNTY TOTAL	5	3	45	4	8	1	20

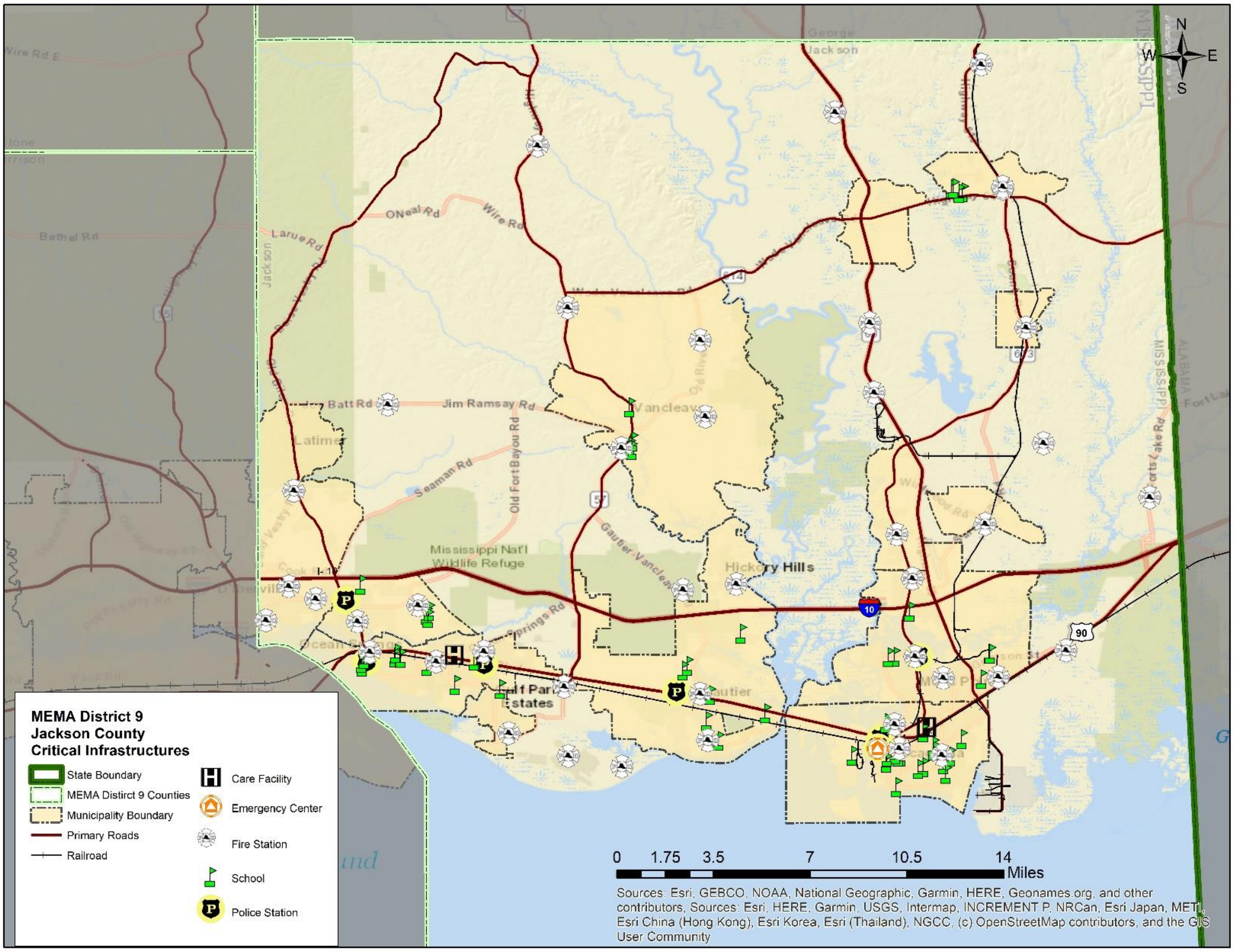
Source: Local Governments

TABLE D.67: CRITICAL FACILITY INVENTORY IN JACKSON COUNTY (CONT.)

Location	Public Facility	School	Shelter	Special Populations	Transportation	Water/ Wastewater
Gautier	1	6	0	0	0	0
Moss Point	2	13	4	7	0	1
Ocean Springs	13	13	0	5	1	8
Pascagoula	6	24	0	5	0	33
Unincorporated Area	28	19	3	10	2	14
JACKSON COUNTY TOTAL	50	75	7	27	3	56

Source: Local Governments

FIGURE D.35: CRITICAL FACILITY LOCATIONS IN JACKSON COUNTY



Source: Local Governments

Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Jackson County that are potentially at risk to these hazards.

Table D.68 lists the population by jurisdiction according to American Community Survey 2015 population estimates. The total population in Jackson County according to Census data is 140,676 persons. Additional population estimates are presented above in Section D.1.

TABLE D.68: TOTAL POPULATION IN JACKSON COUNTY

Location	Total 2015 Population
Gautier	18,563
Moss Point	13,685
Ocean Springs	17,528

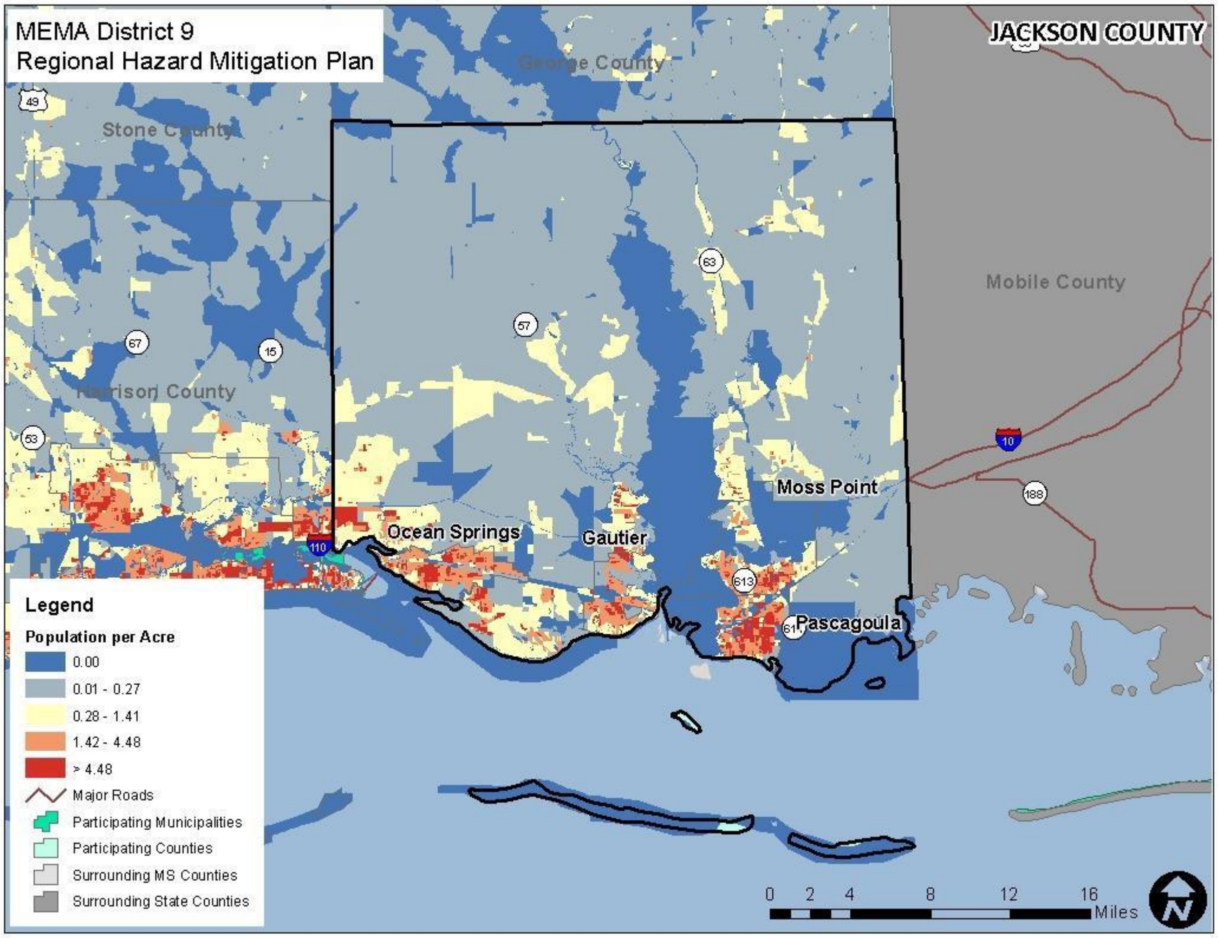
Pascagoula	22,230

Location	Total 2015 Population
Unincorporated Area	68,670
JACKSON COUNTY TOTAL	140,676

Source: United States Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

In addition, Figure D.36 illustrates the population density per acre by census block as it was reported by the U.S. Census Bureau in 2010. As can be seen in the figure, the population is spread out through most of the county, with heavy concentrations in Gautier, Moss Point, Ocean Springs, and Pascagoula.

FIGURE D.36: POPULATION DENSITY IN JACKSON COUNTY



Source: United States Census Bureau, 2010 Census

Development Trends and Changes in Vulnerability

Since the previous local-level hazard mitigation plans were approved, Jackson County has experienced moderate growth and development. Table D.69 shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

TABLE D.69: BUILDING COUNTS FOR JACKSON COUNTY

Location	2010	2011	2012	2013	2014	2015	% Building Stock Built Post-2010
Gautier	7,507	7,748	7,886	8,034	8,113	8,180	9.0%
Moss Point	6,305	6,488	6,555	6,435	6,505	6,476	2.7%
Ocean Springs	7,246	7,482	7,628	7,892	7,880	7,625	5.2%
Pascagoula	10,803	10,935	10,696	10,813	10,574	10,891	0.8%
Unincorporated Area	26,134	26,563	27,046	27,063	27,577	27,717	6.1%
JACKSON COUNTY TOTAL	57,995	59,216	59,811	60,237	60,649	60,889	5.0%

Source: United States Census Bureau, American Community Survey

Table D.70 shows population growth estimates for the county from 2010 to 2015 based on the based on the American Community Survey's annual population estimates.

TABLE D.70: POPULATION GROWTH FOR JACKSON COUNTY

Location	Population Estimates						% Change 2010-2015
	2010	2011	2012	2013	2014	2015	
Gautier	18,088	18,344	18,502	18,539	18,581	18,563	2.6%
Moss Point	13,963	13,885	13,807	13,749	13,690	13,685	-2.0%
Ocean Springs	17,258	17,379	17,420	17,474	17,446	17,528	1.6%
Pascagoula	22,947	22,765	22,523	22,372	22,239	22,230	-3.1%
Unincorporated Area	64,826	66,138	67,178	67,772	68,238	68,670	5.9%
JACKSON COUNTY TOTAL	137,082	138,511	139,430	139,906	140,194	140,676	2.6%

Source: United States Census Bureau, American Community Survey

Based on the data above, there has been a moderate rate of residential development and population growth in the county since 2010, and the majority of incorporated jurisdictions have experienced slight increases in population and housing development, resulting in an increased number of structures and people that are vulnerable to the potential impacts of the identified hazards. However, the cities of Moss Point and Pascagoula have both experienced a decline in both population since 2010 according to estimates. Therefore, development and population growth have impacted the county's vulnerability since the previous local hazard mitigation plans were approved and there has been an increase in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains or other identified areas of high risk.

Vulnerability Assessment Results

As noted in Section 6: Vulnerability Assessment, only hazards with a specific geographic boundary, available modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Jackson County, are presented here. All other hazards are assumed to impact the entire planning region (e.g., drought) or, due to lack of data, analysis would not lead to credible results (e.g., infectious disease). The total county exposure, and thus risk to these hazards, was presented in Table D.64.

The hazards to be further analyzed in this subsection include: flood, wildfire, earthquake, hurricane and tropical storm winds and storm surge, hazardous materials incident, dam and levee failure, and sea level rise.

The annualized loss estimate for all hazards is presented near the end of this subsection in Table D.82.

FLOOD

Historical evidence indicates that Jackson County is susceptible to flood events. A total of 25 flood events have been reported by the National Climatic Data Center resulting in around $4.1 million (2016 dollars) in property damage. On an annualized level, these damages amounted to $234,715 for Jackson County.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with improved property records for Jackson County. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified floodplain.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table D.71 shows the results of the analysis.

TABLE D.71: ESTIMATED EXPOSURE OF PROPERTY TO THE FLOOD HAZARD

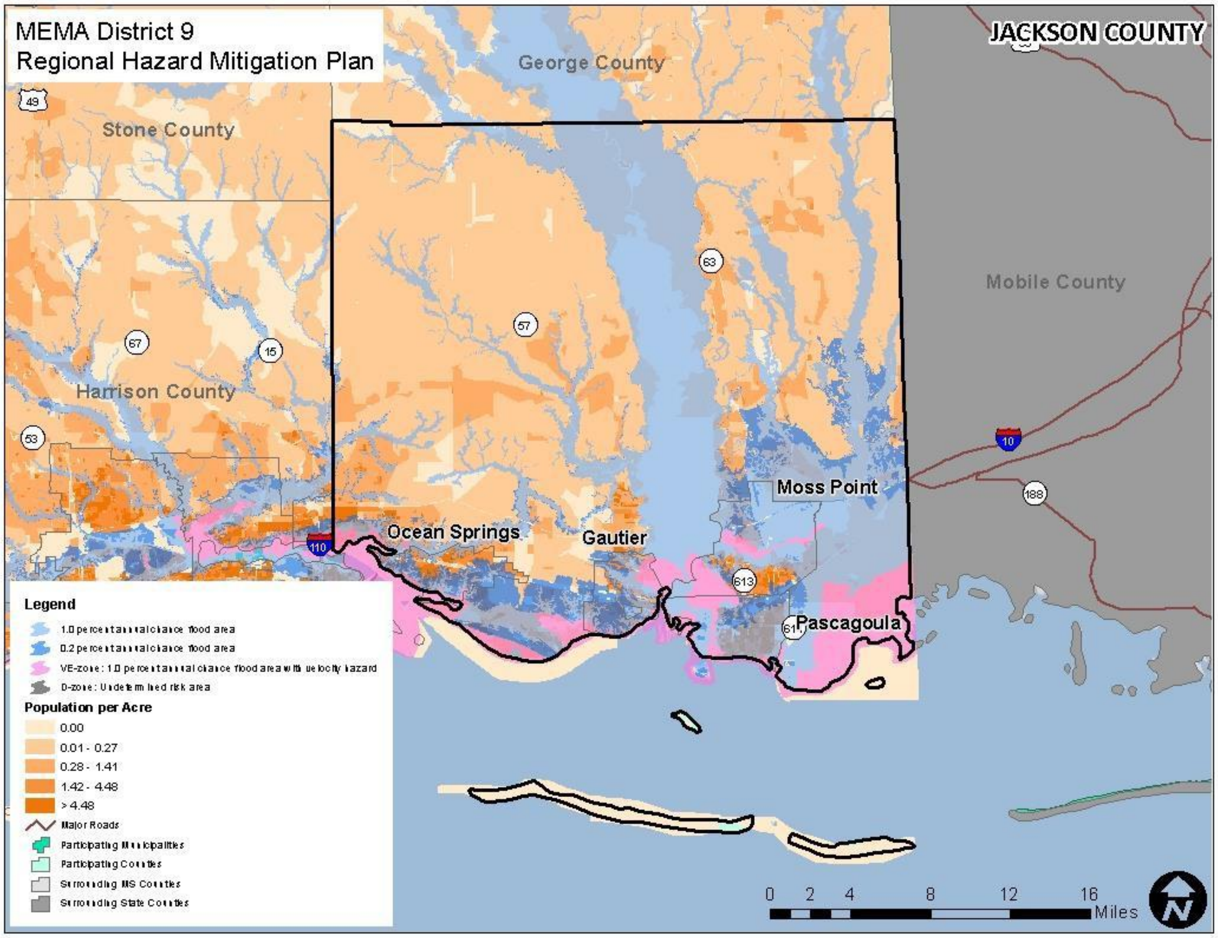
Location	1.0-percent ACF		0.2-percent ACF		VE Zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Gautier	2,316	$118,332,200	4,728	$281,124,330	84	$7,279,640
Moss Point	3,119	$130,471,550	2,572	$132,822,500	55	$5,563,840
Ocean Springs	1,226	$154,955,040	5,987	$571,123,770	94	$12,202,880
Pascagoula	12,248	$644,004,050	2,804	$243,751,930	171	$13,956,290
Unincorporated Area	10,787	$481,853,710	8,300	$536,609,990	629	$45,577,430
JACKSON COUNTY TOTAL	29,696	$1,529,616,550	24,391	$1,765,432,520	1,033	$84,580,080

Source: Federal Emergency Management Agency DFIRM, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Figure D.37 is presented to gain a better understanding of at-risk population by evaluating census block level population data against mapped floodplains. There are areas of concern in most of the population centers in the county. Indeed, each of the incorporated municipalities is potentially at risk of being impacted by flooding in some areas of its jurisdiction. Therefore, there is significant population vulnerability to flooding.

FIGURE D.37: POPULATION DENSITY NEAR FLOODPLAINS IN JACKSON COUNTY



Source: Federal Emergency Management Agency DFIRM, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are 195 facilities located in one of the identified floodplain zones. (Please note, as previously indicated, this analysis does not consider building elevation, which may negate risk.) Of these facilities, 88 are located in the 1.0 percent annual chance flood zone, 103 are located in the 0.2 percent annual chance flood zone, and 4 are located in a VE-zone. A list of specific critical facilities and their associated risk can be found in Table D.83 at the end of this subsection.

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in Jackson County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. Such site-specific vulnerability determinations are outside the scope of this assessment but may be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

WILDFIRE

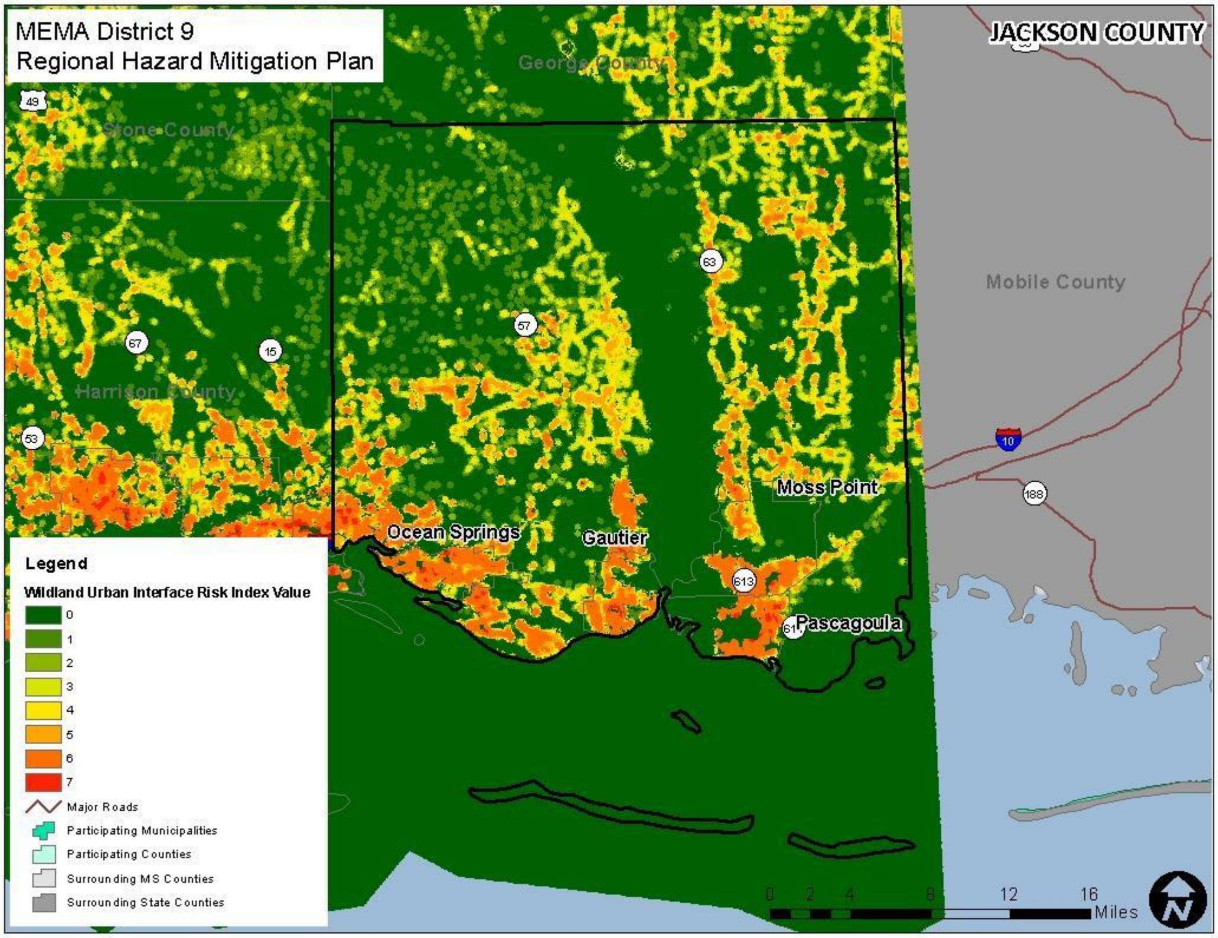
Although historical evidence indicates that Jackson County is susceptible to wildfire events, there are few reports which include information on historic dollar losses. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered relatively low, though it should be noted that a single event could result in significant damages throughout the county.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones. For the critical facility analysis, areas of concern were intersected with critical facility locations.

Figure D.38 shows the Wildland Urban Interface Risk Index (WUIRI) data, which is a data layer that shows a rating of the potential impact of a wildfire on people and their homes. The key input, Wildland Urban Interface (WUI), reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the WUI and rural areas is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, it was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to 7 with higher values being most severe (as noted previously, this is only a measure of relative risk). Figure D.39 shows the areas of analysis where any grid cell is less than 3. Areas with a value below 3 were chosen to be displayed as areas of risk because this showed the upper echelon of the scale and the areas at highest risk.

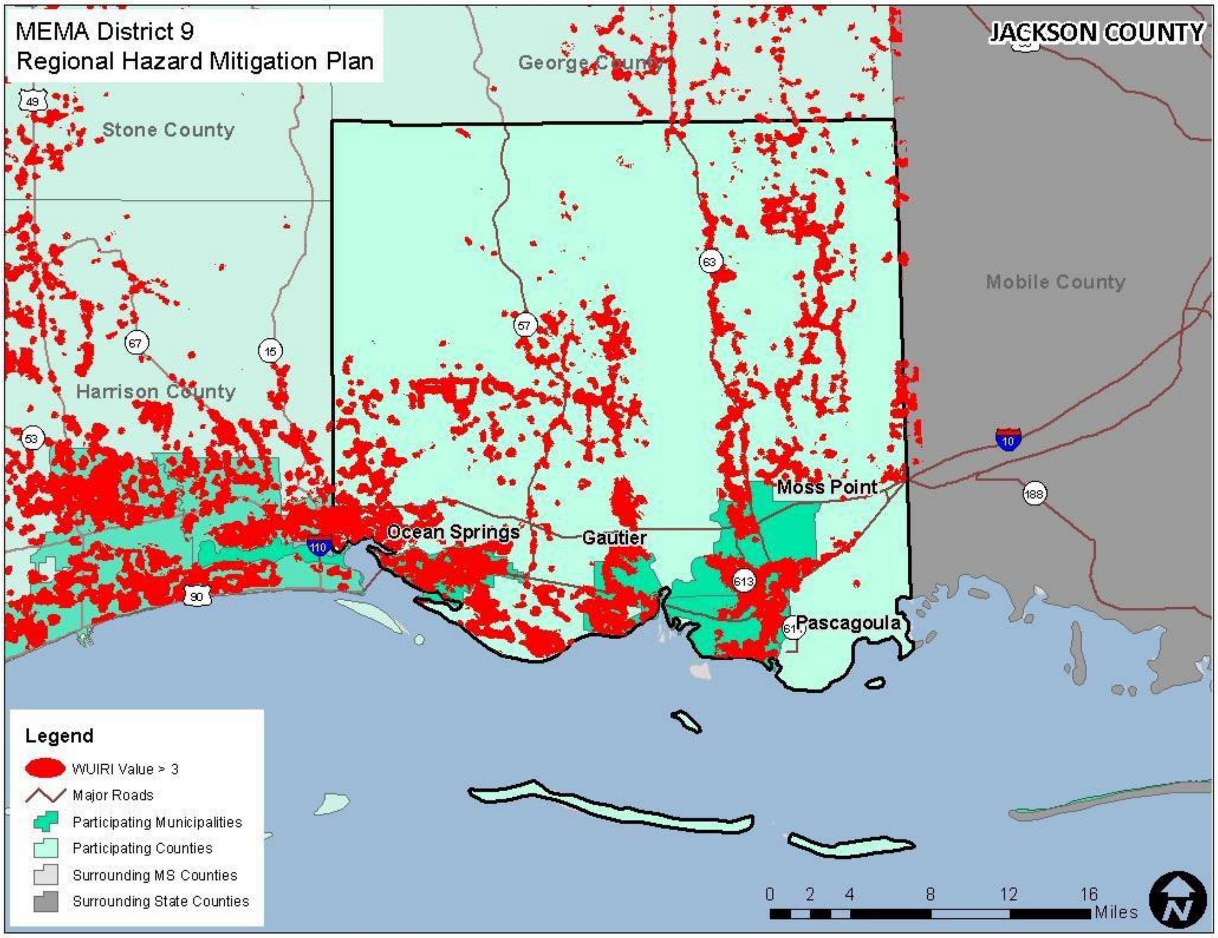
Table D.72 shows the results of the analysis.

FIGURE D.38: WUI RISK INDEX AREAS IN JACKSON COUNTY



Source: Southern Wildfire Risk Assessment Data

FIGURE D.39: WILDFIRE RISK AREAS IN JACKSON COUNTY



Source: Southern Wildfire Risk Assessment Data

TABLE D.72: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE RISK AREAS

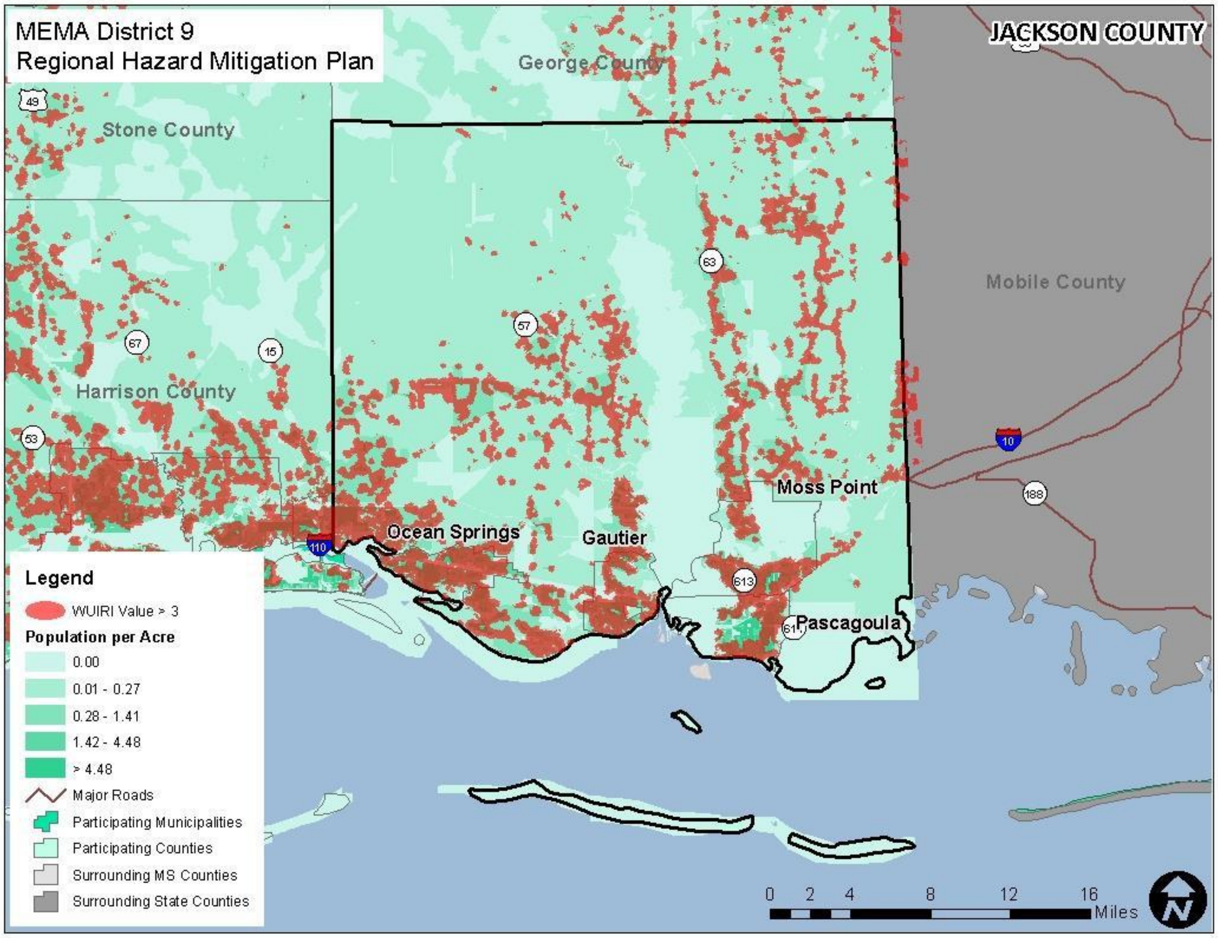
Location	Wildfire Risk	
	Approx. Number of Buildings	Approx. Improved Value
Gautier	6,767	$362,594,440
Moss Point	9,227	$342,127,140
Ocean Springs	9,622	$850,642,070
Pascagoula	9,231	$541,505,990
Unincorporated Area	40,410	$1,880,656,320
JACKSON COUNTY TOTAL	75,257	$3,977,525,960

Source: SWRA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Given some level of susceptibility across the county, it is assumed that the total population is at risk to the wildfire hazard. Figure D.40 shows an overlay of the wildfire risk areas identified above with the population density by census block. This shows that many of the areas of high population concentration are susceptible to wildfire because of their proximity to the wildland urban interface.

FIGURE D.40: WILDFIRE RISK AREAS IN JACKSON COUNTY



Source: Southern Wildfire Risk Assessment Data; United States Census

Critical Facilities

The critical facility analysis revealed that there are 202 critical facilities located in wildfire areas of concern, including 1 communications, 1 EOC, 39 fire stations, 1 medical, 5 police stations, 8 private/non-profits, 33 public facilities, 43 schools, 6 shelters, 23 special populations, 2 transportation, and 40 water/wastewater. It should be noted, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in Table D.83 at the end of this subsection.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Jackson County.

EARTHQUAKE

As the Hazus-MH model suggests below, and historical occurrences confirm, any earthquake activity in the area is likely to inflict only minor to moderate damage to the county. Hazus-MH 3.2 estimates a total annualized loss of $49,000 which includes buildings, contents, and inventory throughout the county.

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the average annualized loss26 for the county. The results of the analysis are generated at the Census Tract level within Hazus-MH and then aggregated to the county level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to structure failure, building loss, contents damage, and inventory loss. They do not include losses to business interruption, lost income, or relocation. Table D.73 summarizes the findings with results rounded to the nearest thousand.

TABLE D.73: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Structural Damage	Non-Structural Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Jackson County	$12,000	$29,000	$8,000	$0	$49,000

Source: Hazus-MH 3.2

Social Vulnerability
It can be assumed that all existing and future populations are at risk to the earthquake hazard.

Critical Facilities
The Hazus-MH probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Jackson County. The Hazus-MH scenario indicates that minimal to moderate damage is expected from an earthquake occurrence. While Jackson County may not experience a large earthquake, localized damage is possible with an occurrence. A list of specific critical facilities and their associated risk can be found in Table D.83 at the end of this subsection.

HURRICANE AND TROPICAL STORM

Historical evidence indicates that Jackson County has very significant risk to the hurricane and tropical storm hazard. There have been 12 disaster declarations due to hurricanes or tropical storms (Hurricanes Betsy, Camille, Frederic, Elena, Georges, Ivan, Dennis, Katrina, Gustav, and Isaac, as well as Tropical Storms Allison and Isidore). A large number tracks have come near or traversed through the county, as shown and discussed in Section D.2.10. Hazus-MH 3.2 estimates a total annualized loss of $102,555,000 which includes buildings, contents, and inventory throughout the county.

Hurricane Winds

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and storm surge and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore, only these two aspects of hurricane losses are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to hurricane and tropical storm wind hazard. Hazus-MH 3.2 was used to determine average annualized losses for the county as shown below in Table D.74. Only losses to buildings, inventory, and contents are included in the results.

TABLE D.74: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Jackson County	$70,481,000	$31,767,000	$307,000	$102,555,000

Source: Hazus-MH 3.2

Storm Surge

In addition, although it was treated as a separate hazard throughout this plan, storm surge is most often associated with hurricanes and tropical storms. Indeed, Hazus incorporates the storm surge model for estimating damage from storm surge as part of the hurricane model. The storm surge model can only be run as part of a historic hurricane model run and not as part of an annualized loss model. Unfortunately, in this model, storm surge impacts are calculated as part of the total damage from the historic event and thus could not be separated out and evaluated solely in terms of storm surge loss. As such, the estimated losses presented below are combined losses from hurricane winds and storm surge. The historic Hurricane Katrina model was utilized as this was certainly one of the most impactful storms in the region and therefore estimates the potential losses that are possible from a large hurricane event. Table D.75 presents the losses from this modeled event.

TABLE D.75: POTENTIAL LOSS ESTIMATIONS FOR LARGE HURRICANE EVENT

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Jackson County	$381,792,000	$142,547,000	$605,000	$524,944,000

Source: Hazus-MH 3.2

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population, both current and future, is at risk to the hurricane and tropical storm wind hazard. In terms of social vulnerability to storm surge, coastal populations are at much higher risk than inland populations. Since large concentrations of population are located along the coast of Jackson County, there is significant social vulnerability to storm surge in the county.

Critical Facilities

Given equal vulnerability across Jackson County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among factors. Determining individual building response to wind and storm surge is beyond the scope of this plan. However, this plan will consider mitigation action for especially vulnerable structures and/or critical facilities to mitigate against the effects of the hurricane hazard. A list of specific critical facilities can be found in Table D.83 at the end of this subsection.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Jackson County.

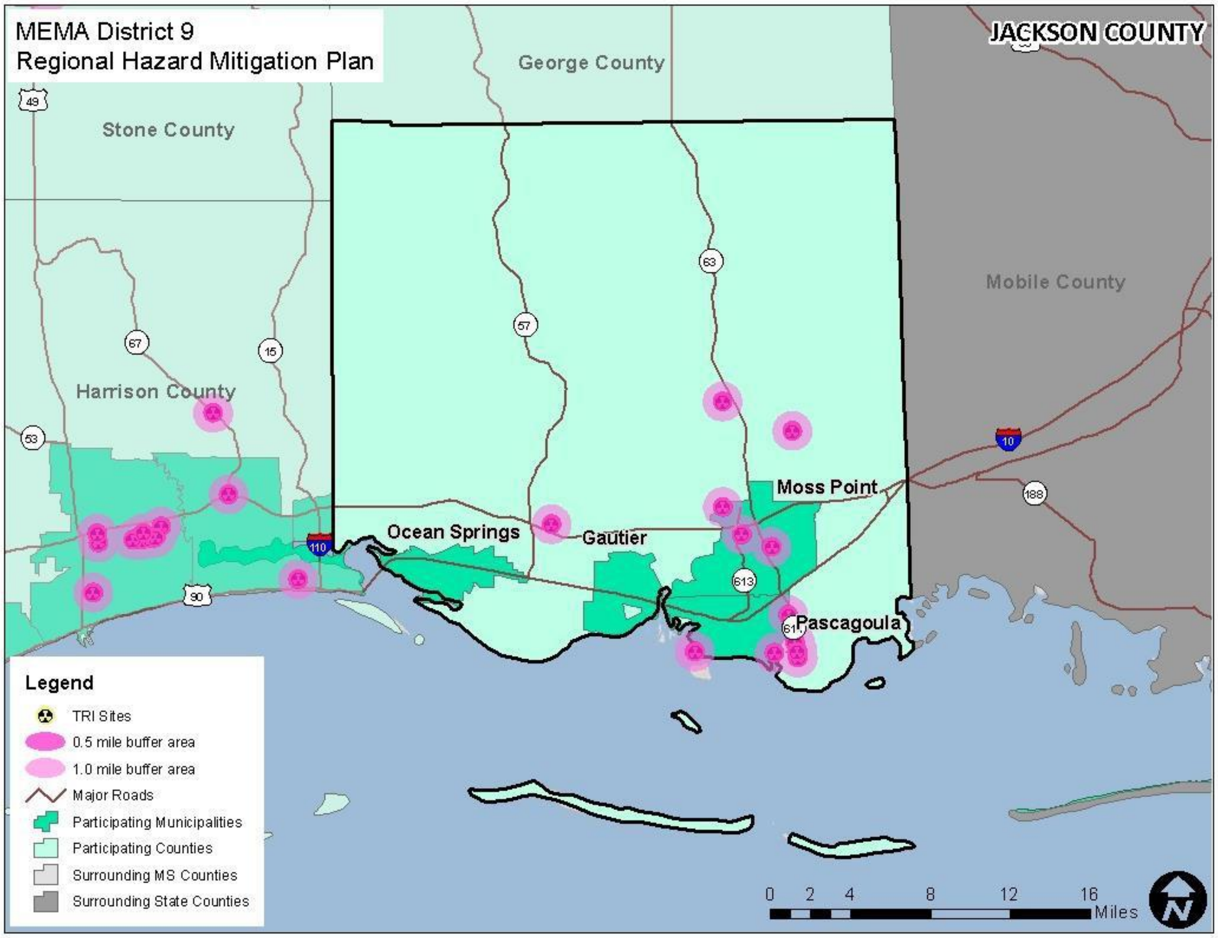
HAZARDOUS MATERIALS INCIDENT

Historical evidence indicates that Jackson County is susceptible to hazardous materials events. A total of 176 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration, resulting in $1.0 million (2016 dollars) in property damage as well as 15 injuries. On an annualized level, these damages amount to $25,777 for the county.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities, and cause affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and building footprints/parcels where available and Census block data where footprints/parcels were not available. In both scenarios, two sizes of buffers—0.5-mile and 1.0-mile— were used. These areas are assumed to represent the different levels of effect: immediate (primary) and secondary. Primary and secondary impact zones were selected based on guidance from the PHMSA Emergency Response Guidebook. For the fixed site analysis, geo-referenced TRI sites in the region, along with buffers, were used for analysis as shown in Figure D.41. For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. Figure D.42 shows the areas used for mobile road toxic release buffer analysis and Figure D.43 shows the areas used for the mobile railroad toxic release buffer analysis. The results indicate the approximate number of improved properties and improved value, as shown in Table D.76 (fixed sites), Table D.77 (mobile roads), and Table D.78 (mobile railroad sites).

FIGURE D.41: TRI SITES WITH BUFFERS IN JACKSON COUNTY



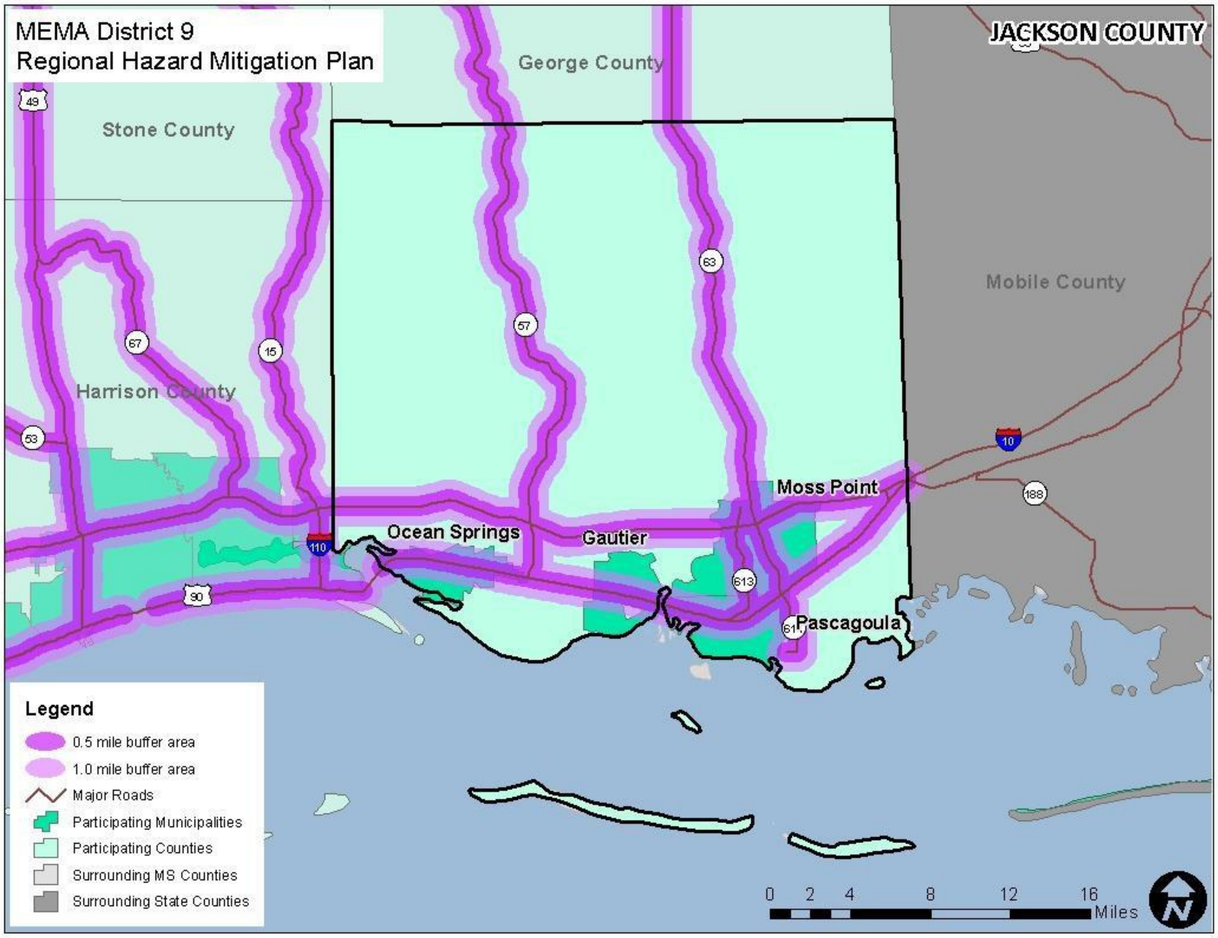
Source: Environmental Protection Agency

TABLE D.76: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Gautier	0	$0	0	$0
Moss Point	583	$19,614,990	1,818	$74,425,480
Ocean Springs	0	$0	0	$0
Pascagoula	1,003	$39,815,600	3,902	$180,770,120
Unincorporated Area	968	$29,897,250	2,531	$67,036,780
JACKSON COUNTY TOTAL	2,554	$89,327,840	8,251	$322,232,380

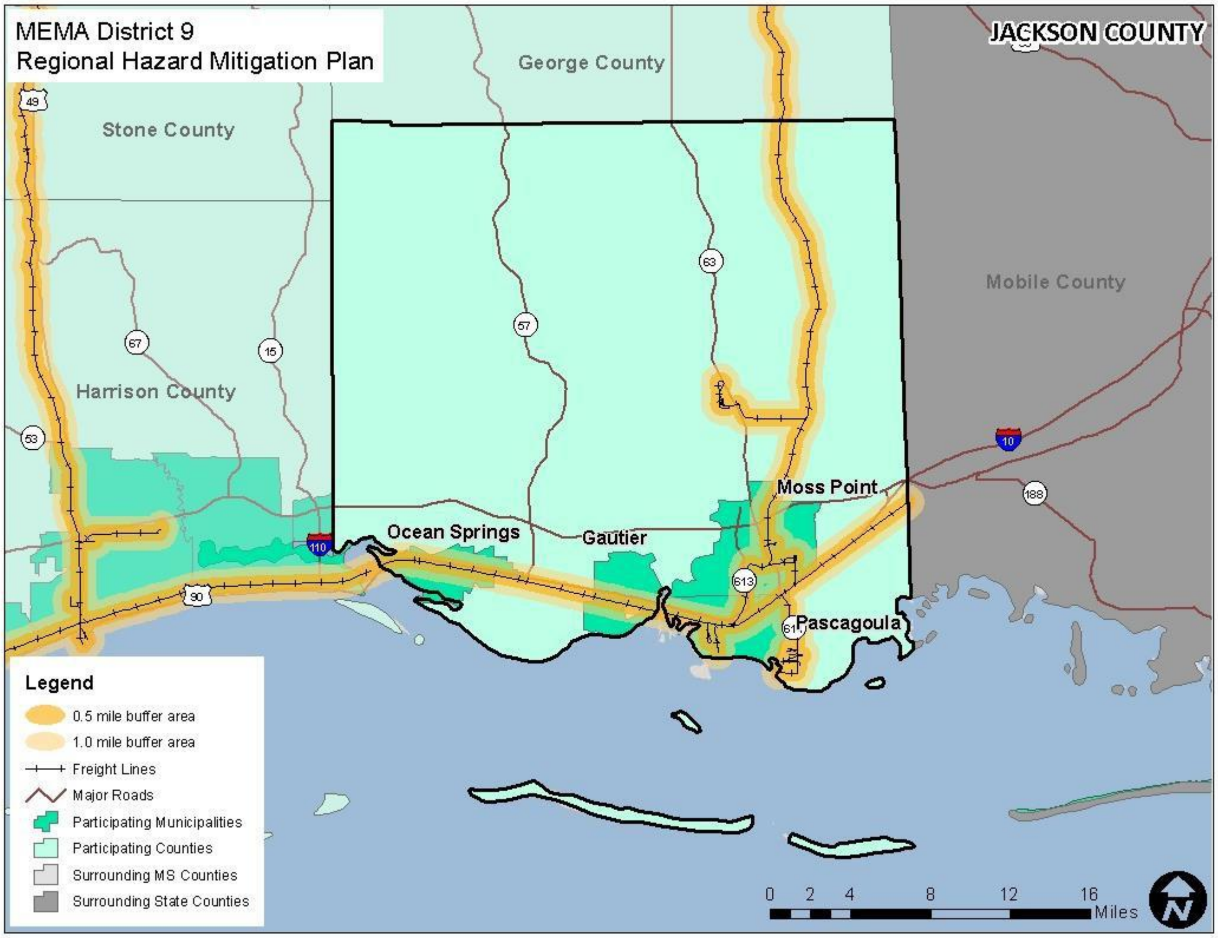
Source: EPA, MDEQ, Hazus MH 3.2 Data

FIGURE D.42: MOBILE (ROAD) HAZMAT BUFFERS IN JACKSON COUNTY



Source: Federal Highway Administration National Highway Planning Network

FIGURE D.43: MOBILE (RAIL) HAZMAT BUFFERS IN JACKSON COUNTY



Source: U.S. Department of Transportation Federal Railroad Administration

TABLE D.77: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Gautier	2,038	$128,322,620	3,973	$231,157,040
Moss Point	6,704	$250,007,730	10,082	$360,729,220
Ocean Springs	6,109	$560,929,950	9,412	$825,611,110
Pascagoula	4,913	$365,649,400	9,604	$599,308,610
Unincorporated Area	10,707	$405,885,670	20,582	$842,454,330
JACKSON COUNTY TOTAL	30,471	$1,710,795,370	53,653	$2,859,260,310

Source: NHPN, MDEQ, Hazus MH 3.2 Data

TABLE D.78: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Gautier	2,105	$96,599,920	4,241	$229,056,300
Moss Point	4,380	$143,660,210	8,047	$285,876,040
Ocean Springs	5,349	$502,955,290	9,255	$811,896,650
Pascagoula	5,903	$415,698,900	11,166	$649,874,460
Unincorporated Area	5,225	$159,075,020	8,949	$302,491,080
JACKSON COUNTY TOTAL	22,962	$1,317,989,340	41,658	$2,279,194,530

Source: USDOT FRA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 21 facilities located in a fixed HAZMAT risk zone. Of these, 6 facilities are in the primary (0.5 mile) risk area including 4 private/non-profit, 1 school, and 1 water/wastewater. A list of specific critical facilities and their associated risk can be found in Table D.83 at the end of this subsection.

Mobile Analysis:

The critical facility analysis for transportation corridors revealed that there are 237 facilities located in the primary and secondary road HAZMAT buffer areas. Of these, there were 173 critical facilities located in the primary risk zone including 2 communications, 3 EOCs, 20 fire stations, 4 medical, 7 police stations, 1 power/gas, 16 private/non-profit, 33 public facilities, 36 schools, 6 shelters, 16 special populations, and 29 water/wastewater.

For the rail line buffer areas, there were a total of 209 critical facilities located in primary and secondary buffer areas. Of these, 148 facilities are located within the primary buffer area including 4 communications, 3 EOCs, 14 fire stations, 4 medical, 6 police stations, 1 power/gas, 17 private/non-profit, 22 public facilities, 33 schools, 4 shelters, 11 special populations, and 29 water/wastewater.

A list of specific critical facilities and their associated risk can be found in Table D.83 at the end of this subsection.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Jackson County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in condition that could alter the impact area (i.e., direction and speed of wind, volume of release, etc.).

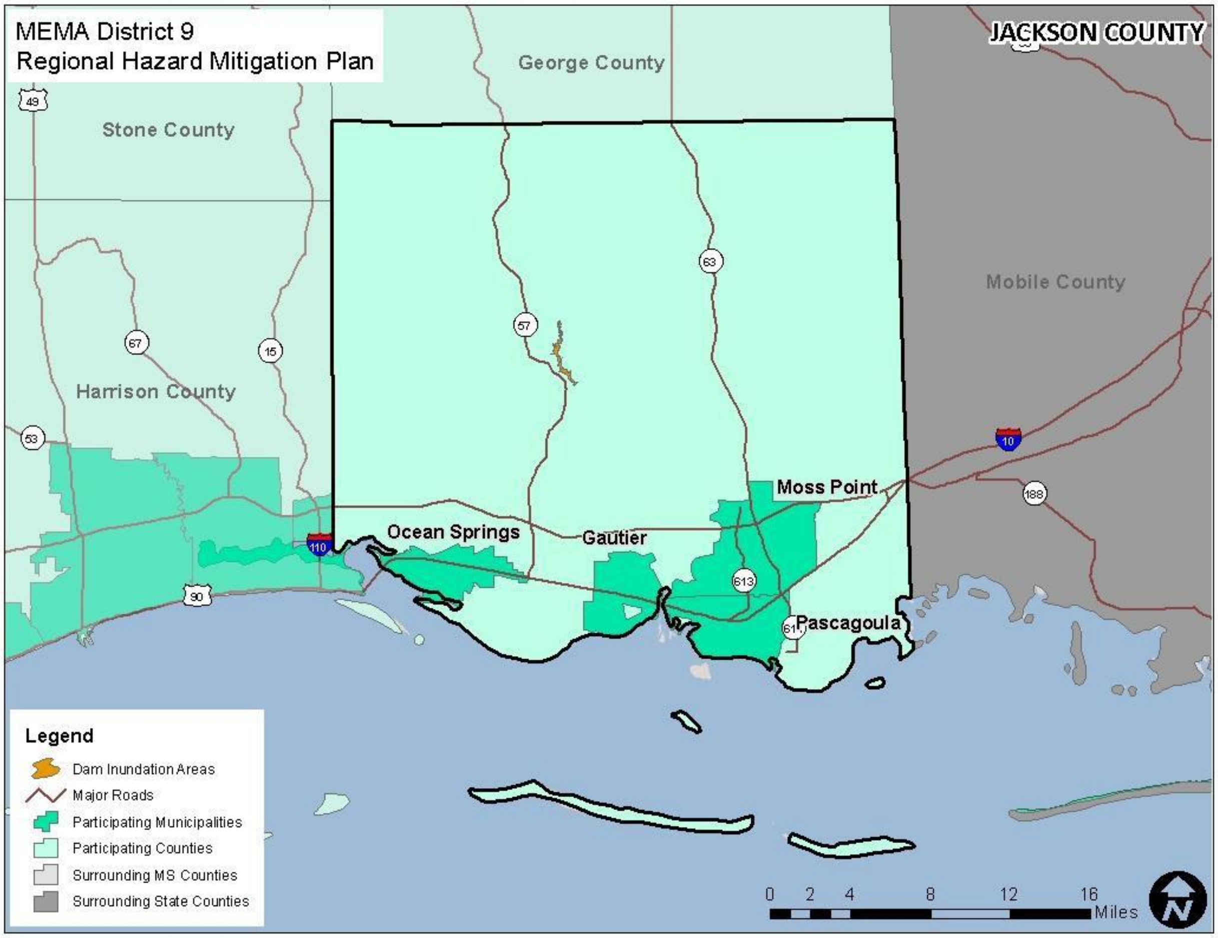
DAM/LEVEE FAILURE

In order to assess risk to a dam or levee failure, a GIS-based analysis was used to estimate exposure to one of the areas delineated by the Mississippi Department of Environmental Quality as a potential inundation area in the event of a failure. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified inundation area. As mentioned previously, this type of inundation mapping has not been completed for every dam/levee in the region, so the results of this analysis likely underestimate the overall vulnerability to a dam or levee failure. However, the analysis is still useful as a sort of baseline minimum of property that is potentially at-risk. The identified inundation areas can be found in Figure D.44.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table D.79 presents the potential at-risk property. Both the number of buildings and the approximate improved value are presented

FIGURE D.44: DAM INUNDATION AREAS IN JACKSON COUNTY



Source: Mississippi Department of Environmental Quality

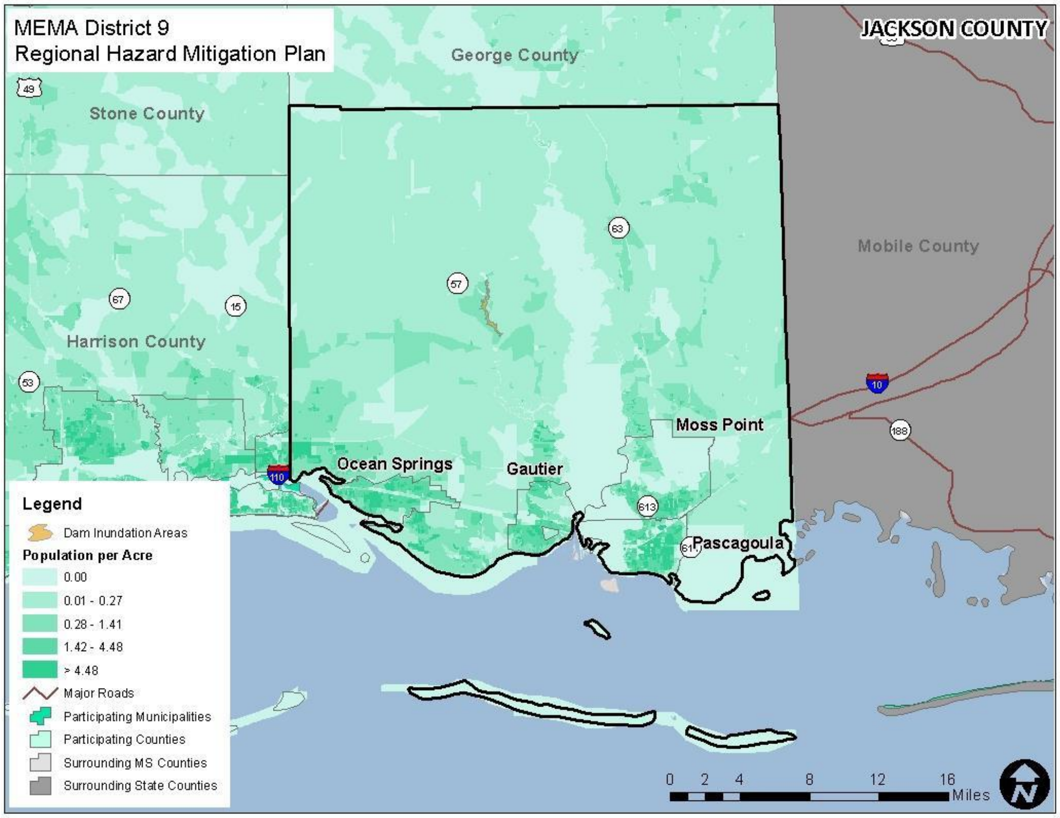
TABLE D.79: ESTIMATED EXPOSURE OF IMPROVEMENTS TO THE DAM/LEVEE FAILURE HAZARD

Location	Dam Inundation Area	
	Approx. Number of Buildings	Approx. Improved Value
Gautier	0	$0
Moss Point	0	$0
Ocean Springs	0	$0
Pascagoula	0	$0
Unincorporated Area	1	$0
JACKSON COUNTY TOTAL†	1	$0

†This does not include areas that would be inundated by the Big Creek Lake Dam, located in Alabama as geospatial data for the inundation area was not available.
Source: MDEQ, Hazus 3.2

Social Vulnerability
Figure D.45 is presented to gain a better understanding of at-risk population by evaluating census block level population data against dam inundation areas. There is an area of concern in the central part of the county, although it should be noted that most of the population of the county is not at risk to a dam/levee failure.

FIGURE D.45: POPULATION DENSITY NEAR DAM INUNDATION AREAS IN JACKSON COUNTY



Source: MDEQ, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are no facilities located in dam inundation areas. A list of specific critical facilities and their associated risk can be found in Table D.83 at the end of this subsection.

In conclusion, a dam has the potential to impact a number of existing and future buildings, facilities, and populations in Jackson County, though this analysis is not all-encompassing in terms of risk to a dam or levee failure because inundation mapping is not available for all dams in the region.

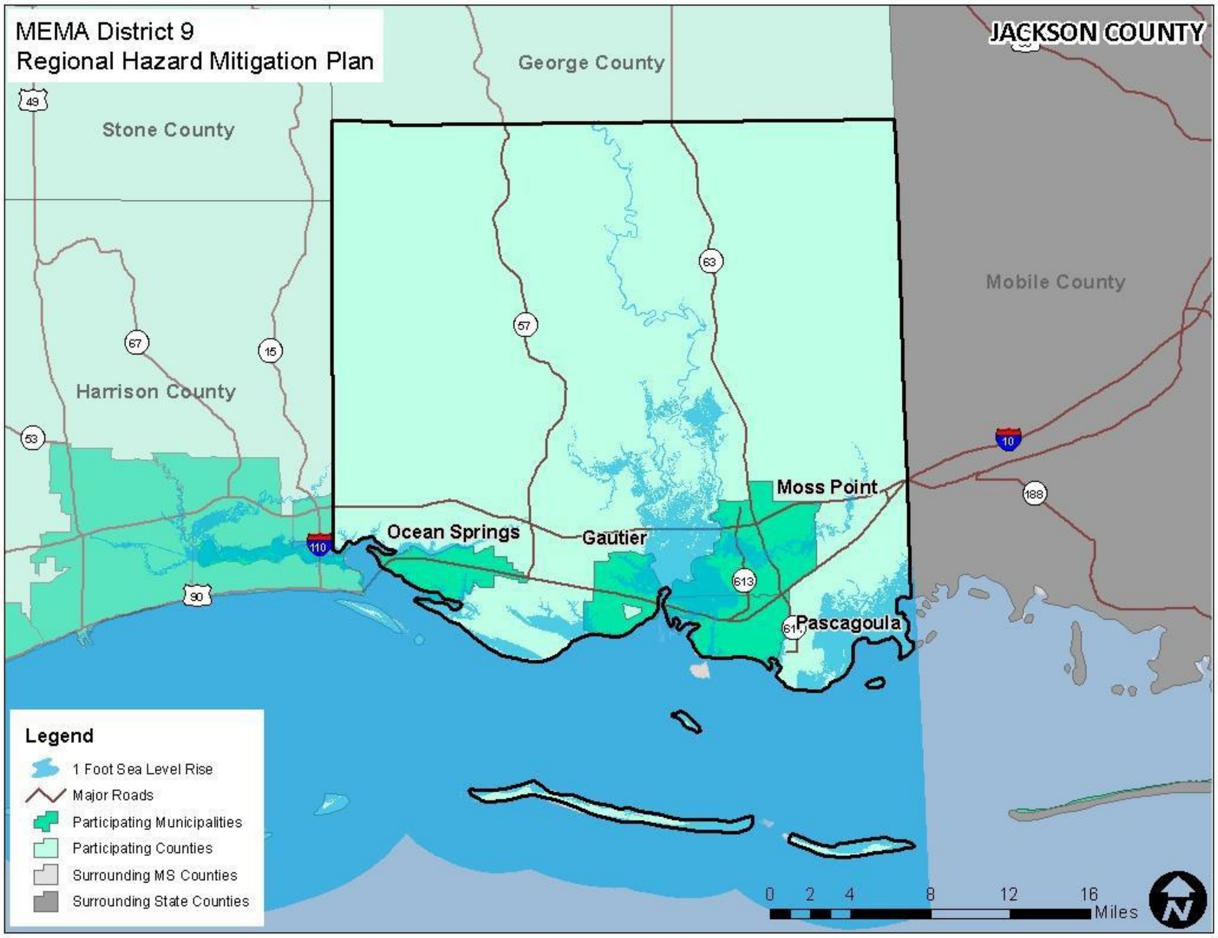
CLIMATE CHANGE/SEA LEVEL RISE

Most assessments carried out across the globe have concluded that climate change is a phenomenon that will impact our planet in the foreseeable future. Among others, the National Climate Assessment, International Panel on Climate Change, and National Oceanic and Atmospheric Administration all project that climate change will impact the United States and will have a major impact on coastal communities due to the effects of sea level rise. As such, projections concerning sea level rise are important to incorporate into planning efforts in order to identify people and property that may be impacted.

In order to assess sea level rise risk, a GIS-based analysis was used to estimate exposure to future projections of sea level rise using data produced by the National Oceanic and Atmospheric Administration in combination with improved property records for the county. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within the inundation zone that would be created in the event of 1 foot, 3 feet, and 6 feet of sea level rise. A number of different sea level rise scenarios were available via NOAA (from 1 foot to 6 feet, at 1 foot intervals), however these scenarios were selected to demonstrate a range of potential sea level rise scenarios from low to moderate to high projections. These scenarios can be found in Figure D.46, Figure D.47, and Figure D.48.

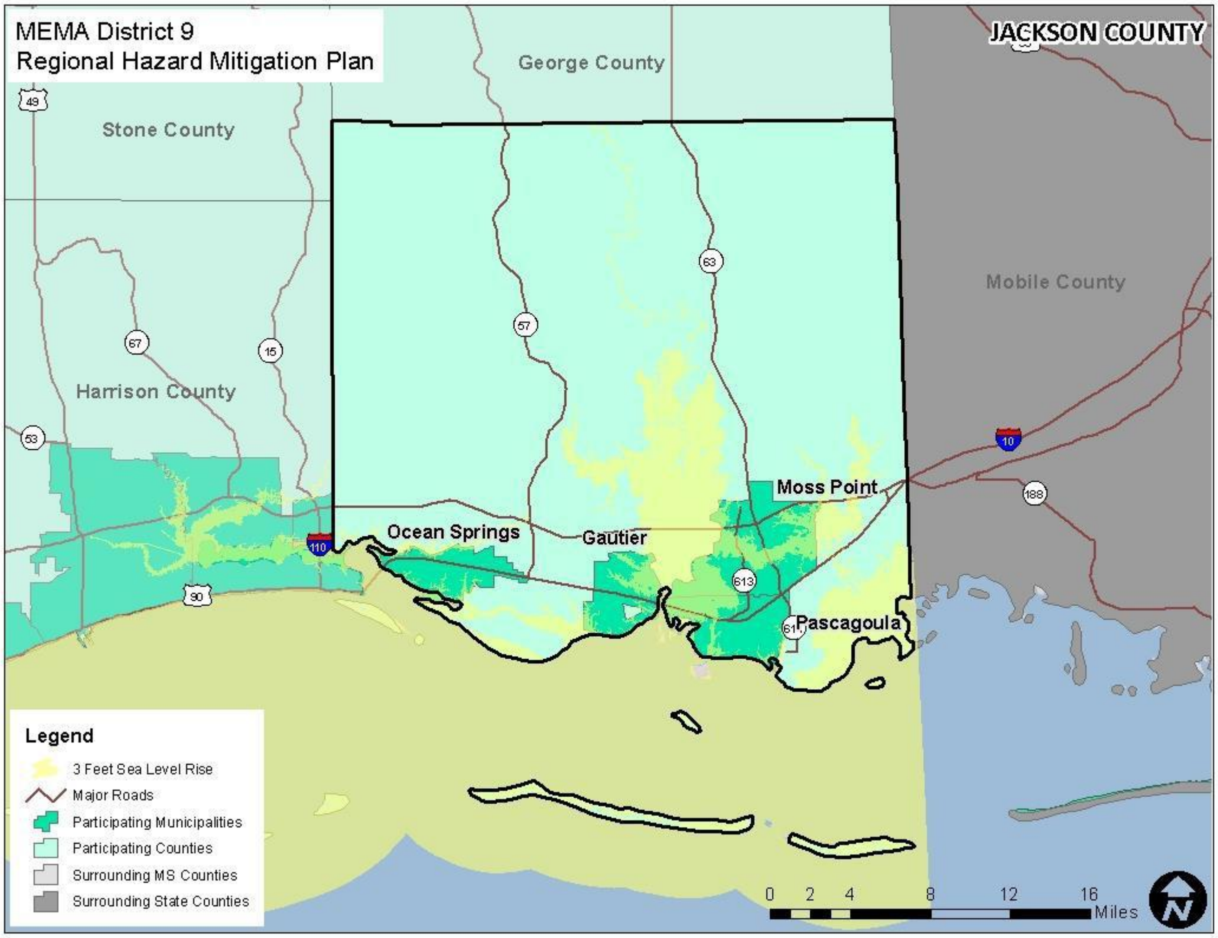
Table D.80 presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

FIGURE D.46: 1 FOOT SEA LEVEL RISE SCENARIO IN JACKSON COUNTY



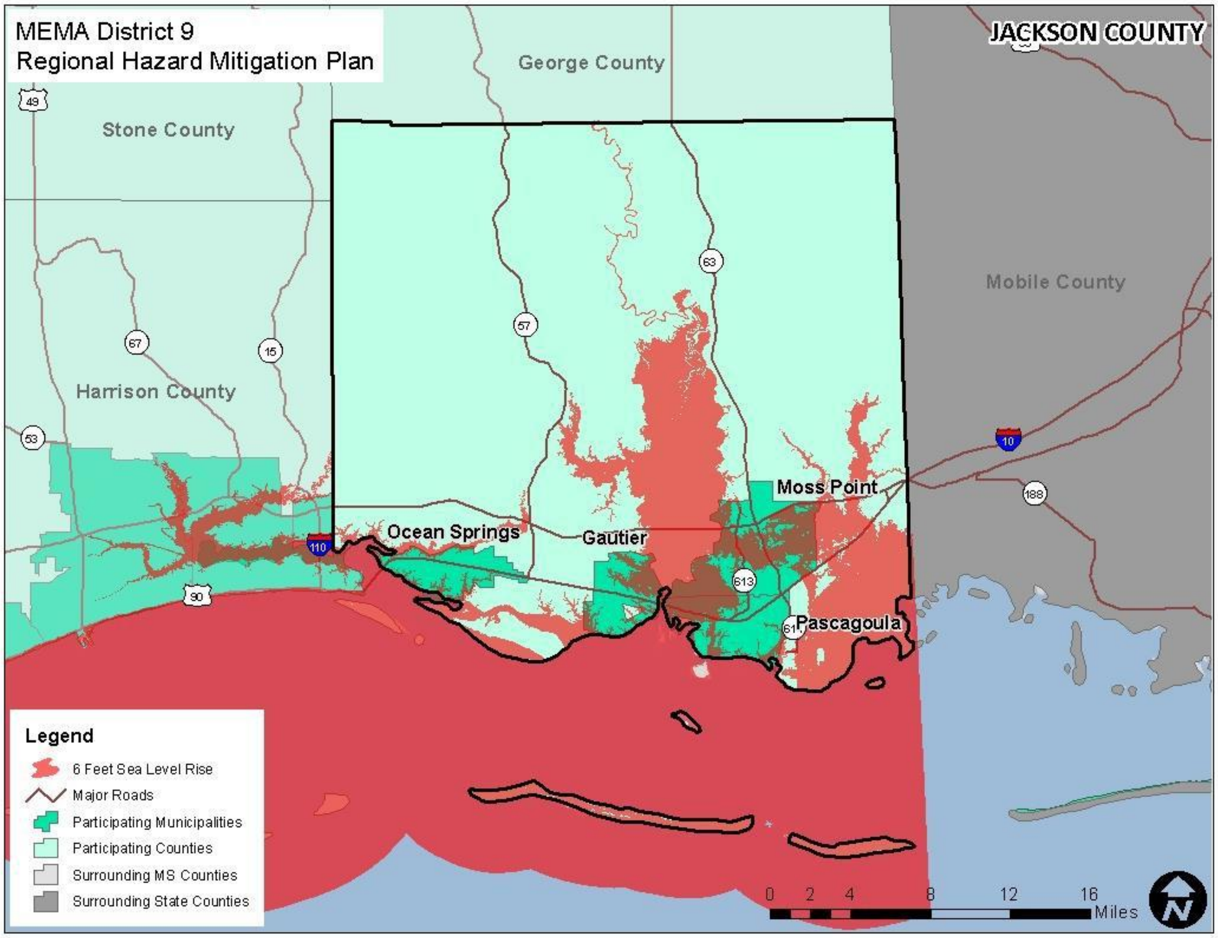
Source: NOAA

FIGURE D.47: 3 FEET SEA LEVEL RISE SCENARIO IN JACKSON COUNTY



Source: NOAA

FIGURE D.48: 6 FEET SEA LEVEL RISE SCENARIO IN JACKSON COUNTY



Source: NOAA

TABLE D.80: ESTIMATED EXPOSURE OF PARCELS TO THE SEA LEVEL RISE HAZARD

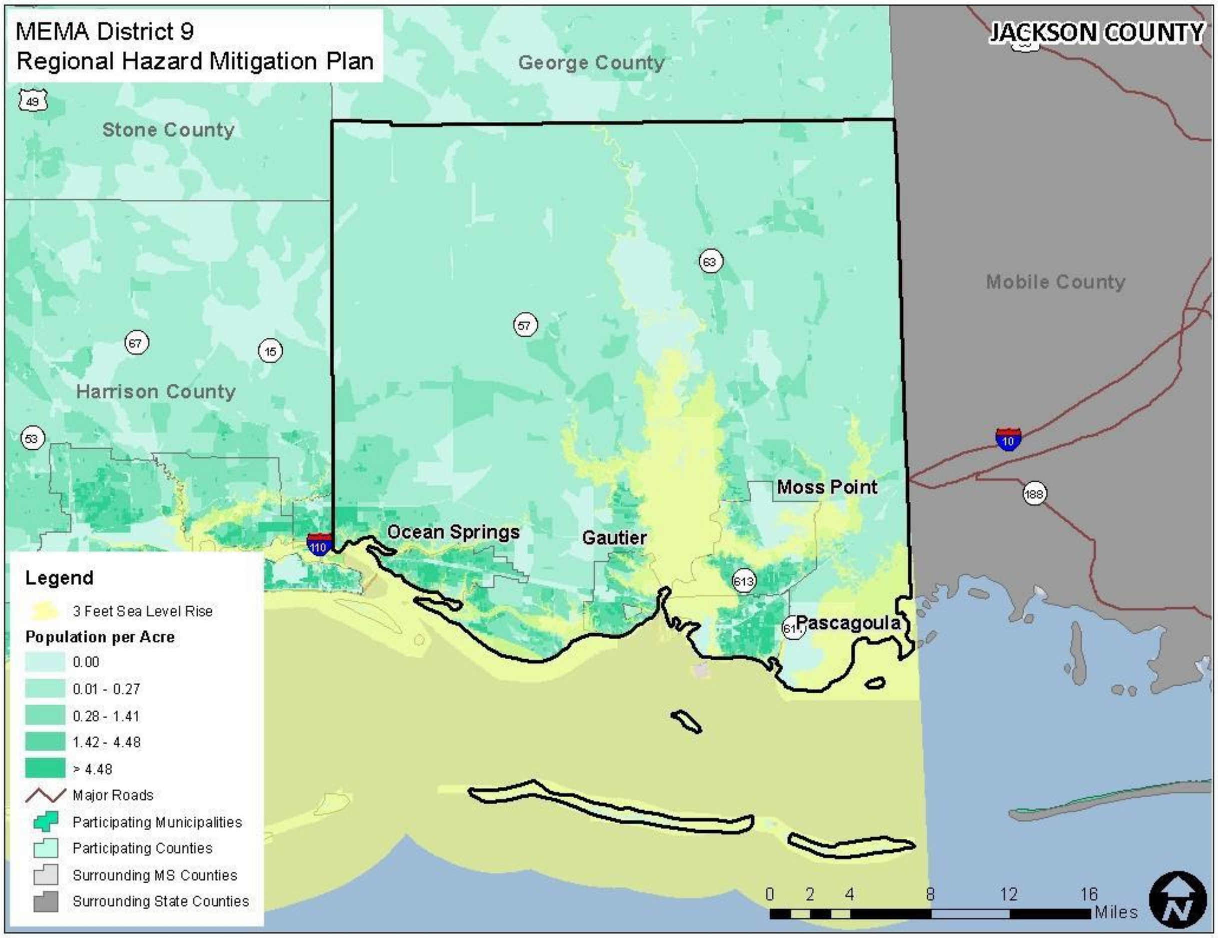
Location	1.0 foot		3.0 feet		6.0 feet	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Gautier	110	$8,651,090	371	$29,086,520	773	$49,712,830
Moss Point	71	$5,883,400	244	$17,686,870	1,550	$56,765,010
Ocean Springs	49	$12,727,870	118	$24,058,690	278	$47,884,160
Pascagoula	65	$6,319,600	245	$28,427,260	1,102	$73,423,870
Unincorporated Area	809	$54,924,890	2,046	$145,204,630	6,728	$324,849,720
JACKSON COUNTY TOTAL	919	$63,575,980	2,417	$174,291,150	7,501	$374,562,550

Source: NOAA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Figure D.49 is presented to gain a better understanding of at-risk population by evaluating census block level population data against the 3 feet sea level rise scenario. The three feet scenario was selected since this is a moderate level projection. Based on this analysis, a significant part of the coastal population in the county is vulnerable to sea level rise.

FIGURE D.49: POPULATION DENSITY WITH 3 FEET SEA LEVEL RISE IN JACKSON COUNTY



Source: NOAA, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are 3 facilities located in the 3 feet of sea level rise scenario inundation area. As mentioned above, this scenario was selected as it is a mid-range projection for sea level rise based on a number of studies. The 5 facilities include 2 public facilities and 3 water/wastewater. A list of specific critical facilities and their associated risk can be found in Table D.83 at the end of this subsection.

CONCLUSIONS ON HAZARD VULNERABILITY

Table D.81 presents an overall summary of the community's vulnerability for each jurisdiction. This summary provides key problem statements and identifies the community's greatest vulnerabilities that will be addressed in the mitigation strategy.

TABLE D.81: SUMMARY OF VULNERABILITY FOR JACKSON COUNTY

	Key Problem Statements
Jackson County	Jackson County, Gautier, Moss Point, Ocean Springs, and Pascagoula have many low-lying neighborhoods and streets that are especially vulnerable to coastal flooding and storm surge. Vulnerable and at-risk populations including low-income, minority, elderly, or disabled persons disproportionately live in flood prone areas. Additionally, many employers like casinos, resorts, and hotels are located in these vulnerable locations. Disruption or loss of these employers and facilities can result in significant unemployment, economic loss, and migration from the county and cities.

Table D.82 presents a summary of annualized loss for each hazard in Jackson County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the county.

It should also be noted that many of these estimates are based on incomplete data and likely underestimate the historic dollar damage sustained in each county. Especially for hazards such as extreme cold, extreme heat, hail, lightning, and winter weather, it is very likely that more damage occurred historically than has been identified.

TABLE D.82: ANNUALIZED LOSS FOR JACKSON COUNTY

Hazard	Jackson County
Flood-related Hazards	
Dam and Levee Failure	Not Available
Erosion	Not Available
Flood	$234,715
Storm Surge	$213,721,103
Fire-related Hazards	
Drought	Not Available
Lightning	$17,009
Wildfire	Not Available
Geologic Hazards	
Earthquake†	$12,000
Wind-related Hazards	
Extreme Cold	$7,675
Extreme Heat/Heat Wave	Not Available
Hailstorm	$17

Hurricane and Tropical Storm	$101,235,648

Hazard	Jackson County
Severe Thunderstorm/High Wind	$20,249
Tornado	$150,650
Winter Weather	Not Available
Climate Change/Sea Level Rise	Not Available
Hazardous Materials Incident/Train Derailment	$25,777
Infectious Disease	Not Available

†Historic dollar damage was not available for this hazard, but since estimated annualized losses from Hazus were available, those numbers were used in this table.
*In this table, the term “Not Available” is used to indicate that no records of dollar losses for the particular hazard were recorded. This could be the case either because there were no events that caused dollar damage or because documentation of that particular type of event is not well kept.

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to impacts from atmospheric hazards such as drought and hailstorm. Some buildings may be more vulnerable to some of these hazards based on locations, construction, and building type. In addition, all populations are vulnerable to hazards like infectious disease which could presumably impact any segment of the population without regard to geographic location. Table D.83 shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an “X”).

For a full listing of vulnerable critical assets within Jackson County, please click the below spreadsheet link:

MEMA_District9_Hazard_TabularData.xlsx

SECTION 21 JACKSON COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Jackson County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: Capability Assessment.

Planning and Regulatory Capability

Table D.84 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Jackson County. An x (x) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. A dagger (†) indicates that the given item is administered for that municipality by the county. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the MEMA District 9 Regional Hazard Mitigation Plan.

TABLE D.84: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Threat and Hazard Identification and Risk Assessment (THIRA)	Comprehensive Land Use Plan	Floodplain Management Plan/Flood Mitigation Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Emergency Management Accreditation Program (EMAP Accreditation)	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment/ Reconstruction Plan/ Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System (CRS
JACKSON COUNTY	x		x			x			x			x			x		x	x	x			x	x	x	x
Gautier	†		x		x	x			x			†		x	†		x	x	x	x		x	x	x	x
Moss Point	x		x						x			†			†		x	x	x			x	x	x	
Ocean Springs	x		x			x			x			†			†		x	x	x	x		x	x	x	x
Pascagoula	x		x		x	x			x			†			†		x	x	x	x		x	x	x	x

A more detailed discussion on the county's planning and regulatory capabilities follows.

EMERGENCY MANAGEMENT

Hazard Mitigation Plan
Jackson County has previously adopted a hazard mitigation plan. The City of Gautier was also included in this plan. The cities of Moss Point, Ocean Springs, and Pascagoula have also previously adopted municipal- level hazard mitigation plans.

Emergency Operations Plan
Jackson County maintains an emergency operations plan through its Emergency Management Agency. The cities of Gautier, Moss Point, Ocean Springs, and Pascagoula have also each adopted a municipal-level emergency operations plan.

GENERAL PLANNING

Comprehensive Land Use Plan
Jackson County has adopted a county comprehensive plan. The cities of Gautier, Moss Point, Ocean Springs, and Pascagoula have also adopted municipal comprehensive plans.

Capital Improvements Plan
Jackson County has not adopted a capital improvements plan. However, the City of Gautier has adopted a capital improvements plan.

Historic Preservation Plan
Neither Jackson County nor any of its participating municipalities have a historic preservation plan. However, the cities of Gautier, Ocean Springs, and Pascagoula have each adopted a historic preservation ordinance.

Zoning Ordinance
Jackson County and the cities of Gautier, Moss Point, Ocean Springs, and Pascagoula have each adopted a zoning ordinance. The cities of Gautier, Ocean Springs, and Pascagoula include zoning regulations as part of their local unified development ordinances. The remaining jurisdictions have adopted stand-alone zoning ordinances.

Subdivision Ordinance
Jackson County and the cities of Gautier, Moss Point, Ocean Springs, and Pascagoula have each adopted a subdivision ordinance. The cities of Gautier, Ocean Springs, and Pascagoula include subdivision regulations as part of their local unified development ordinances. The remaining jurisdictions have adopted stand-alone subdivision ordinances.

Building Codes, Permitting, and Inspections
After Hurricane Katrina, Mississippi Legislature mandated the adoption of the International Building Code and International Residential Code in five coastal counties including Jackson County. The cities of Gautier, Moss Point, Ocean Springs, and Pascagoula have also adopted building codes.

FLOODPLAIN MANAGEMENT

Table D.85 provides NFIP policy and claim information for each participating jurisdiction in Jackson County.

TABLE D.85: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
JACKSON COUNTY†	04/03/78	03/16/09	5,996	$1,507,783,300	3,810	$303,874,274
Gautier	11/13/86	03/16/09	1,724	$434,030,100	681	$59,663,535
Moss Point	09/18/70	03/16/09	1,131	$238,909,100	886	$28,225,055
Ocean Springs	09/18/70	03/16/09	2,622	$749,420,700	823	$86,224,366
Pascagoula	09/18/70	03/16/09	4,944	$1,164,782,600	2,763	$221,292,452

†Includes unincorporated areas of county only
Source: NFIP Community Status information as of 1/10/2017; NFIP claims and policy information as of 10/31/2016

Community Rating System
Jackson County (Class 9) as well as the cities of Gautier (Class 7), Ocean Springs (Class 6), and Pascagoula (Class 7) participate in the CRS. Participation in the CRS program should be considered as a mitigation action by the City of Moss Point. The program would beneficial to the city which has 1,131 NFIP policies in force.

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Jackson County and the cities of Gautier, Moss Point, Ocean Springs, and Pascagoula all participate in the NFIP and have adopted flood damage prevention ordinances.

Open Space Management Plan
Jackson County has not adopted a county open space management plan. However, the cities of Gautier and Pascagoula each have a municipal parks and recreation master plan in place.

Stormwater Management Plan
Jackson County and the City of Gautier have both adopted a stormwater management plan. The cities of Gautier, Ocean Springs, and Pascagoula have adopted local stormwater management ordinances.

Implement the substantial improvement/substantial damage provisions
Damage Estimates are a part of the National Flood Insurance Program (NFIP). If a community participates in the NFIP, part of the responsibility of the local participating community is to perform damage estimates. These estimates are performed using a FEMA Substantial Damage Estimate software program. This program is used by the Mississippi Emergency Management Agency's (MEMA) Office of Mitigation Floodplain Management (FPM) Bureau to assist local communities in determining damage estimates as it relates to the NFIP. The FPM Bureau is tasked with assisting local communities with the training and deployment of the SDE program. Local building officials/Stormwater management and floodplain managers for each participating jurisdiction are responsible for ensuring that the substantial improvement/substantial damage provisions are implemented following a flood

related event within their respective jurisdiction. The local officials will ensure that all NFIP criteria/requirements are implemented and met following a flood event, local officials will work with FEMA to ensure proper documentation/designations are made and properly recorded for structures deemed substantially damaged during an event.

Administrative and Technical Capability

Table D.86 provides a summary of the capability assessment results for Jackson County with regard to relevant staff and personnel resources. An x (x) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill. A dagger (†) indicates a county-level staff member(s) provides the specified knowledge or skill to that municipality.

TABLE D.86: RELEVANT STAFF/PERSONNEL RESOURCES

Staff/Personnel Resource	Planners with knowledge of land development/land management	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human- caused hazards	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
JACKSON COUNTY	x	x	x	x	x		x	x	x	x
Gautier	x	x	x	†	x		†	x	x	x
Moss Point		x	x	†	x		†	x	†	
Ocean Springs	x	x	x	†	x		†	x		x
Pascagoula	x	x	x	x	x		†	x	x	x

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

Fiscal Capability

Table D.87 provides a summary of the results for Jackson County with regard to relevant fiscal resources. An x (x) indicates that the given fiscal resource has previously been used to implement hazard mitigation actions. A dagger (†) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

TABLE D.87: RELEVANT FISCAL RESOURCES

Fiscal Tool/Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: HMGP and other federal, state, and private grants/resources
JACKSON COUNTY	†								†	x
Gautier	†								†	x
Moss Point	†	x	†	†	†			†	†	x
Ocean Springs		x			†				†	x
Pascagoula	†	†		†	†			†	†	x

Political Capability

During the months immediately following a disaster, local public opinion in Jackson County is more likely to shift in support of hazard mitigation efforts.

Table D.88 provides a summary of the results for Jackson County with regard to political capability. An x (x) indicates the expected degree of political support by local elected officials in terms of adopting/funding information.

TABLE D.88: LOCAL POLITICAL SUPPORT

Political Support	Limited	Moderate	High
JACKSON COUNTY			x
Gautier			x
Moss Point		x	
Ocean Springs			x
Pascagoula			x

Conclusions on Local Capability

Table D.89 shows the results of the capability assessment using the designed scoring methodology described in Section 7: Capability Assessment. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. This information was reviewed by all jurisdictions and each jurisdiction provided feedback on the information included in the capability assessment. Local government input was vital to identifying capabilities. According to the assessment, the average local capability score for the county and its jurisdictions is 46.2, which falls into the moderate capability ranking.

TABLE D.89: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
JACKSON COUNTY	46	Moderate
Gautier	46	Moderate
Moss Point	41	Moderate
Ocean Springs	46	Moderate
Pascagoula	52	High

JACKSON COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Jackson County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Council and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: Mitigation Strategy and Section 9: Mitigation Action Plan.

Mitigation Goals

Jackson County developed nine mitigation goals in coordination with the other participating MEMA District 9 Region jurisdictions. The regional mitigation goals are presented in Table D.90.

TABLE D.90: MEMA DISTRICT 9 REGIONAL MITIGATION GOALS

	Goal
Goal #1	Minimize risk and vulnerability of the community to hazards. Objective 1: Improve understanding of hazard risks through monitoring and assessment projects.
Goal #2	Minimize loss of life, injury, and damages to property, the economy, and the environment. *Objective 1:* Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment. *Objective 2:* Improve hazard assessment information to make recommendations for encouraging higher standards for safer development in areas vulnerable to natural and

	technological hazards. *Objective 3*: Implement sustainable activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resilient to natural and technological hazards.
Goal #3	Minimize loss to critical facilities and infrastructure, utilities, and services. *Objective 1:* Prioritize mitigation projects for critical facilities, services, and infrastructure.
Goal #4	Improve, expand, and enhance public education, awareness, and preparedness. *Objective 1:* Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.
Goal #5	Build and enhance local mitigation capabilities to improve the region's ability to prepare for, respond to, and recover. *Objective 1:* Strengthen communication and coordinate participation among and within public agencies, community members, non-profit organizations, business, and industry to gain a vested interest in implementation.
Goal #6	Enter into partnerships with neighboring jurisdictions, federal and state agencies, and others to share information and develop a more hazard resistant community. *Objective 1:* Encourage leadership within the public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.
Goal #7	Enhance response procedures and emergency management capabilities. *Objective 1*: Coordinate and integrate natural and technological hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
Goal #8	Reduce economic losses, minimize social disruptions, and maintain quality of life. *Objective 1*: Reduce losses and repetitive damages for hazard events while promoting insurance coverage for catastrophic hazards.
Goal #9	Protect the environment and natural resources. *Objective 1:* Preserve, rehabilitate, re-establish, and enhance natural systems to serve natural hazard mitigation functions.

Mitigation Action Plan

The mitigation actions proposed by Jackson County and the cities of Gautier, Moss Point, Ocean Springs, and Pascagoula are listed in the following individual Mitigation Action Plans.

Jackson County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Enforce building codes.	All	High	Gautier and Jackson County Planning Departments	Internal	2028	Ongoing
P-2	Maintain debris program to clean drainage ways from existing properties and critical facilities.	Flood	High	Gautier Street Division; Jackson County Road Department	Internal	2028	Ongoing
P-3	Maintain debris program to clear roadside ditches and culverts.	Flood	High	Gautier Street Division; Jackson County Road Department	Internal	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Develop/enforce landscaping requirements to provide absorption of average volumes of rainfall on property.	Flood	Moderate	Gautier and Jackson County Planning Departments	Internal	2028	Ongoing
P-5	Enforce storm water ordinances and encourage use of pervious surfaces and natural absorption of rainwater.	Flood	High	Gautier and Jackson County Planning Departments	Internal	2028	Ongoing
P-6	Enforce the revised Digital Flood Insurance Rate Map (DFIRM).	Flood	High	Gautier and Jackson County Planning Departments	Internal	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Control vegetation growth around critical facilities.	Wildfire	High	Gautier Street Division; Jackson County Road Department	Internal	2028	Ongoing
P-8	Coordinate prescribed burns in heavily forested areas with state and federal agencies.	Wildfire	High	Gautier and Jackson County Fire Departments	Internal	2028	Ongoing
P-9	Conduct a study of the effects of sea level rise and develop mitigation strategies to minimize those effects.	Sea Level Rise	Low	Gautier and Jackson County Planning Departments	Internal	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-10	Encourage private land owners on waterfronts to implement erosion control measures.	Erosion	Low	Gautier and Jackson County Planning Departments	Internal	2028	Ongoing
P-11	Develop/enforce water use ordinance to address drought condition procedures.	Drought	High	Gautier and Jackson County Planning Departments	Internal	2026	Ongoing
P-12	Conduct study on aquifers to determine impacts on public and private wells.	Drought	Moderate	Jackson County Utility Authority	Jackson County Utility Authority	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Implement dredging program for the Bayou areas to improve effects of sediment buildup caused by storm surge.	Storm Surge	Moderate	Gautier Public Works; Jackson County Public Works	MDMR, USACE, NRCS, CIAP, Tideland	2028	Partially completed/ Ongoing contingent upon funding
P-14	Develop continuity of operations plans.	All	High	Jackson County and City of Gautier	Internal	2026	Ongoing contingent upon funding
P-15	Develop Emergency response plans.	All	High	Jackson County and City of Gautier	Internal	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-16	Develop capital improvement plans.	All	High	Gautier and Jackson County Planning Departments	Internal	2028	Ongoing contingent upon funding
P-17	Develop/enhance asset inventories (e.g., critical facilities, infrastructure, equipment) into GIS.	All	High	Gautier and Jackson County Planning Departments	Internal	2028	Completed/ Ongoing
P-18	Upgrade devices used for damage assessments and communication as technology improves/changes.	All	High	Jackson County Emergency Management Agency	Internal	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-19	Seek opportunities to continue to lower the CRS rating (and insurance rate).	Flood	High	Gautier and Jackson County Planning Departments	Internal	2028	Ongoing
P-20	Incorporate the goals and objectives of the hazard mitigation plan into all planning documents and ordinances.	All	High	Gautier and Jackson County Planning Departments	Internal	2023	Ongoing during regular updates
P-21	Conduct annual review of the hazard mitigation plan.	All	High	Hazard Mitigation Council; Gautier and Jackson County Planning Departments	Internal	2024, Annually	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-22	Conduct evaluation of mitigation strategies and projects following a hazard impact.	All	High	Hazard Mitigation Council; Jackson County Emergency Management Agency	Internal	2028	Ongoing following disaster events
P-23	Document damages/losses sustained from natural hazards.	All	High	Jackson County Emergency Management Agency	Internal	2028	Ongoing following disaster events
P-24	Conduct After Action Reviews (AAR) following events to capture lessons learned, reassess damages incurred, and complete damage assessment forms with accurate information.	All	High	Hazard Mitigation Council	Internal	2028	Ongoing following disaster events

P-25	Rehabilitating and /or removing high and significant hazard dams from service	Dam Failure	High	Jackson County	Dam Owner	Ongoing as needed	New
P-26	Adopting and enforcing land use ordinances in dam inundation zones downstream of dams	Dam Failure	High	Jackson County	Internal	Ongoing as needed	New
P-27	Acquiring and/or elevating structures and/or acquiring easements in inundation zones downstream of dams.	Dam Failure	High	Jackson County	Internal	Ongoing as needed	New
P-28	Flood protection, such as berms, floodwalls, or floodproofing, in inundation zones downstream of dams.	Dam Failure	High	Jackson County	Internal	Ongoing as needed	New
P-29	Revamping the LEPC within Jackson County, to bolster communications between emergency responders and private industry.	All	High	Jackson County OES	Local Industry	2025	New

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Upgrade/harden water and wastewater facilities. (Gautier water towers/wells, Shell landing Wastewater Collection Systems, Jackson County motor control centers, Jackson County sanitary generators)	All	High	City of Gautier; Jackson County Utility Authority	HMA	2028	Ongoing contingent upon funding
PP-2	Harden existing critical facilities. (Gautier Police Dept., Gautier Public Works, Gautier Maintenance Shop, Singing River Hospital and Ocean Springs Hospital, Gautier Fire Dept., Pascagoula/Moss Point Wastewater Treatment Facility, and Escatawpa Wastewater Reclamation Facility).	All	High	City of Gautier; Jackson Count; Singing River Health	HMA	2028	Partially completed/Ongoing contingent upon funding
PP-3	Elevate/improve roads and bridges that are below base flood elevation.	Flood	High	Jackson County Road Dept.; Gautier Public Works	Local, State, Federal	2028	Partially completed/ Ongoing contingent upon funding
PP-4	Relocate Jackson County Emergency Operation Center to county-owned property on Jim Ramsey Road.	All	High	Jackson County	HMA	2024	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Relocate Jackson County Sheriff Dispatch/E-911 with EOC on Jim Ramsey Road or to existing EOC on Convent Avenue.	All	High	Jackson County	HMA	2025	Ongoing contingent upon funding
PP-6	Encourage use of underground utilities in higher elevation areas.	All	Moderate	Gautier and Jackson County Planning Departments	Internal	2028	Partially completed/ Ongoing contingent upon funding
PP-7	Construct all new critical facilities and infrastructure with materials designed to minimize impacts from all hazards.	All	High	Gautier and Jackson County Planning Departments	Internal	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-8	Identify location for community safe rooms in Gautier and Jackson County to accommodate the remaining population not covered in the existing safe rooms.	All	High	Gautier City Council; Jackson County Board of Supervisors	HMA	2028	Ongoing contingent upon funding
PP-9	Acquisition/demolition of Severe Repetitive Loss Properties (SRL) and Repetitive Flood Claim (RFC) properties by continuing to apply for FMA to mitigate when practical.	Flood	High	Gautier and Jackson County Planning Departments	FMA	2028	Partially completed/Ongoing
PP-10	Raise lift stations and other critical infrastructure above base floodplain where feasible.	Flood	High	Jackson County Utility Authority; City of Gautier	Local	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-11	Encourage existing and new developments to include surge and lightning protectors and use of enhanced construction materials.	Lightning	High	Gautier and Jackson County Planning Departments	Internal	2028	Ongoing
PP-12	Implement mast arm traffic signal improvements.	All	High	Gautier Street Division; Jackson County Road Department	Local	2028	Partially completed/Ongoing
PP-13	Mount street signs to existing mast arm traffic signals.	All	High	Gautier Street Division; Jackson County Road Department	Local	2028	Partially completed/Ongoing
PP-14	Mitigate/redirect flood waters from Big Creek Reservoir in Mobile County.	Flood, Tropical Storm Hurricane, Erosion	High	Jackson County Board of Supervisors	FEMA, MEMA, BRIC, Alabama EMA	2026	New

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
NRP-1	Develop/maintain a beach erosion and renourishment program.	Erosion	Moderate	Gautier and Jackson County Public Works	Internal	2028	Partially completed/Ongoing
Structural Projects							
SP-1	Coordinate with applicable agencies on constructing new roadways and bridges above the base flood elevation.	Flood	High	Gautier Public Works, Jackson County Road Department	Local Budget	2028	Ongoing
Emergency Services							
ES-1	Identify and prioritize portable generator hook ups or permanent mount units for wells, lift stations, and facilities.	All	High	Jackson County; City of Gautier; Jackson County Utility	HMA	2026	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-2	Explore options for back up water supply system/service for Ocean Springs and Singing River Hospitals.	All	High	Singing River Health Systems	Local Budget	2024	Ongoing
ES-3	Develop agreements/reprocess for providing tie-ins and back up water service for Jackson County Utility Authority and Gautier.	All	High	Jackson County Utility Authority; Gautier Public Works	Local Budget	2024	Ongoing regular updates
ES-4	Improve notification procedures of impending hazards and evacuation procedures.	All	High	Jackson County Emergency Management Agency	Local Budget	2025	Ongoing regular updates
ES-5	Develop/update and conduct exercises on response procedures.	All	High	Jackson County Emergency Management Agency and City of Gautier Planning Department	Internal Budget and HMGP	2026	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-6	Increase evacuation route options and coordination of activation by working with state/federal agencies.	All	High	Jackson County Emergency Management Agency	Local Budget State DOTD Funding	2027	Ongoing
ES-7	Improve signage/traffic control devices for evacuations.	All	High	Jackson County Emergency Management Agency	Local Budget	2027	Ongoing
Public Education and Awareness							
PEA-1	Educate the public on all hazard preparedness.	All	High	Jackson County Emergency Management Agency	Local Budget/General Fund	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Educate the public on all hazard mitigation programs (safe rooms, wind retrofit, etc.).	All	High	Jackson County Emergency Management Agency	Local Budget/General Fund	2028	Ongoing
PEA-3	Educate the public about the benefits of flood mitigation of homes and businesses.	Flood	High	Jackson County Emergency Management Agency	Local Budget/General Fund	2028	Ongoing
PEA-4	Continue to deliver programs to residents, business owners, and developers regarding best management practices for storm water control and household hazardous waste.	Flood, Hazardous Materials Incident	High	Gautier and Jackson County Planning Departments	Local Budget/General Fund	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Develop education materials for water conservation.	Drought	High	Gautier and Jackson County Planning Departments	Local Budget HMGP	2028	Ongoing
PEA-6	Promote Firewise program to homeowners, builders/contractors, and developers.	Wildfire	High	Gautier and Jackson County Fire Departments	Local Budget/General Fund	2028	Ongoing
PEA-7	Develop outreach strategies for non- English/underserved communities.	All	High	Applicable state and federal agencies and local agencies/ associations	Local Budget/General Fund	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-8	Develop outreach strategies for tourists (i.e., part-time residents, RV campers, vacationers, etc.)	All	High	Applicable state and federal agencies and local agencies/ associations	Local Budget/General Fund	2028	Ongoing
PEA-9	Develop outreach strategies for elderly and low-income underserved residents.	All	High	Applicable state and federal agencies and local agencies/ associations	Local Budget/General Fun	2028	Ongoing
PEA-10	Develop outreach strategies for the physically challenged.	All	High	Applicable state and federal agencies and local agencies/ associations	Local Budget/General Fund	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-11	Develop outreach strategies for those with mental health disabilities.	All	High	Applicable state and federal agencies and local agencies/ associations	Local Budget/General Fund	2028	Ongoing
PEA-12	Develop outreach strategies and implement school programs for children.	All	High	All school districts and daycare providers within the county	Local Budget/General Fund	2028	Ongoing

City of Gautier Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Enforce building codes.	All	High	Gautier and Jackson County Planning Departments	Internal Buget	2028	Ongoing
P-2	Maintain debris program to clean drainage ways from existing properties and critical facilities.	Flood	High	Gautier Street Division; Jackson County Road Department	Internal Budget	2028	Ongoing
P-3	Maintain debris program to clear roadside ditches and culverts.	Flood	High	Gautier Street Division; Jackson County Road Department	Internal Budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Develop/enforce landscaping requirements to provide absorption of average volumes of rainfall on property.	Flood	Moderate	Gautier and Jackson County Planning Departments	Internal Budget	2028	Ongoing
P-5	Enforce storm water ordinances and encourage use of pervious surfaces and natural absorption of rainwater.	Flood	High	Gautier and Jackson County Planning Departments	Internal Budget	2028	Ongoing
P-6	Enforce the revised Digital Flood Insurance Rate Map (DFIRM).	Flood	High	Gautier and Jackson County Planning Departments	Internal Budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Control vegetation growth around critical facilities.	Wildfire	High	Gautier Street Division; Jackson County Road Department	Internal Budget	2028	Ongoing
P-8	Coordinate prescribed burns in heavily forested areas with state and federal agencies.	Wildfire	High	Gautier and Jackson County Fire Departments	Internal Budget	2028	Ongoing
P-9	Conduct a study of the effects of sea level rise and develop mitigation strategies to minimize those effects.	Sea Level Rise	Low	Jackson County OEM	HMGP, BRIC and FMA grants	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-10	Encourage private land owners on waterfronts to implement erosion control measures.	Erosion	Low	Gautier and Jackson County Planning Departments	Internal Budget	2028	Ongoing
P-11	Develop/enforce water use ordinance to address drought condition procedures.	Drought	High	Gautier and Jackson County Planning Departments	Internal Budget	2026	Ongoing
P-12	Implement dredging program for the Bayou areas to improve effects of sediment buildup caused by storm surge.	Storm Surge	Moderate	Gautier Public Works; Jackson County Public Works	Jackson County Utility Authority	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Develop continuity of operations plans.	All	High	Jackson County and City of Gautier	MDMR, USACE, NRCS, CIAP, Tideland	2028	Ongoing contingent upon funding
P-14	Emergency response plans.	All	High	Jackson County and City of Gautier	Internal Budget	2026	Ongoing contingent upon funding
P-15	Develop capital improvement plans.	All	High	Gautier and Jackson County Planning Departments	Internal Budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-16	Develop/enhance asset inventories (e.g., critical facilities, infrastructure, equipment) into GIS.	All	High	Gautier and Jackson County Planning Departments	Internal Budget	2028	Completed/Ongoing regular updates
P-17	Upgrade decides used for damage assessments and communication as technology improves/changes.	All	High	Jackson County Emergency Management Agency	Internal Budget	2028	Ongoing
P-18	Seek opportunities to continue to lower the CRS rating (and insurance rate).	Flood	High	Gautier and Jackson County Planning Departments	Internal Budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-19	Incorporate the goals and objectives of the hazard mitigation plan into all planning documents and ordinances.	All	High	Gautier and Jackson County Planning Departments	Internal Budget	2028	Ongoing annual review and five-year updates
P-20	Conduct annual review of the hazard mitigation plan.	All	High	Hazard Mitigation Council; Gautier and Jackson County Planning Departments	Internal Budget	2028	Ongoing Annually
P-21	Conduct evaluation of mitigation strategies and projects following a hazard impact.	All	High	Hazard Mitigation Council; Jackson County Emergency Management Agency	Internal Budget	2024, Annually	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-22	Document damages/losses sustained from natural hazards.	All	High	Jackson County Emergency Management Agency	Internal Budget	2028	Ongoing following disaster events
P-23	Conduct After Action Reviews (AAR) following events to capture lessons learned, reassess damages incurred, and complete damage assessment forms with accurate information.	All	High	Hazard Mitigation Council	Internal Budget	2028	Ongoing following disaster events
P-24	Rehabilitating and/or removing high and significant hazard dams from service.	Dam Failure	High	Jackson County OEM	Dam Owner	Ongoing as needed	New
P-25	Adopting and enforcing land use ordinances in dam inundation zones downstream of dams.	Dam Failure	High	Jackson County OEM	Internal Budget	Ongoing as needed	New

P=26	Acquiring and/or elevating structures and/or easements in inundation zones downstream of dams.	Dam Failure	High	Jackson County OEM	Internal Budget	Ongoing as needed	New
P-27	Flood protection such as berms, floodwalls, or flood proofing in inundation zones downstream of dams.	Dam Failure	High	Jackson County OEM	Internal Budget	Ongoing as needed	New
Property Protection							
PP-1	Retrofit critical facilities with safe rooms, including the Fire, Police, Public Works, and City Hall facilities.	All	Moderate	City of Gautier	HMGP and BRIC	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	Upgrade/harden water and wastewater facilities. (Gautier water towers/wells, Shell landing Wastewater Collection Systems, Jackson County motor control centers, Jackson County sanitary generators)	All	High	City of Gautier; Jackson County Utility Authority	HMGP and BRIC	2028	Ongoing contingent upon funding
PP-3	Harden existing critical facilities. (Gautier Police Dept., Gautier Public Works, Gautier Maintenance Shop, Singing River Hospital and Ocean Springs Hospital, Gautier Fire Dept., Pascagoula/Moss Point Wastewater Treatment Facility, and Escatawpa Wastewater Reclamation Facility).	All	High	City of Gautier; Jackson Count; Singing River Health	HMGP and BRIC	2028	Ongoing contingent upon funding
PP-4	Elevate/improve roads and bridges that are below base flood elevation.	Flood	High	Jackson County Road Dept.; Gautier Public Works	Local Budget, HMGP, BRIC FMA	2028	Ongoing contingent upon funding
PP-5	Relocate Emergency Operation Center for Gautier.	All	High	City of Gautier	HMGP, BRIC	2024	Ongoing contingent upon funding.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-6	Encourage use of underground utilities in higher elevation areas.	All	Moderate	Gautier and Jackson County Planning Departments	Internal Budget	2028	Ongoing contingent upon funding
PP-7	Construct all new critical facilities and infrastructure with materials designed to minimize impacts from all hazards.	All	High	Gautier and Jackson County Planning Departments	Internal Budget	2028	Ongoing
PP-8	Identify location for community safe rooms in Gautier and Jackson County to accommodate the remaining population not covered in the existing safe rooms.	All	High	Gautier City Council; Jackson County Board of Supervisors	HMGP, BRIC	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-9	Acquisition/demolition of Severe Repetitive Loss Properties (SRL) and Repetitive Flood Claim (RFC) properties by continuing to apply for FMA to mitigate when practical.	Flood	High	Gautier and Jackson County Planning Departments	FMA	2028	Partially completed/ Ongoing contingent upon funding
PP-10	Raise lift stations and other critical infrastructure above base floodplain where feasible.	Flood	High	Jackson County Utility Authority; City of Gautier	Local Budget, FMA	2028	Ongoing contingent upon funding
PP-11	Encourage existing and new developments to include surge and lightning protectors and use of enhanced construction materials.	Lightning	High	Gautier and Jackson County Planning Departments	Internal Budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-12	Implement mast arm traffic signal improvements.	All	High	Gautier Street Division; Jackson County Road Department	Local Budget	2028	Ongoing
PP-13	Mount street signs to existing mast arm traffic signals.	All	High	Gautier Street Division; Jackson County Road Department	Local Budget	2028	Ongoing
Natural Resource Protection							
NRP-1	Develop/maintain a beach erosion and renourishment program.	Erosion	Moderate	Gautier and Jackson County Public Works	Internal Budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Coordinate with applicable agencies on constructing new roadways and bridges above the base flood elevation.	Flood	High	Gautier Public Works, Jackson County Road Department	Local Budget	2028	Completed/Ongoing
Emergency Services							
ES-1	Identify and prioritize portable generator hook ups or permanent mount units for wells, lift stations, and facilities.	All	High	Jackson County; City of Gautier; Jackson County Utility	HMGP, BRIC	2026	Completed/Ongoing
ES-2	Develop agreements/reprocess for providing tie-ins and back up water service for Jackson County Utility Authority and Gautier.	All	High	Jackson County Utility Authority; Gautier Public Works	Local Budget	2024	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-3	Improve notification procedures of impending hazards and evacuation procedures.	All	High	Jackson County Emergency Management Agency	Local Budget	2025	Ongoing
ES-4	Develop/update and conduct exercises on response procedures.	All	High	Jackson County and City of Gautier	Internal Budget	2026	Ongoing
ES-5	Increase evacuation route options and coordination of activation by working with state/federal agencies.	All	High	Jackson County Emergency Management Agency	Local Budget	2027	Ongoing
ES-6	Improve signage/traffic control devices for evacuations.	All	High	Jackson County Emergency Management Agency	Local Budget	2027	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Public Education and Awareness							
PEA-1	Educate the public on all hazard preparedness.	All	High	Jackson County Emergency Management Agency	Local Budget	2028	Ongoing
PEA-2	Educate the public on all hazard mitigation programs (safe rooms, wind retrofit, etc.).	All	High	Jackson County Emergency Management Agency	Local Budget	2028	Ongoing
PEA-3	Educate the public about the benefits of flood mitigation of homes and businesses.	Flood	High	Jackson County Emergency Management Agency	Local Budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-4	Continue to deliver programs to residents, business owners, and developers regarding best management practices for storm water control and household hazardous waste.	Flood, Hazardous Materials Incident	High	Gautier and Jackson County Planning Departments	Local Budget	2028	Ongoing
PEA-5	Develop education materials for water conservation.	Drought	High	Gautier and Jackson County Planning Departments	Local Budget	2028	Ongoing
PEA-6	Promote Firewise program to homeowners, builders/contractors, and developers.	Wildfire	High	Gautier and Jackson County Fire Departments	Local Budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-7	Develop outreach strategies for non- English communities.	All	High	Applicable state and federal agencies and local agencies/ associations	Local Budget	2028	Ongoing
PEA-8	Develop outreach strategies for tourists (i.e., part-time residents, RV campers, vacationers, etc.)	All	High	Applicable state and federal agencies and local agencies/ associations	Local Budget	2028	Ongoing
PEA-9	Develop outreach strategies for elderly and low-income residents.	All	High	Applicable state and federal agencies and local agencies/ associations	Local Budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-10	Develop outreach strategies for the physically challenged.	All	High	Applicable state and federal agencies and local agencies/ associations	Local	2028	Ongoing
PEA-11	Develop outreach strategies for those with mental health disabilities.	All	High	Applicable state and federal agencies and local agencies/ associations	Local	2028	Ongoing
PEA-12	Develop outreach strategies and implement school programs for children.	All	High	All school districts and daycare providers within the county	Local	2028	Ongoing

City of Moss Point Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Update Emergency Operation Plan.	All	High	Fire and Human Resources Departments	Budget	2025	Completed/Regular updates
P-2	New water supply tank.	Drought	Moderate	Public Works Department	Budget as capital outlay project for Public Works	2027	Ongoing contingent upon funding
P-3	Develop no burn ordinance.	Drought, Wildfire	Moderate	Fire Department	N/A or minimal	2025	Ongoing as needed
P-4	Promote and implement conservation program (in coordination with developing emergency drought ordinance).	Drought	High	Fire Department and Building Inspection	N/A or minimal	2025	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Retrofit/361.	Hurricane	Low	Community Development	CDBG grant funding, city funding	2026	Ongoing
PP-2	Elevation of streets.	Flood, Hurricane, Severe Thunderstorm	Moderate	Public Works and Governing Body	Local	2028	Ongoing contingent upon funding
PP-3	Bridge replacement.	Flood, Hurricane, Severe Thunderstorm	Moderate	Public Works and Governing Body	Local	2028	Ongoing contingent upon funding
PP-4	Acquisition projects.	Flood, Hurricane, Severe Thunderstorm	Low	Community Development	HMGP, CDBG	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Home elevation projects.	Flood, Hurricane, Severe Thunderstorm	Moderate	Community Development	CDBG Hazard Mitigation funding, city and county funding	2028	Ongoing contingent upon funding
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	Drainage improvement projects.	Flood, Hurricane, Severe Thunderstorm	High	Community Development and Public Works	CDBG Hazard Mitigation funding, city and county funding	2025	Ongoing contingent upon funding
SP-2	Scaling system.	Flood, Hurricane, Severe Thunderstorm	High	Public Works	CIAP Grant funding, city and county funding	2026	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Evacuation routing and planning.	All	Moderate	Police Department	Seek/secure grant opportunities with MDOT, MS Public Safety Commission, etc.	2025	Ongoing
ES-2	Establish an effective early warning audio system (sirens).	All	Low	Police and Fire Department	Seek grant opportunities with MDOT, MS Public Safety Commission, etc.	2026	Ongoing
ES-3	Generator	Hurricane	High	Community Development Department	Budget and/or secure CDBG grant funding	2026	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Public outreach: education and preparedness for all hazards.	All	High	Fire and Human Resources Department	Existing budget	2028	Ongoing

City of Ocean Springs Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Coordinate with the Ocean Springs participants on Jackson County's Haz- Mat team to ensure the adequacy of the regional response strategy.	Hazardous Materials Incident	High	Fire Department	MS Dept. of Public Safety Planning	2028	Ongoing regular updates
P-2	Buildings above a certain elevation must have sprinklers for fire protection	Wildfire	High	Buildings Department	Individual home and building owners	Delete	Delete/Remove due to no longer enforcing on residential properties
P-3	Include structural design, elevation, and location standards in the Unified Development Code to mitigate effects of natural hazards.	All	High	Planning and Community Development and Building Official	Administrative – not revenue dependent	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Continue to require that development exceeds FEMA's require base elevations by a measure of 1.5 feet free board.	Flood	High	Buildings Department	Administrative – not revenue dependent	2028	Ongoing enforcement
P-5	Continue to require lot elevation determination for structures in new subdivision through site plan review.	Flood	High	Buildings Department	Administrative – not revenue dependent	2028	Ongoing enforcement
P-6	Continue to enforce city's subdivision regulations for developments in flood hazard areas by enforcing flood ordinance and restricting development in floodplain.	Flood	High	Planning and Community Development; Buildings Department	Administrative – not revenue dependent	2028	Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Undertake an annual review of the Hazard Mitigation Plan with the assistance of the floodplain manager, building official, city planner, and EOC coordinator.	All	High	Planning and Community Development	Administrative – not revenue dependent	2024, Annually	Ongoing
P-8	Incorporated the Ocean Springs Hazard Mitigation Plan into the city's Comprehensive Plan.	All	High	Planning and Community Development; Planning Commission; Board of Alderman	Administrative – not revenue dependent	2028	Ongoing annual review and five year update
P-9	Develop a Capital Improvements Plan (CIP) for the City of Ocean Springs.	All	High	Planning and Community Development; Public Works	MDA – Economic Development	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-10	Maintain elevation certificates on all structures built after the adoption of new FIRM maps.	Flood	High	Buildings Department	Administrative – not revenue dependent	2028	Ongoing regular updates
P-11	Continue to promote storm smart coasts through the Coastal Hazard Outreach Strategy Team (C-HOST) which brings together local officials, community stakeholders, private businesses, and major employers to coordinate messages and develop new projects with the guidance of building officials and floodplain managers from Ocean Springs, Pascagoula, Gautier, Bay St. Louise, Biloxi, D'Iberville, Gulfport, Harrison County, Long Beach, Pass Christian, and Waveland.	Hurricane, Storm Surge, Flood	Moderate	Buildings Department	FEMA, Sea Grant	2023	Ongoing

P-12	Enhance the city's Continuity Plan to ensure that emergency operations can function and that day-to-day management of the city can be back on track as soon as possible after an emergency.	All	Moderate	Fire Department	MS Dept. of Public Safety	2028	Ongoing plan updates

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Maintain flood elevation certificates in the Buildings Department.	Flood	Moderate	Buildings Department	Administrative – not revenue dependent	2028	Ongoing
P-14	Conduct regional beach clean-up programs to reduce the potential of damage from flooding and free- floating debris.	Flood	Moderate	MS Power	DMR, Sea Grant	2024, Annually	Ongoing
P-15	Provide buffers between natural forest and urban development to protect against wildfire.	Wildfire	Moderate	Planning and Community Development	MS Dept. of Forestry, Gulf Islands National Seashore	2026	Partially completed/Ongoing
P-16	Study potential effects of sea level rise on near shore structures and infrastructure and prepare to adopt mitigation measures to minimize its effects.	Sea Level Rise	Low	Mayor’s Office; Planning and Community Development	MS AL Sea Grant, COE	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-17	Mandate larger setbacks from bayous and streams.	Flood	Low	Planning and Community Development	Administrative – not revenue dependent	2028	Ongoing
P-18	Conduct regular controlled burns to limit fuel for forest fires in wet pine savanna habitats.	Wildfire	Low	Fire Department; MS Department of Forestry	MS Dept. of Forestry	2025	Ongoing as needed
Property Protection							
PP-1	Encourage the underground placement of electric, telephone, and cable TV lines by developers working outside of the coastal zone to improve aesthetics, prevent disfigurement of trees, and provide protection form high winds and other hazards.	Hurricane, Tornado, Severe Thunderstorm	High	Public Works Department; MS Power; Singing River Electric	MEMA - HMGP	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	New construction of city buildings should meet the 2018 IBC. As required by BCEG and CRS	All	High	Buildings Department; Board of Alderman	MDA – Energy Efficiency Programs	2028	Ongoing enforcement will update to 2024 Codes as needed
PP-3	Inspect water wells and towers to ensure they are sufficiently strong to withstand high winds and storm surge.	Hurricane, Storm Surge, Tornado, Severe Thunderstorm	High	Water Department	DEQ, EPA	2023	Ongoing inspections
PP-4	Prepare lift stations for inundation and power outages by raising electrical equipment above the BFE in the event of storm surge and long- term power outages.	Hurricane, Storm Surge, Flood	High	MS Power; Public Works	Utility fees	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Mitigate properties in V and AE zones through acquisition, elevation and other flood proofing measures.	Flood	Moderate	Mayor's Office; Grant Building Department	COE, MEMA-HMGP, MCIAP/ Army Corps of Engineers	2028	Ongoing contingent upon funding
PP-6	Protect transformers after a tropical storm or hurricane by washing down salt spray before power supply is re- engaged.	Hurricane	Low	MS Power; Singing River Electric; Fire Department	MS Power, Singing River Electric, Fire Department	2028	Ongoing as needed
Natural Resource Protection							
NRP-1	Preserve trees and vegetation on uninhabited properties to improve stormwater management/flood control.	Flood	Low	Parks and Public Works Departments	MDOT (MS Dept. of Forestry)	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
NRP-2	Preserve natural/wetlands and riparian areas through acquisition or conservation easements.	Flood	Low	Mayor's Office; Grants Department	FEMA, Army Corps of Engineers/ MCIAP, MEMA-HMGP	2028	Ongoing contingent upon funding
NRP-3	Extend sand beach additional 100 feet to the east and stabilize with plantings.	Storm Surge, Erosion	Low	Planning and Community Development; Jackson County	FEMA Grant, DMR, COE	2026	Ongoing contingent upon funding.
NRP-4	Request that Jackson County continue dune propagation in areas along East Beach and Front Beach.	Storm Surge, Erosion	Low	Jackson County	Jackson County Seawall Tax	2023	Completed/Ongoing
Structural Projects							
SP-1	Maintain the Jackson County seawall tax.	Storm Surge, Erosion	Moderate	Jackson County	Jackson County	2028	Ongoing tax renewal process

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-2	Continue the city's efforts to upgrade drainage facilities along coastal roadways.	Flood	Moderate	Public Works and Streets	COE, MEMA-HMGP, MCIAP	2028	Partially completed/ Ongoing contingent upon funding
Emergency Services							
ES-1	Maintain a hazardous materials, oil spill, and natural gas response force to address immediate aftermath of a material release.	Hazardous Materials Incident	High	Fire Department	AFG, SAFER	2028	Ongoing
ES-2	Update the city's Hazard Mitigation and Emergency Response Plan and its Hurricane Response Plan to ensure emergency service and evacuation routes are adequate for demand, well-marked, and accessible to individuals with special needs during inclement weather.	All	High	Planning and Community Development Department; Fire Department	MEMA - HMGP	2025	Ongoing

ES-3	Maintain a reverse 911 call-back system for railroad derailments and other hazardous material spills.	Hazardous Materials Incident	High	Fire Department	MS Dept. of Public Safety Planning	2028	Ongoing.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-4	Increase the number of fire department and police personnel trained to respond to hazardous waste releases on the railroad, highways, hospital, and other critical facilities.	Hazardous Materials Incident	Moderate	Fire Department	FEMA, AFG	2028	Ongoing regular basis
ES-5	Alert citizens to oncoming hazards by enhancing Code Red capabilities for oncoming hazards.	All	Moderate	Fire and Police Departments	MS Dept. of Public Safety Planning, AFG	2028	Ongoing enhancements
ES-8	Establish high ground staging area for emergency vehicles that provides added protection from wind-blown debris.	All	Moderate	Fire and Police Departments	FEMA, Local Budget	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-9	As population grows to the east, southeast, and northeast, plan for the expansion of the city's firefighting capacity through an additional facility, possible on the Highway 57 corridor, including new fire trucks, personnel, and equipment.	All	Low	Fire Department	AFG	2028	Ongoing contingent upon funding
ES-10	Plan for the construction of an underpass to the railroad tracks at Halstead for emergency evacuation with a water pump to prevent groundwater flooding.	All	Low	Public Works Department	MS Dept. of Public Safety Planning, MDOT, DEQ, EPA	2028	Ongoing contingent upon funding
ES-11	Upgrade fire protection through acquisition of a new fire truck capable of reaching new elevated buildings and construct a fire station large enough to accommodate it.	Wildfire	Low	Fire Department	AFG	2028	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Create partnership to assist with development of Family Disaster Plans.	All	High	Fire Department	Administrative – not revenue dependent	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Educate residents on how better waste disposal can reduce flooding.	Flood	Moderate	Public Works; Planning and Community Development	FEMA, Sea Grant	2028	Ongoing
PEA-3	Provide outreach materials about mitigating the impact of a hazard through city mailings and raise the awareness of home and business owners.	All	Moderate	Mayor's Office; Buildings and Water Departments	FEMA, Sea Grant	2024, Annually	Ongoing
PEA-4	Encourage small businesses to develop business continuity plans.	All	Moderate	Mayor's Office	MDA – Economic Development, FEMA	2025	Ongoing
PEA-5	Launch a coordinated education effort on hurricane evacuation procedures to teach people who should evacuate, when evacuation should begin, and routes available through Ocean Springs and the surrounding areas.	Hurricane	Low	Fire and Police Departments	FEMA, Sea Grant	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-6	Participate in Gulf Coast Homeowner's Show and building supply store shows to provide mitigation information to the public.	All	Low	Buildings Department	FEMA, Sea Grant	2028	Ongoing

City of Pascagoula Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Update Emergency Response Plan.	All	Moderate	Fire	General Fund	2024, Annually	Ongoing
P-2	Adopt Local Hazard Mitigation Plan as part of Comprehensive Plan.	All	Moderate	Community and Economic Development Department	General Fund	2025	Ongoing
P-3	Enhance enforcement of existing codes, ordinances, etc.	All	Moderate	Planning and Building	General Fund	2028	Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Continued compliance with the NFIP/implementation of CRS Activities.	Flood, Hurricane, Severe Thunderstorm	Moderate	Planning and Building	General Fund	2028	Ongoing participation.
P-5	Continue to participate in the Jackson County Stormwater Taskforce.	Flood, Hurricane, Tropical Storm, Severe Thunderstorm	Moderate	Planning and Building; Public Works	General Fund	2024, Annually	Ongoing
P-6	Maintenance of existing drainage facilities.	Flood, Hurricane, Tropical Storm, Severe Thunderstorm	High	Public Works; Engineering	General Fund	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Continue implementation of open space preservation.	Flood, Hurricane, Tropical Storm, Severe Thunderstorm	Moderate	Planning and Building	General Fund	2028	Ongoing
P-8	Continue citizens' hotline for drainage issues.	Flood, Hurricane, Thunderstorm, Erosion	High	Planning and Building; Public Relations	General Fund, HMGP grants	2028	Ongoing
Property Protection							
PP-1	Protect water wells, sewer systems, and ensure backup power.	All	High	Public Works	City Budget Utility Fund, Hazard Mitigation Grant funding	2026	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-2	Residential elevation.	Flood	High	Planning and Building; CRS Coordinator	HMGP, FMA	2028	Ongoing contingent upon funding
PP-3	Property acquisition project.	Flood	Moderate	CRS Coordinator	HMGP and FMA Grant funds	2028	Ongoing contingent upon funding
PP-4	Mitigation reconstruction/ floodproofing.	Hurricane, Flood	Moderate	CRS Coordinator	HMGP or FMA Grant programs	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PP-5	Structure hardening: upgrade roof systems/windows to meet current code requirements to ensure continuity of emergency services – Pascagoula Police Dept., Lake Avenue Fire Station, City Hall, and others.	Hurricane, Severe Thunderstorm / High Wind, Hailstorm, Tornado	High	Planning and Building Department; Economic Development	General Fund; Hazard Mitigation Grants	2028	Ongoing contingent upon funding
PP-6	Relocation and placement of utilities.	Flood, Hurricane, Tropical Storm, Severe Thunderstorm	High	Planning and Building; Economic Development; Public Works	HMGP funding, City of Pascagoula Utility Fund, state and federal grants, JCUA budget funding	2028	Ongoing contingent upon funding
PP-7	Critical facilities inventory and mitigation opportunities.	All	Moderate	Public Works; Police; Fire; Parks and Recreation; Economic Development; Building and Planning; City Hall	HMGP and BRIC Grants	2024	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
NRP-1	Natural resource protection – wetlands, others.	Flood, Hurricane, Severe Thunderstorm, Erosion	High	Planning and Building; Public Relations	General Fund, Hazard Mitigation grants, and other funded activities	2028	Ongoing
Structural Projects							
SP-1	Implement projects from Master Drainage Plan.	Flood, Hurricane, Tropical Storm, Severe Thunderstorm	High	Public Works; Engineering	General Fund	2028	Partially completed/ Ongoing contingent upon funding
Emergency Services							
ES-1	Coordination of evacuation planning and sheltering	All	Moderate	Pascagoula Police/Fire	General Fund, CDBG, HMGP funding	2024, Annually	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-2	NIMS certification.	All	High	Fire/Police	Federal grant, Local Budget	2028	Ongoing regular training
Public Education and Awareness							
PEA-1	Public/stakeholder outreach: education and preparedness for all hazards.	All	High	Planning and Building; Public Relations	General Fund; Hazard Mitigation Grants	Mailing biannually, web and media constant	Ongoing
PEA-2	Provide post-disaster guidance materials.	All	Moderate	Planning and Building	Existing budget	2028	Ongoing following disaster events

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ANNEX E: PEARL RIVER COUNTY

This annex includes jurisdiction-specific information for Pearl River County and its participating municipalities. It consists of the following five subsections:

SECTION 22 PEARL RIVER COUNTY COMMUNITY PROFILE

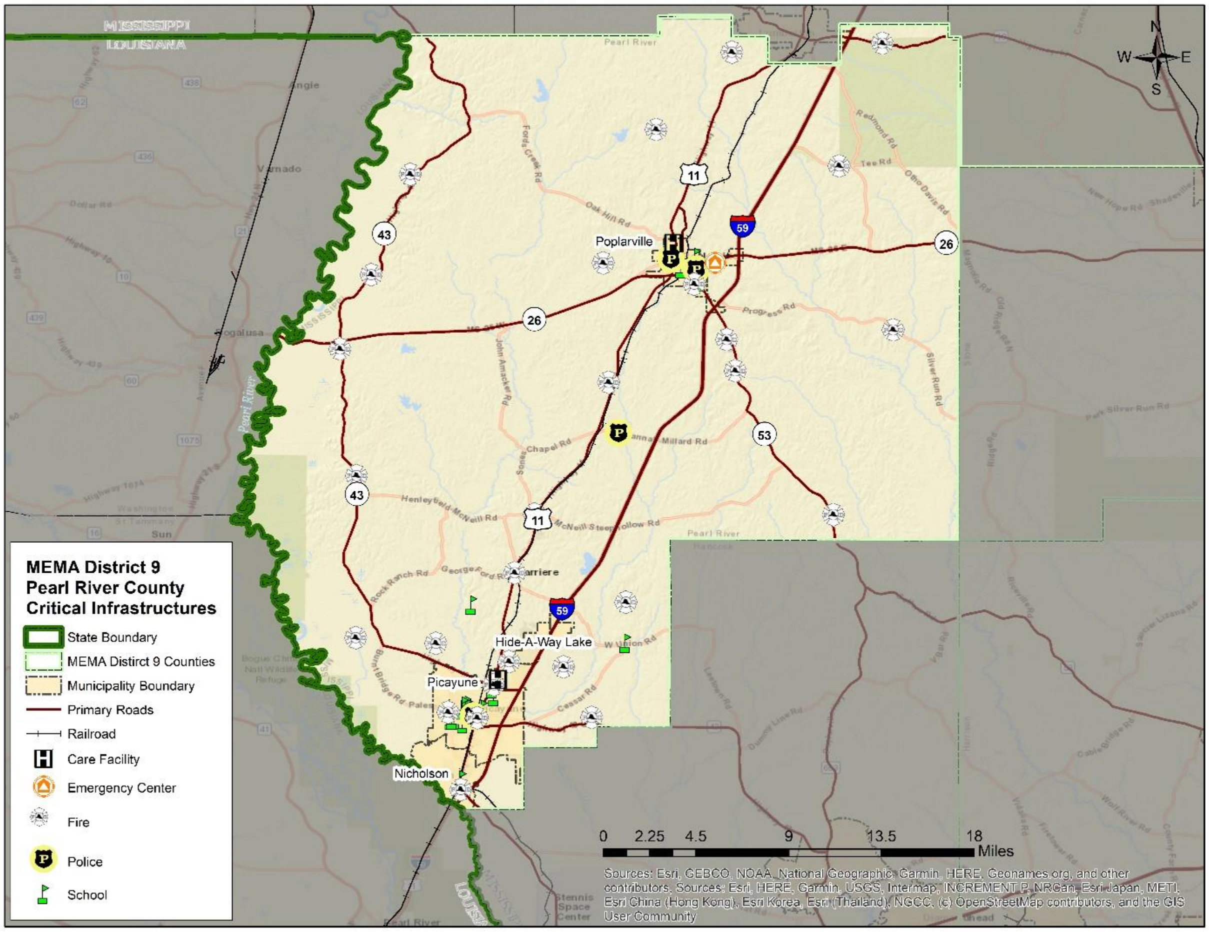
Geography and the Environment

Pearl River County is located in southern Mississippi. It comprises two cities, Picayune and Poplarville, as well as many small unincorporated communities. An orientation map is provided as Figure E.1.

Pearl River County is situated in the East Gulf Coastal Plain. It is made up of the gently rolling Pine Belt, also known as the "Piney Woods," and the coastal area called the Coastal Meadows or Terrace. The region has generally low topographic elevations and extensive tracts of marshy land. There are many rivers, creeks, bayous, and other natural drainage networks in the region which empty into the Gulf of Mexico. The total area of the county is 819 square miles, 8 square miles of which is water area.

Pearl River County enjoys four distinct seasons but the climate in the region is generally hot and humid compared to the rest of the United States given its latitude and location along the Gulf Coast. Precipitation is generally highest in winter months when the temperatures are moderately lower, but the likelihood of precipitation remains relatively constant throughout the year. Snowfall is rare but does occur. Summers in the region can become fairly hot with average highs in the nineties and lows in the seventies. The region is also often susceptible to turbulent weather when warm, wet air from the Gulf of Mexico is pushed up into the region to mix with cooler air coming down from across the continent which can result in severe weather conditions. This is particularly true in the spring when seasons are changing and diverse weather patterns interact. The region is also subject to hurricanes and tropical storms from June to October.

FIGURE E.1: PEARL RIVER COUNTY ORIENTATION MAP



Population and Demographics

Population counts from the US Census Bureau for 1990, 2000, 2010, and 2020 for the county and participating jurisdictions are presented in Table E.1.

TABLE E.1: POPULATION COUNTS FOR PEARL RIVER COUNTY

Jurisdiction	2000 Census Population	2010 Census Population	2020 Census Population	% Change 2010-2020
Pearl River County	48,621	55,834	56,145	0.6%
Picayune	10,535	10,878	11,885	9.3.%
Poplarville	2,601	2,894	2,837*	-2%

Source: United States Census Bureau, 1990, 2000, 2010 Census, *ACS 2021 5-year

The racial characteristics of the county are presented in Table E.2.

TABLE E.2: DEMOGRAPHICS OF PEARL RIVER COUNTY

Jurisdiction	White, Percent (2020)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Pearl River County	84.5%	12.2%	0.7%	0.4%	0.1%	2.0%	3.5%
Picayune	55.5%	37.7%	0.0%	0.3%	0.0%	5.4%	2.8%
Poplarville	62.1%	34.8%	0.0%	0%	0%	0%	0%

Source: United States Census Bureau, 2020 Census/2017-2021 ACS

Housing

Housing information for the county and two municipalities is presented in Table E.3.

TABLE E.3: HOUSING CHARACTERISTICS OF PEARL RIVER COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Housing Units (2010)	Median Home Value (2017-2021)
Pearl River County	20,610	23,968	25,434	$144,100
Picayune	4,568	4,891	X	$117,000
Poplarville	936	1,019	888	$134,600

Source: United States Census Bureau, 2000, 2010, 2020 Census, 2017-2021 American Community Survey 5-Year Estimates

Infrastructure

TRANSPORTATION

In Pearl River County, Interstate 59 and U.S. Highway 11 run roughly northeast to southwest allowing transportation across the county. Mississippi Highway 26 runs east-west and Mississippi Highway 43 and 53 run north-south through Pearl River County.

The Picayune Municipal Airport and Poplarville-Pearl River County Airport are two general aviation airports located in Pearl River County. The Oreck Airport in Poplarville is a notable private-use airport in the county. The Gulfport-Biloxi International Airport, located in Harrison County, also serves the county. This airport is served by three major airlines with direct flights to Atlanta, Charlotte, Dallas/Ft. Worth, and Houston as well as connections to hundreds of locations in the U.S. and worldwide.

In terms of other transportation services, one Class-I Major railway also serves the county.

UTILITIES

Electrical power in Pearl River County is mainly provided by electric power associations. Mississippi Power Company also provides power to some parts of the county.

There are two private and municipal natural gas suppliers that serve Pearl River County. These include CenterPoint Energy Resources and the City of Picayune.

Water and sewer service is provided by a number of different sources, but unincorporated areas often rely on septic systems and wells in Pearl River County.

COMMUNITY FACILITIES

There are a number of buildings and community facilities located throughout Pearl River County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 5 communications facilities, 1 emergency operations center (EOC), 29 fire stations, 4 medical facilities, 3 police stations, 8 public facilities, 5 shelters, 1 transportation facility, and 9 water/wastewater facilities located within the county.

There are three hospitals located in Pearl River County. Crosby Memorial Hospital and Highland Community Hospital in Picayune and Pearl River County Hospital in Poplarville. There are also additional medical care facilities located in the county as outlined in the vulnerability assessment (Section 6.4.1).

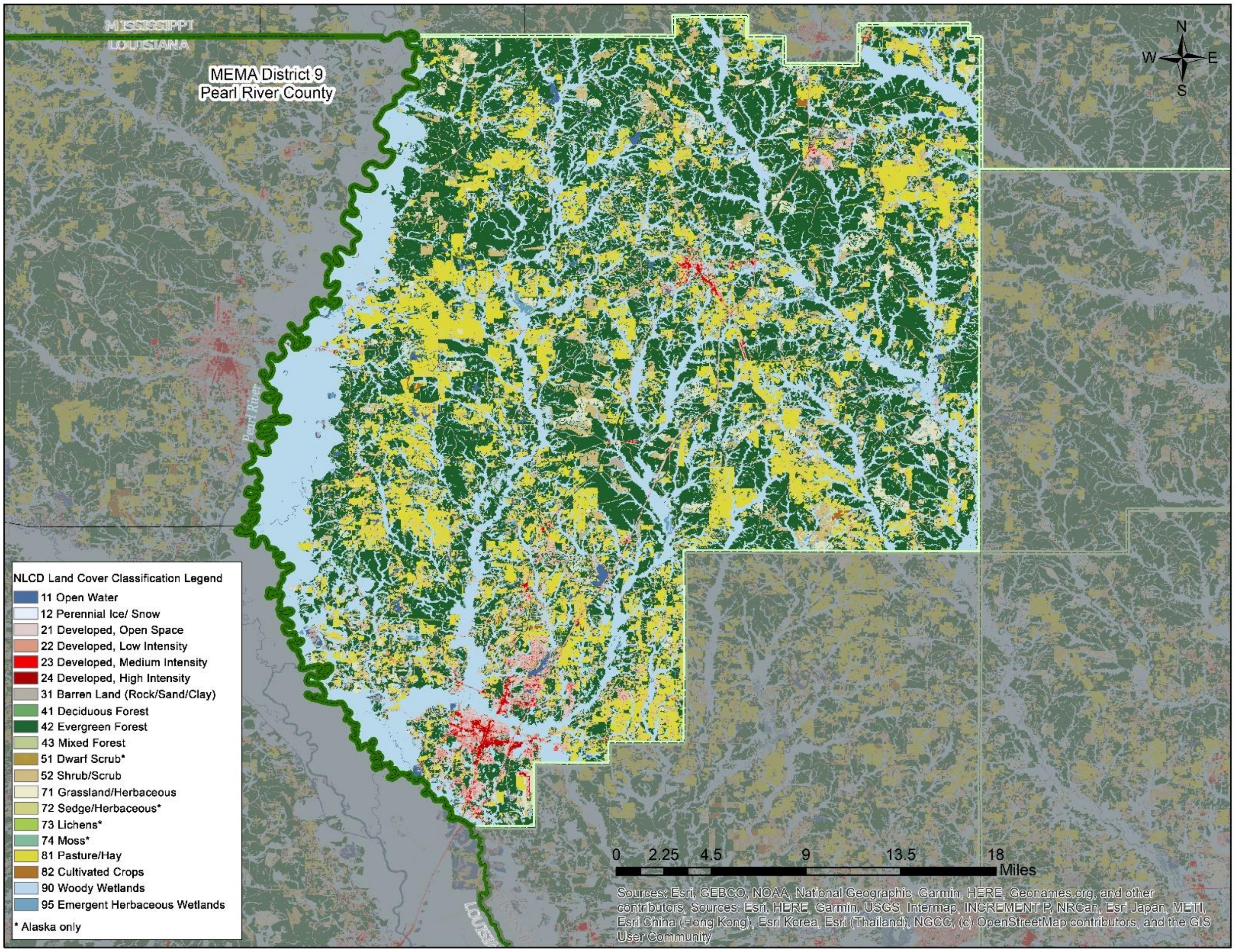
Pearl River County contains numerous local, state, and national parks and recreation areas, including the Mississippi Gulf Coast National Heritage Area and DeSoto National Forest. Golf courses and other recreational opportunities are also available in the county.

Land Use

Many areas of Pearl River County are undeveloped or sparsely developed. There are two small incorporated municipalities located in the county and a few unincorporated rural centers. There is a mix of protected lands, such as the DeSoto National Forest and a National Wildlife Refuge. Private lands are used for exurban housing, agriculture, and forestry. Consistent with its rural character, densities are very low and uses are not mixed, making motor vehicles the only viable mode for virtually all travel.

Local land use and associated regulations are further discussed in Section 7: Capability Assessment.

Figure E.2: Land Classification



Employment and Industry

According to the 2019 American Community Survey (ACS), Pearl River County had an average annual employment of 23,674 workers and an average unemployment rate of 4.4 percent (compared to 4.2 percent for the state In 2019, the average annual median household income in Pearl River County was $46,901 compared to $45,081 in the state of Mississippi.
https://data.greenvilleonline.com/american-community-survey/pearl-river-county-mississippi/population/total-population/yty/05000US28109/area/

SECTION 23 PEARL RIVER COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: Hazard Identification as they pertain to Pearl River County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: Hazard Profiles.

National Risk Index Scores:
The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather. Because not all hazards apply to the County, only those with a defined risk to the County are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability and Community Resilience, to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions but cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision-makers as they develop risk reduction strategies.

Social Vulnerability:
Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Per the FEMA National Risk Index, Pearl River County has a Social Vulnerability Rating of **"Relatively High"** and a Social Vulnerability Score of **"61.7"** (FEMA, 2023).

The "Social Vulnerability Score" and "Rating" represent the relative level of a community's social vulnerability compared to all other communities at the same level. A community's Social Vulnerability Score is also proportional to a community's risk. A higher Social Vulnerability Score results in a higher Risk Index Score (FEMA, 2023).

Social vulnerability is also one of five components included in the formulation of the "National Risk Index Score" in addition to community resilience, estimated annual loss (EAL) based on exposure, annualized frequency, and historic Loss Ratio (HLR) factors (FEMA, 2023).

Table E.4: Social Vulnerability FEMA NRI Score

PEARL RIVER COUNTY, MS FEMA NRI SOCIAL VULNERABILITY SCORE	
Social Vulnerability Score	**Social Vulnerability Rating**
61.7	Relatively High
Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).	
Source: hazards.fema.gov/nri/social-vulnerability	

Community Resilience:
Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Table E.5: Community Resilience FEMA NRI Score

PEARL RIVER COUNTY, MS FEMA NRI COMMUNITY RESILIENCE SCORE	
Community Resilience Score	**Community Resilience Rating**
23.0	Relatively Low
Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).	
Source: hazards.fema.gov/nri/community-resilience	

Expected Annual Loss:

Table E.6:. Expected Annual Loss FEMA NRI Score (All Natural Hazards)

EXPECTED ANNUAL LOSS FOR PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS SCORE	
Expected Annual Loss Score	**Expected Annual Loss Rating**
90.0	Relatively Moderate
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio).	
Source: hazards.fema.gov/nri/expected-annual-loss	

FEMA National Risk Index Score:

Table E.7: Overall FEMA NRI Score

FEMA OVERALL NRI SCORE FOR PEARL RIVER COUNTY,MS FEMA OVERALL NRI SCORE	
FEMA Overall NRI Score	**FEMA Overall NRI Rating**
Relatively Moderate	90.01
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience. (Expected Annual Loss X Social Vulnerability / Community Resilience = Risk Index).	
Source: hazards.fema.gov/nri/determining-risk	

Pearl River County Overall Risk Scores:

The following tables represent the new overall risk scores for ---- County based on the described methodology above. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores. FEMA NRI Scores were used as appropriate and applicable to inform the analysis.

Table E.8: 2023 Hazard Risk Scores Pearl River County

Hazard Event	Probability	Consequence				Total Risk Score (Probability x Consequence)
	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Factors	Sum of Weighted Impact Factors	Consequence Score	
Dam and Levee Failure	1	1	6	15	22	14
Erosion	3	8	8	16	32	52
Flood	3	12	12	32	56	84
Storm Surge	3	8	5	23	36	57
Drought	2	8	11	18	37	41
Lightning	3	10	11	22	43	67
Wildfire	3	9	6	24	39	61
Earthquake	0	0	4	12	16	0
Extreme Cold	2	10	5	19	34	38
Extreme Heat/Heat Wave	3	12	10	27	49	75
Hailstorm	2	7	6	13	26	30
Hurricane Tropical Storm	3	12	17	39	68	99
Severe Thunderstorm/High Wind	3	10	16	32	58	86
Tornado	2	8	15	34	57	60
Winter Weather	3	9	7	26	42	65

Climate Change/Sea Level Rise	3	8	6	22	36	57
HAZMAT/Train Derailment	1	4	6	17	27	17
Dam and Levee Failure	1	1	6	15	22	14

For a full listing of hazard rankings and methodologies, please see the below link:

PearlRiverCounty_RankingSpreadsheet.xls›

Table E.9. Hazard Risk Scores Legend

Probability Factor		Sum of Weighted Extent Factors		Sum of Weighted Vulnerability Factors		Sum of Weighted Impact Factors		Consequence Score		Total Risk Score	
1	Low (L)	0–6	Low (L)	0–6	Low (L)	0–12	Low (L)	0–25	Low (L)	0–24	Low (L)
2	Medium (M)	7–12	Medium (M)	7–12	Medium (M)	13–26	Medium (M)	26–50	Medium (M)	25–59	Medium (M)
3	High (H)	13–18	High (H)	13–18	High (H)	27–39	High (H)	51–75	High (H)	60–100	High (H)

** The **Legend** – specifically the assignment of low, medium, and high—provides an additional means to qualitatively assess the probability factor, sum of weighted factors, and the total risk scores for each hazard.*

*The **Consequence Score** represents the sum of the Extent, Vulnerability, and Impact Factors.*

*The **Total Risk Score** is a measure of Probability and Consequence.*

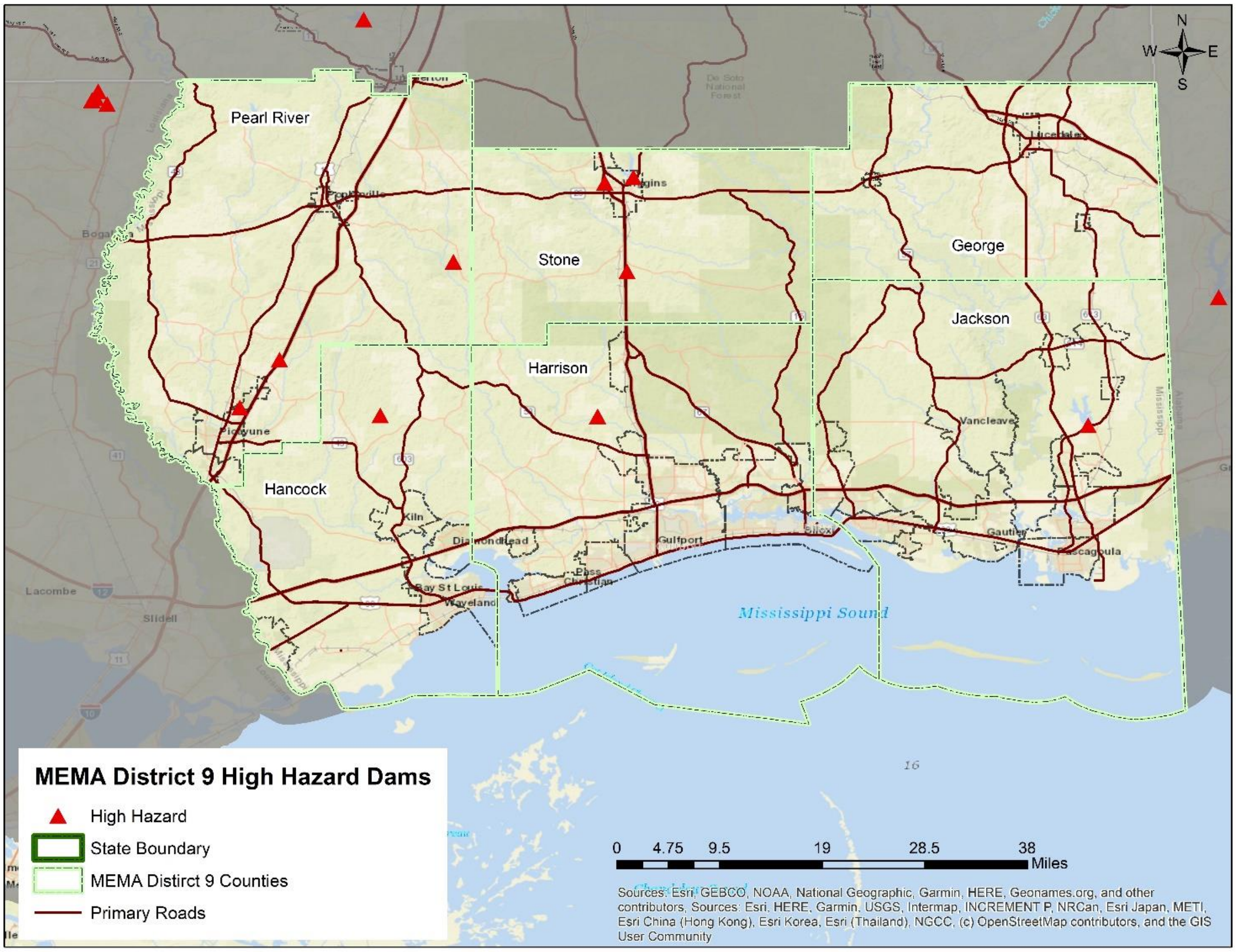
FLOOD-RELATED HAZARDS

Dam and Levee Failure

LOCATION AND SPATIAL EXTENT

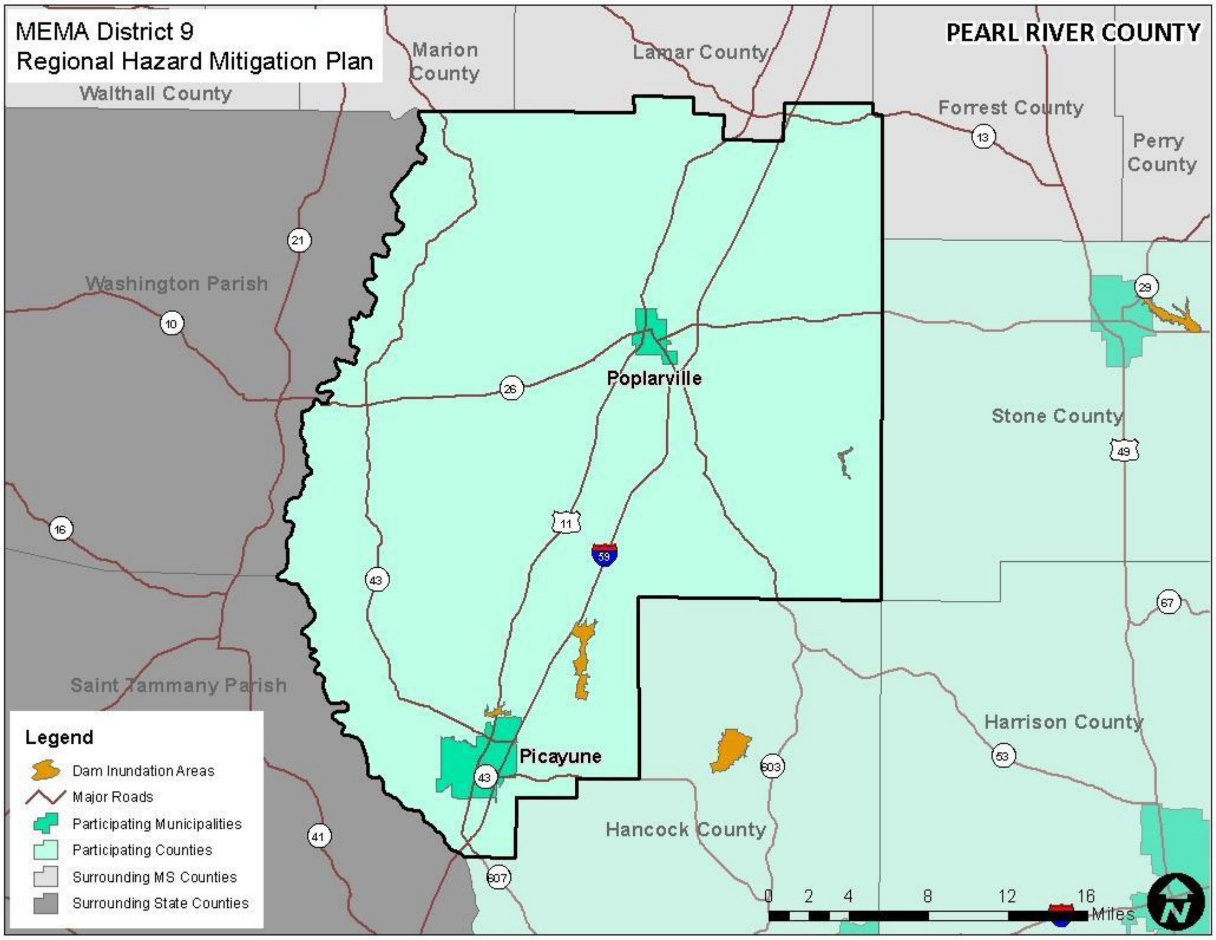
According to the Mississippi Department of Environmental Quality, there are three high hazard dams in Pearl River County. Figure E.3 and Figure E.4 show the location of each of these high hazard dams as well as mapped dam inundation areas, and Table E.10 lists them by name.

FIGURE E.3: PEARL RIVER COUNTY HIGH HAZARD DAM LOCATIONS



Source: Mississippi Department of Environmental Quality

FIGURE E.4: PEARL RIVER COUNTY DAM INUNDATION AREAS



Source: Mississippi Department of Environmental Quality

TABLE E.10: PEARL RIVER COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential
Pearl River County	
ANCHOR LAKE DAM	High
GO GO ROAD LAKE DAM	High
HIDE-A-WAY LAKE DAM	High

Source: Mississippi Department of Environmental Quality

HISTORICAL OCCURRENCES

According to the Mississippi State Hazard Mitigation Plan, there have been two dam failures reported in Pearl River County. Although no damage was reported with these events, several breach scenarios in the region could be catastrophic.

Table E.11 below provides a brief description of the two reported dam failures.

TABLE E.11: PEARL RIVER COUNTY DAM FAILURES (1982-2022)

Date	County	Structure Name	Cause of Failure
April 1983	Pearl River	Anchor Lake	Breached
April 2004	Pearl River	Dove Lake	Piping

Source: Mississippi State Hazard Mitigation Plan

PROBABILITY OF FUTURE OCCURRENCES

Given the current dam inventory and historic data, a dam breach is possible (between 1 and 10 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess high-hazard dams and levees.

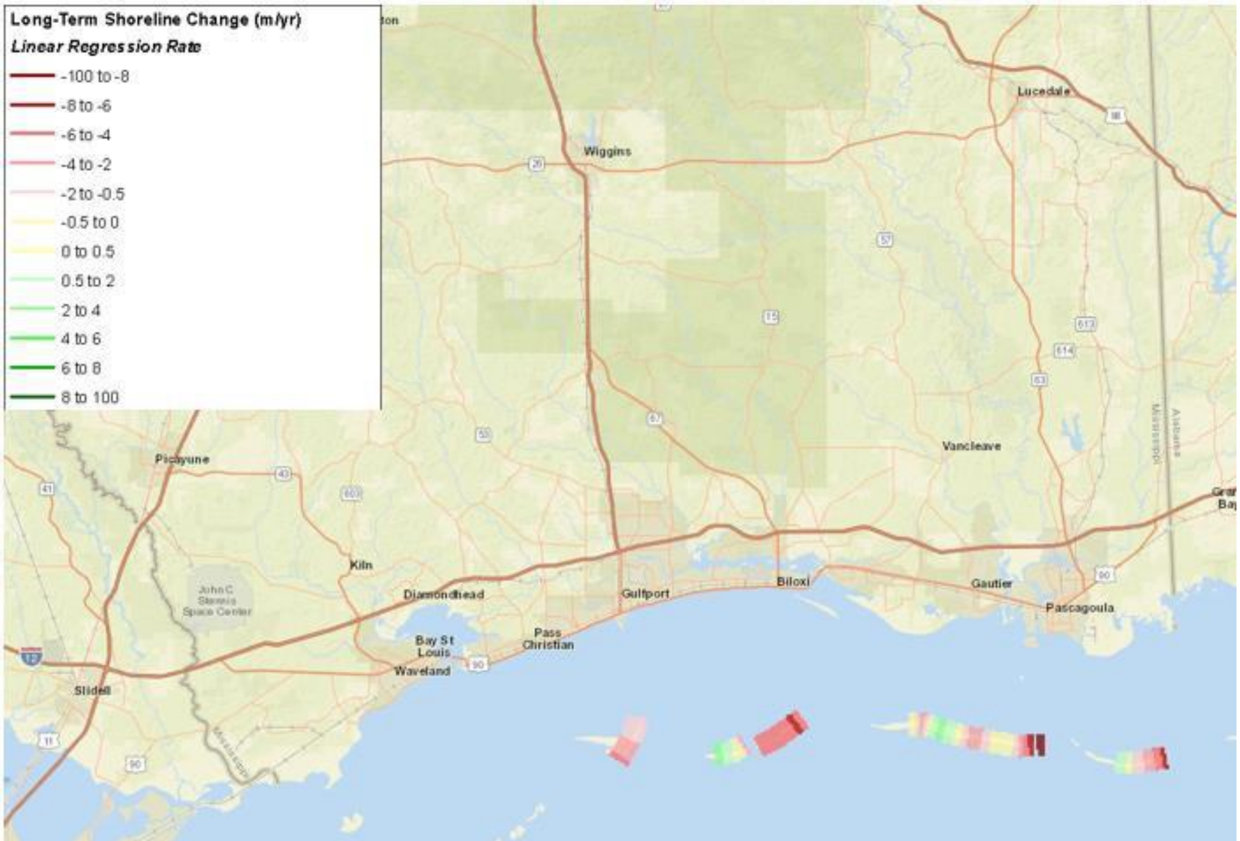
Erosion

LOCATION AND SPATIAL EXTENT

For the most part, major erosion in the MEMA District 9 Region is typically caused by coastal tides, ocean currents, and storm events. Although the region also experiences riverine erosion in many of its inland areas, including Pearl River County, these are of somewhat less concern than coastal erosion areas which historically have had larger impacts. Unlike inland areas, where the soil has greater organic matter content, coastal soils are mainly composed of fine grained particles such as sand. This makes coastal soils much more susceptible to erosion. Although some areas of the MEMA District 9 Region coast are protected and natural erosion processes are allowed to take place for the most part, many areas near where development has occurred are especially susceptible.

At this time, there is limited data available on localized areas of erosion. Most of the information collected by the United States Geological Survey (USGS) is focused on the barrier islands that are just off the coast of the mainland. The long-term shoreline change for the barrier islands as calculated by the USGS can be found in Figure E.5. It should be noted that many areas of the coast are protected through the use of structural techniques. Also, a great deal of renourishment activities are carried out along the mainland coastal communities.

FIGURE E.5: LONG-TERM SHORELINE CHANGE (M/YR) IN THE MEMA DISTRICT 9 REGION



Source: United States Geological Survey

HISTORICAL OCCURRENCES

Several sources were vetted to identify areas of erosion in Pearl River County. This includes searching local newspapers, interviewing local officials, and reviewing previous hazard mitigation plans. Because dramatic, short-term erosion tends to take place after major storm events such as hurricanes, flooding, or storm surge, the erosion events often correspond directly with those events. Conversely, with long- term erosion, it is difficult to identify a specific historic occurrence because these events are by nature occurring at all times over a long period at a very gradual rate. Therefore, long-term historic erosion events cannot be confined to a specific timeframe or occurrence.

PROBABILITY OF FUTURE OCCURRENCES

Erosion remains a natural, dynamic, and continuous process for Pearl River County, and it will continue to occur. The annual probability level assigned for erosion is likely (between 10 and 100 percent annually).

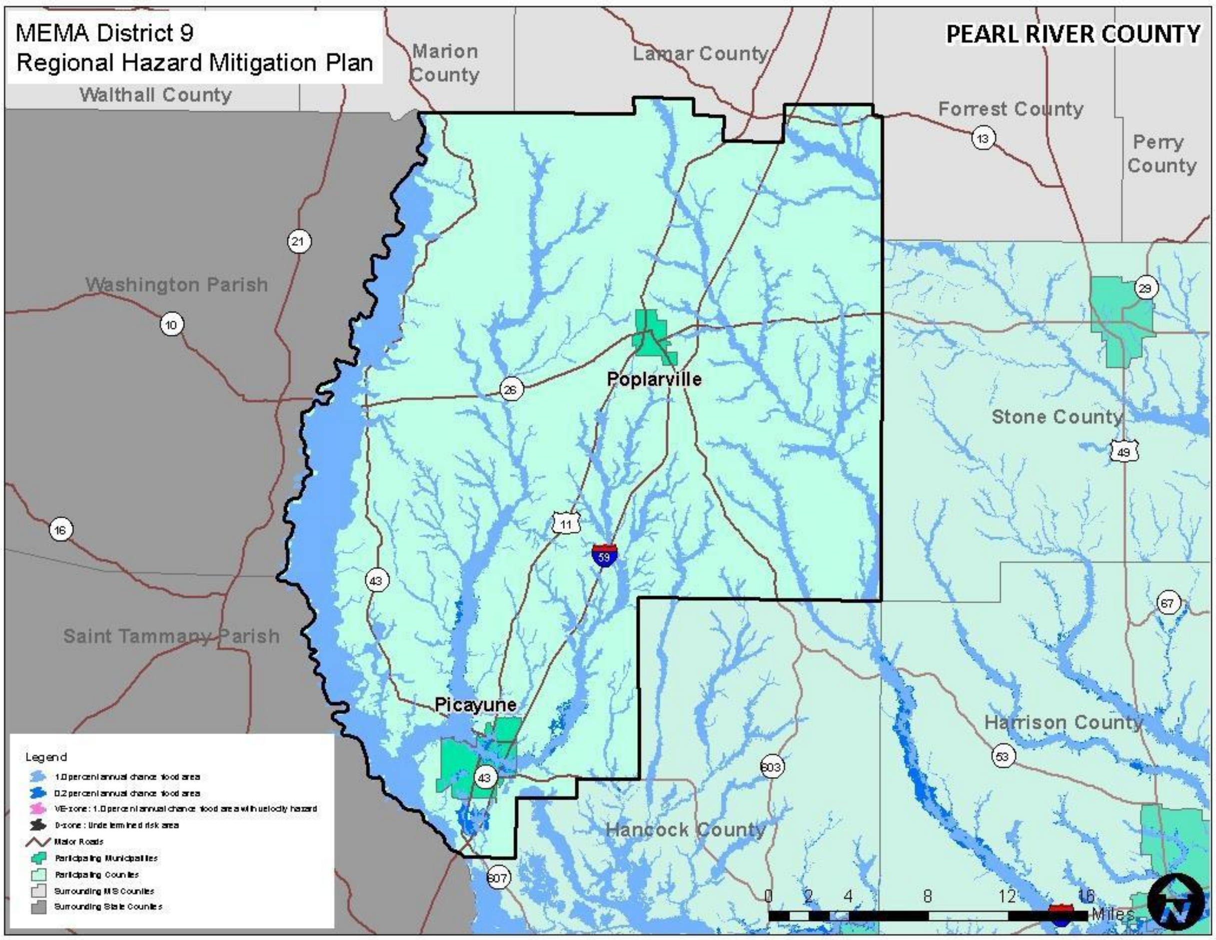
FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess erosion events.

Flood

LOCATION AND SPATIAL EXTENT

There are areas in Pearl River County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM). This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevations), Zone VE (1-percent annual chance floodplain with additional hazards due to storm-induced velocity wave action), Zone X500 (0.2-percent annual chance floodplain), and Zone D (undetermined risk area). Figure E.6 illustrates the location and extent of currently mapped special flood hazard areas for the county based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

FIGURE E.6: SPECIAL FLOOD HAZARD AREAS IN PEARL RIVER COUNTY



Source: Federal Emergency Management Agency

Figure E.7: National Flood Hazard Layer (No Facilities)

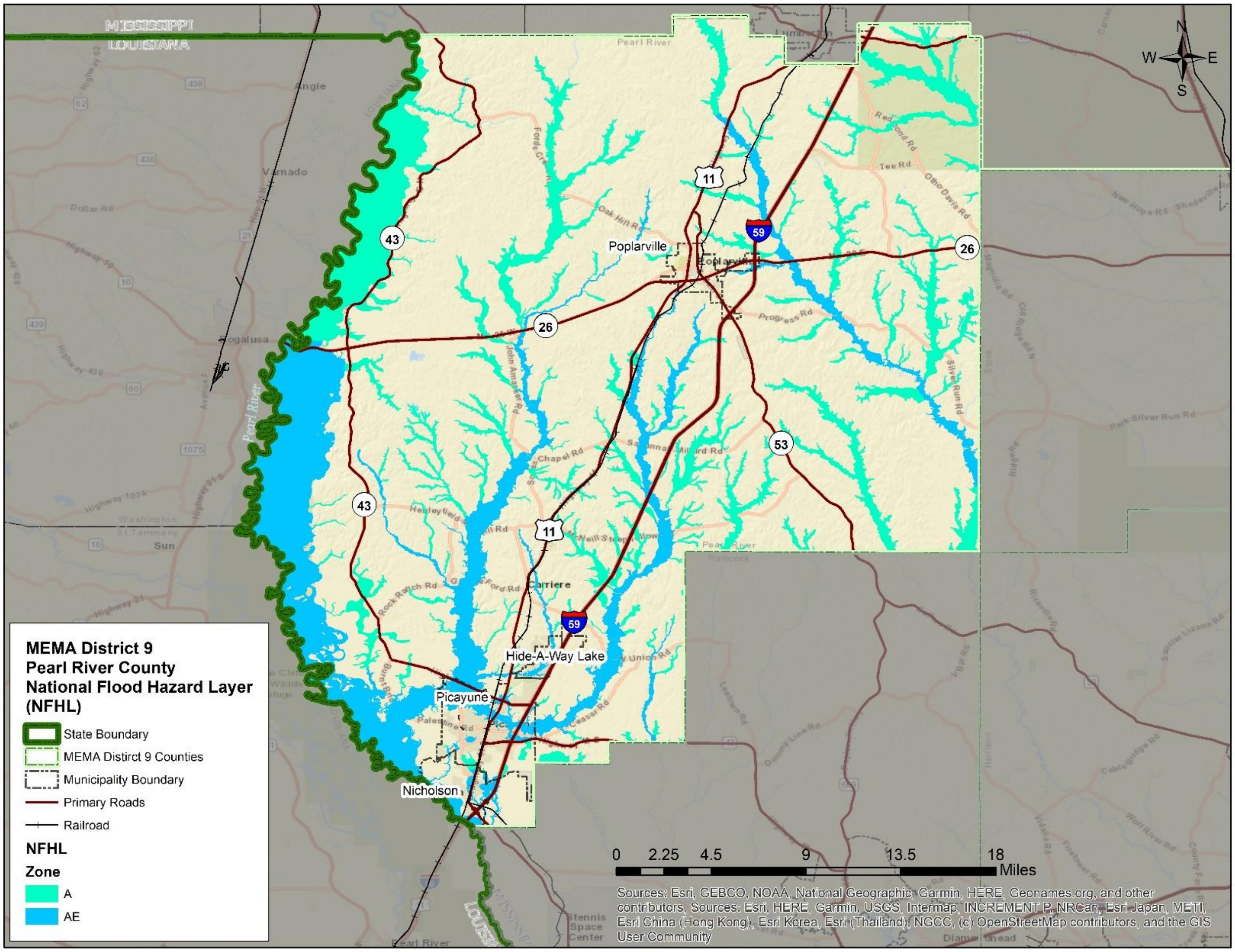


Figure E.8: National Flood Hazard Layer (Facilities)

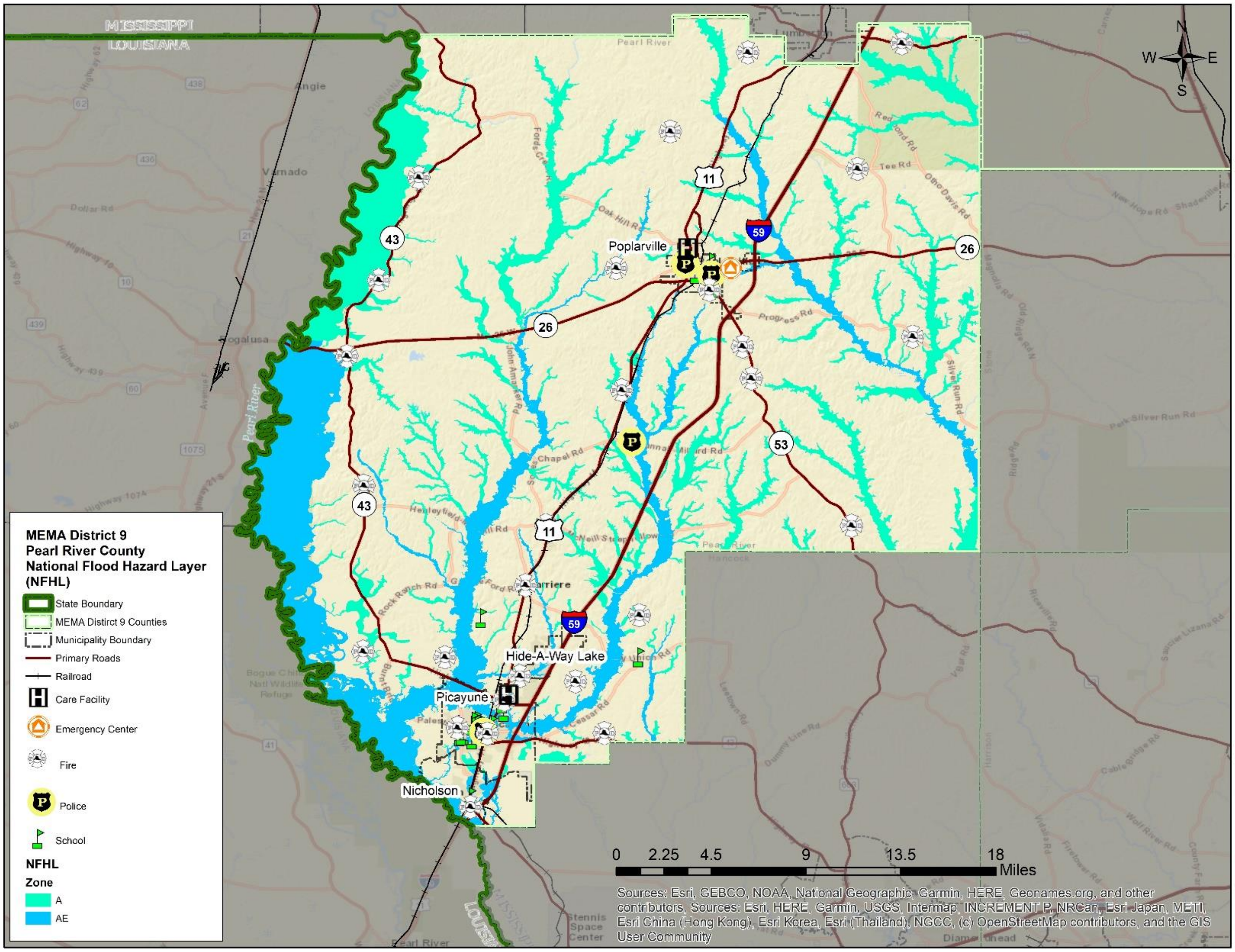


Figure E.9: HAZUS 100-Year Flood Analysis (No Facilities)

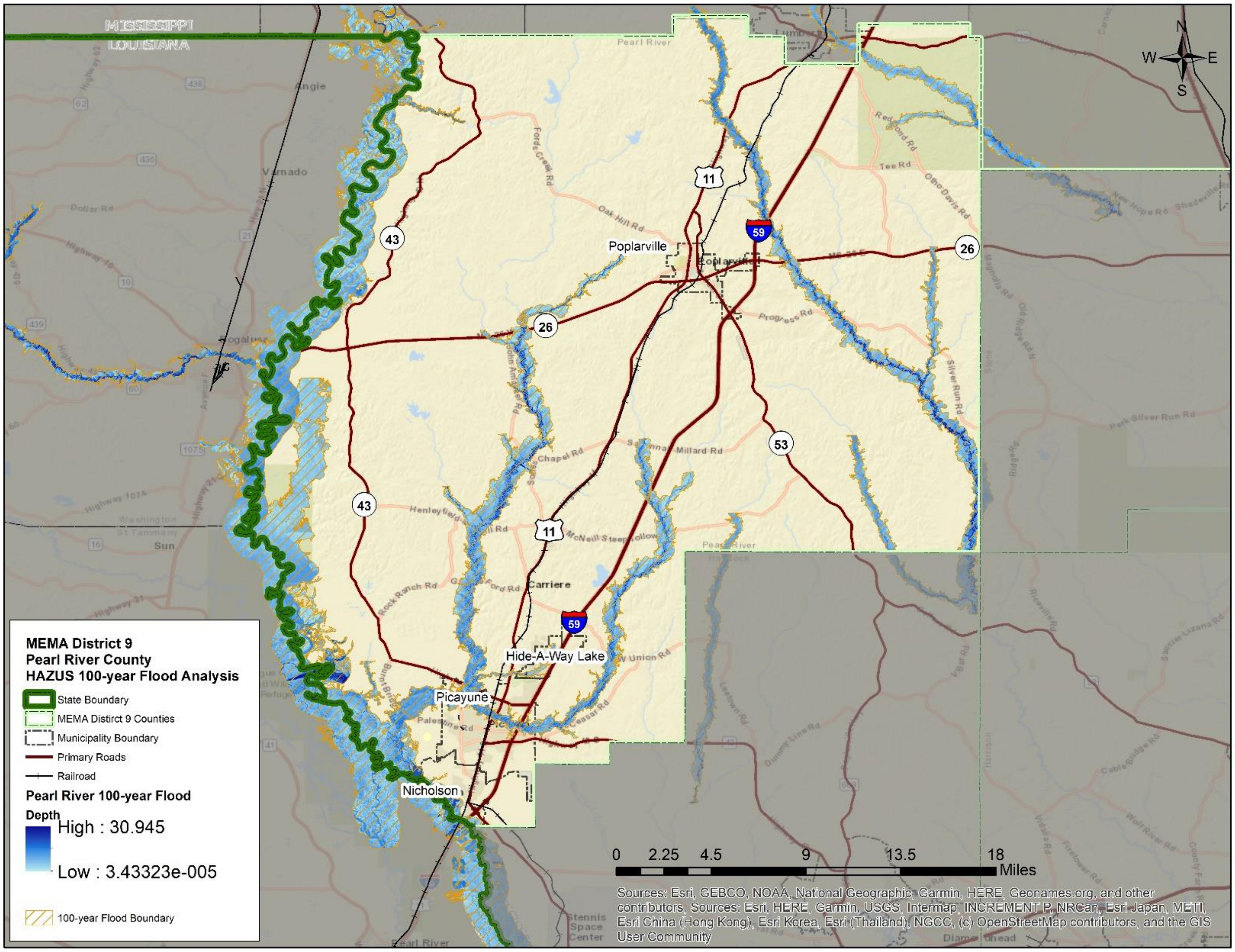
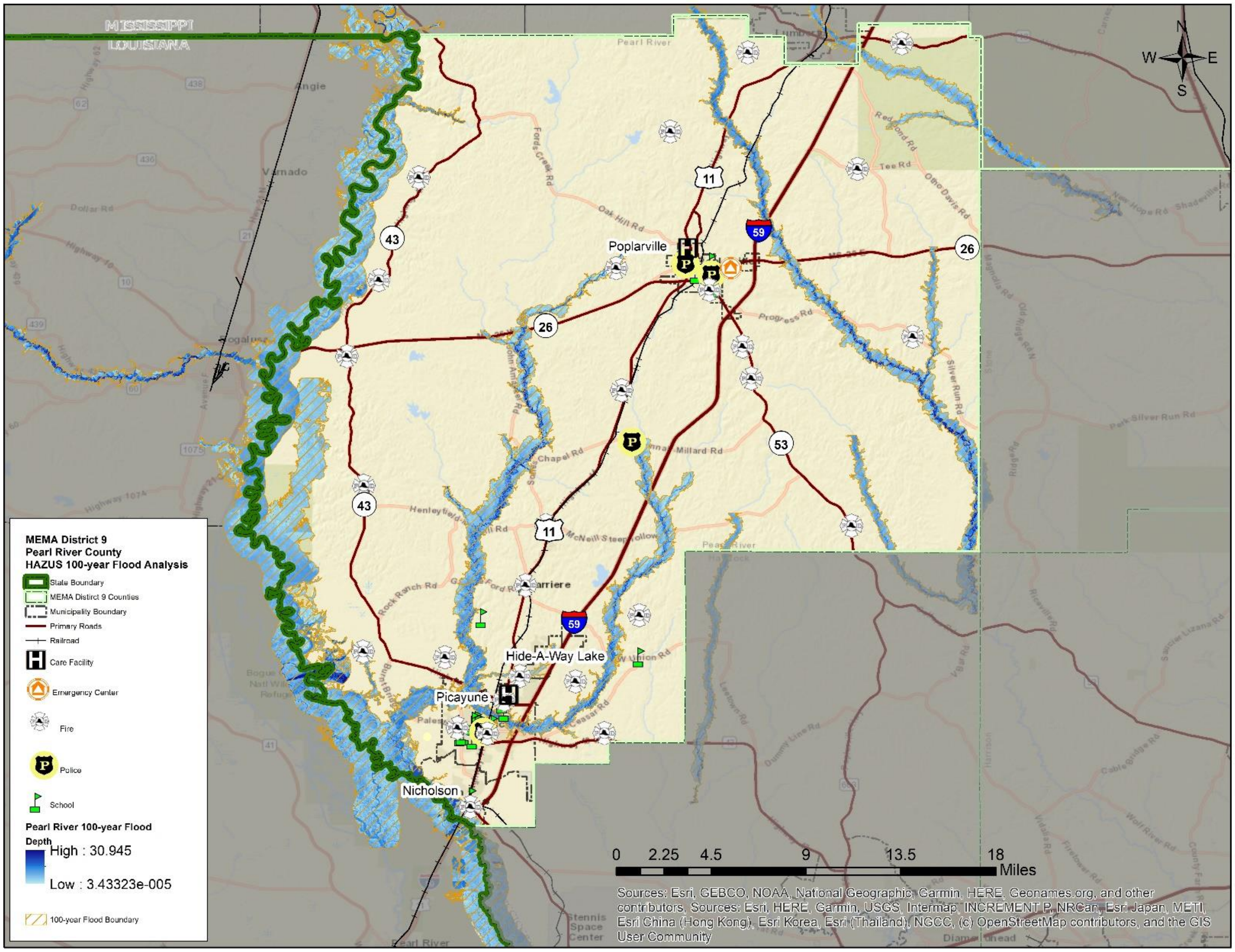


Figure E.10: HAZUS 100-Year Flood Analysis (Facilities)



HISTORICAL OCCURRENCES

Floods were at least partially responsible for six disaster declarations in Pearl River County in 1974, 1983, 1991, 1995, 2003, and 2016. Information from the National Center for Environmental Information was used to ascertain additional historical flood events. The National Center for Environmental Information reported a total of 22 events in Pearl River County since 1997. These events accounted for over $4.4 million in property damage in the county. Based on recorded historic events by NCEI, Pear River County has experienced up to 15'' of rainfall from single event causing widespread flooding throughout the county including rd. closures, flooded homes and bridge washouts, specific water depths were not reported for the county and jurisdictions, based on damage estimates flood depths range from a few inches to feet of water within floodways, for specific flood depths additional analyses is required through hydrologic and hydraulic studies. A summary of these events is presented in Table E.12. Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in Table E.13.

TABLE E.12: SUMMARY OF FLOOD OCCURRENCES IN PEARL RIVER COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2016)	Annualized Property Losses
Picayune	2	0/0	$31,876	$1,275
Poplarville	2	0/0	$100,000	$4,000

Unincorporated Area	18	0/0	$4,331,047	$173,242
PEARL RIVER COUNTY TOTAL	20	0/0	$4,462,923	$178,517

Source: National Center for Environmental Information

TABLE E.13: HISTORICAL FLOOD EVENTS IN PEARL RIVER COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Picayune				
PICAYUNE	4/25/2004	Flash Flood	0/0	$31,876
PICAYUNE	3/21/2012	Flash Flood	0/0	$0
Poplarville				
POPLARVILLE	5/21/1997	Flood	0/0	$0
POPLARVILLE	5/11/2019	Flood	0/0	$100,000
Unincorporated Area				
PINE GROVE	2/25/1997	Flood	0/0	$0
COUNTYWIDE	1/7/1998	Flash Flood	0/0	$147,763
COUNTYWIDE	3/3/2001	Flash Flood	0/0	$13,600
COUNTYWIDE	6/11/2001	Flood	0/0	$0
COUNTYWIDE	9/26/2002	Flash Flood	0/0	$0
COUNTYWIDE	6/30/2003	Flash Flood	0/0	$654,492
PEARL RIVER (ZONE)	7/1/2003	Flood	0/0	$654,492
COUNTYWIDE	4/1/2005	Flash Flood	0/0	$30,831
PEARL RIVER (ZONE)	4/1/2005	Flood	0/0	$30,831
MILL CREEK	10/22/2007	Flash Flood	0/0	$0
TYLER	10/23/2007	Flood	0/0	$0
NICHOLSON	6/10/2012	Flash Flood	0/0	$0
NICHOLSON	8/29/2012	Flash Flood	0/0	$1,049,039
OZONA	4/14/2015	Flash Flood	0/0	$0
NICHOLSON	4/14/2015	Flash Flood	0/0	$0
CYBUR	3/10/2016	Flash Flood	0/0	$500,000
NICHOLSON	3/11/2016	Flood	0/0	$500,000
WHITE SANDS	5/11/2019	Flash Flood	0/0	$750,000
NICHOLSON	4/10/2021	Flash Flood	0/0	$0

Source: National Center for Environmental Information

HISTORICAL SUMMARY OF INSURED FLOOD LOSSES

According to FEMA flood insurance policy records as of October 2016, there have been 568 flood losses reported in Pearl River County through the National Flood Insurance Program (NFIP) since 1978, totaling almost $13.5 million in claims payments. A summary of these figures for the county is provided in Table E148. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Pearl River County were either uninsured, denied claims payment, or not reported.

TABLE E.14: SUMMARY OF INSURED FLOOD LOSSES IN PEARL RIVER COUNTY

Location	Number of Policies	Flood Losses	Claims Payments
Picayune	255	194	$3,579,191

Poplarville	2	0	$0
Unincorporated Area	732	374	$9,905,285
PEARL RIVER COUNTY TOTAL	989	568	$13,484,478

Source: National Flood Insurance Program

REPETITIVE LOSS PROPERTIES

According to the Mississippi Emergency Management Agency, there are 69 non-mitigated repetitive loss properties located in Pearl River County, which accounted for 219 losses and almost $4.4 million in claims payments under the NFIP. The average claim amount for these properties is $19,945. Of the 69 properties, 66 are residential and 3 are non-residential. Without mitigation, these properties will likely continue to experience flood losses. Table E.15 presents detailed information on repetitive loss properties and NFIP claims and policies for Pearl River County.

During the 2022 HMP update process updated NFIP/Repetitive Loss data was requested; however, no new data was made available. The 2016 data is considered the best available data for the plan update. With a lack of data provided via FEMA the National Resource Defense Council (NRDC) was utilized to provide unofficial NFIP/RL data. Based on data available via the (NRDC), Pearl River County has experienced a total of 765 NFIP claims totaling $15,723,136 in payments. The total number of SRL properties is 18 totaling 2,310,224 claim payments.
[Losing Ground: Severe Repetitive Flooding in the United States (nrdc.org)]

TABLE E.15: REPETITIVE LOSS PROPERTIES IN PEARL RIVER COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Picayune	30	26 single family; 1 2-4 family; 1 other residential; 2 other non-residential	88	$1,285,638	$302,289	$1,587,927	$18,045
Poplarville	0	--	0	$0	$0	$0	$0

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Unincorporated Area*	39	38 residential; 1 commercial	131	--	--	$2,779,983	$21,221
PEARL RIVER COUNTY TOTAL	69		219			$4,367,910	$19,945

*The information provided by the county for the unincorporated area did not include specific building types, building payments, or content payments information.
Source: Federal Emergency Management Agency, National Flood Insurance Program

PROBABILITY OF FUTURE OCCURRENCES

Flood events will remain a threat in Pearl River County, and the probability of future occurrences will remain highly likely (100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figure above, which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain). Further, as described in other hazard profiles, it is highly likely that Pearl River County will continue to experience inland flooding associated with large tropical storms and hurricanes.

It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county. For example, the western portion of the county has more floodplain and thus a higher risk of flood than the rest of the county. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

It should also be noted that anticipated sea level rise will increase the probability and intensity of future tidal flooding events in years to come. Rising sea level over time will shorten the return period (increasing the frequency) of significant flood events. This hazard is discussed elsewhere in this section.

FEMA NRI Expected Annual Loss Estimates

Table E.16: Pearl River County Expected Annual Loss Table

PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR FLOODING EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.8 events/year	0.03	$394,515	$259,934	$3,252	$657,701	61.5	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table E.17: Pearl River County Hazard Specific Risk Index Table

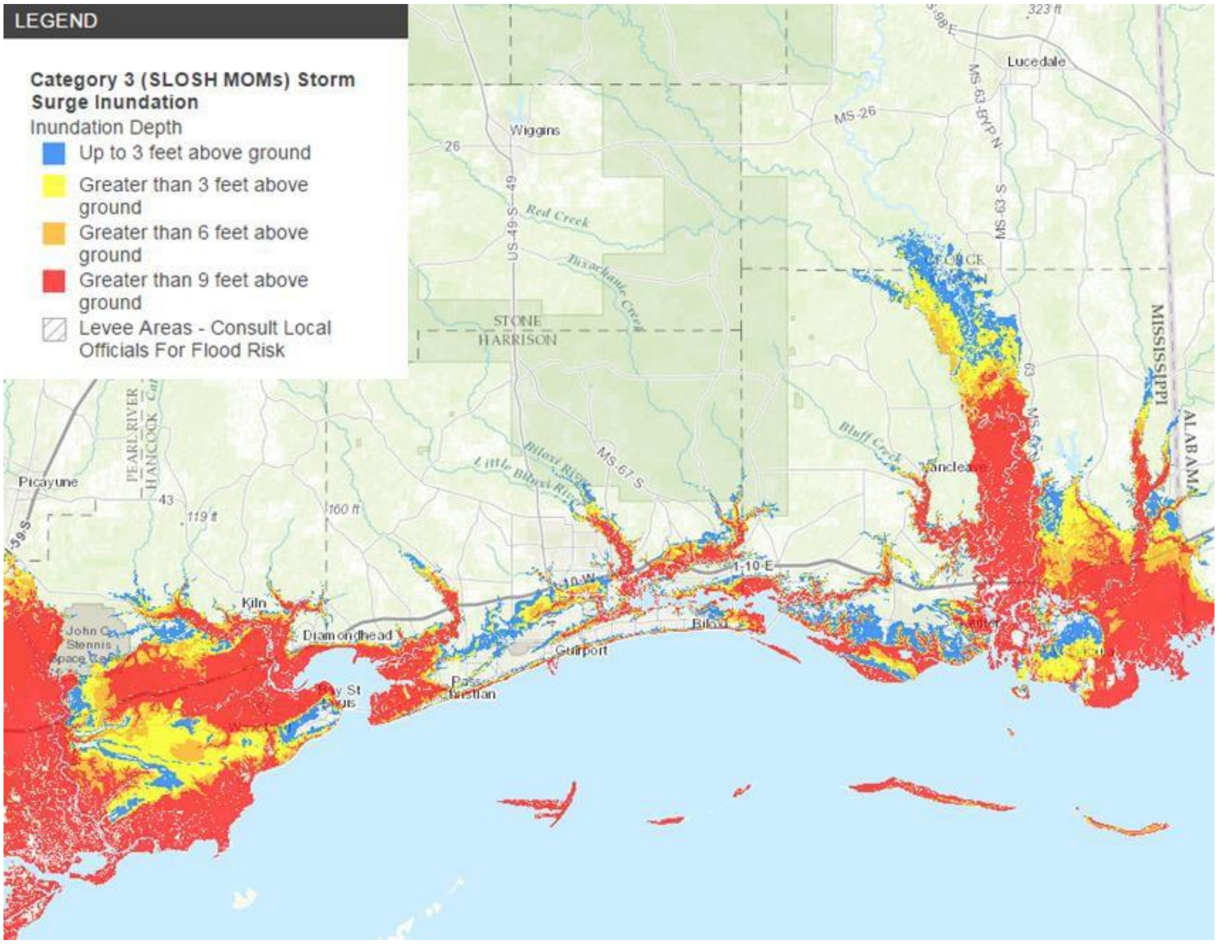
PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX –FLOODING	
Risk Index Score	Risk Index Rating
61.7/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Storm Surge

LOCATION AND SPATIAL EXTENT

There is a small area in Pearl River County that is subject to potential storm surge inundation as modeled and mapped by the National Oceanic and Atmospheric Administration (NOAA). Figure E.11 illustrates hurricane storm surge inundation zones based on a Category 3 storm. The illustration is derived from geo-referenced SLOSH (Sea, Lake, and Overland Surge from Hurricanes) data produced by the USACE in coordination with NOAA. SLOSH is a modeling tool used to estimate storm surge for coastal areas resulting from historical, hypothetical, or predicted hurricanes taking into account maximum expected levels for pressure, size, forward speed, track, and winds. Therefore, the SLOSH data is best used for defining the potential maximum surge associated with various storm intensities for any particular location. As shown in the figure, a small area in southern Pearl River County is at risk to storm surge inundation. Inland areas may also experience substantial flooding during a storm event.

FIGURE E.11: STORM SURGE RISK AREAS IN THE MEMA DISTRICT 9 REGION



Source: NOAA

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, no storm surge events have been reported for Pearl River County since 1996. A summary of these events is presented in Table E.18. Detailed information on the recorded storm surge events can be found in Table E.19.

TABLE E.18: SUMMARY OF STORM SURGE EVENTS IN PEARL RIVER COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Picayune	0	0/0	$0	$0
Poplarville	0	0/0	$0	$0

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Unincorporated Area	0	0/0	$0	$0
PEARL RIVER COUNTY TOTAL	0	0/0	$0	$0

Source: National Center for Environmental Information

TABLE E.19: HISTORICAL STORM SURGE EVENTS IN PEARL RIVER COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Picayune				
None reported	--	--	--	--
Poplarville				
None reported	--	--	--	--
Unincorporated Area				
None reported	--	--	--	--

Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

It is possible (between 1 and 10 percent annual probability) that Pearl River County will experience storm surge associated with large tropical storms, hurricanes, and squalls combined with high tides. As noted in the preceding section (under Flood), anticipated sea level rise will increase the probability and intensity of future storm surge events in years to come. This rise in sea level will not only increase the probability and intensity of tidal flooding events, but will also contribute to the loss of coastal wetlands and erosion of sand beaches that act as protective buffers against storm surge events.

FEMA NRI Expected Annual Loss Estimates

Table E.20: Pearl River County Expected Annual Loss Table

PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR COASTAL FLOODING/STORM SURGE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0 events/year	0.00	$180	$162	n/a	$342	24.6	Very Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table E.21: Pearl River County Hazard Specific Risk Index Table

PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – COASTAL FLOODING/STORM SURGE	
Risk Index Score	Risk Index Rating
22.1/100	Very Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

FIRE-RELATED HAZARDS

Drought

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that Pearl River County would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment but may exacerbate wildfire conditions.

HISTORICAL OCCURRENCES

According to the U.S. Drought Monitor, Pearl River County had drought levels of Severe or worse in 8 of the last 17 years (January 2000-October 2022). Table E.22 shows the most severe drought classification for each year, according to U.S. Drought Monitor classifications. It should be noted that the U.S. Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

TABLE E.22: HISTORICAL DROUGHT OCCURRENCES IN PEARL RIVER COUNTY

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

	Pearl River County
2000	EXCEPTIONAL
2001	MODERATE
2002	SEVERE
2003	ABNORMAL
2004	ABNORMAL
2005	ABNORMAL
2006	EXTREME
2007	MODERATE
2008	MODERATE
2009	MODERATE
2010	SEVERE
2011	EXCEPTIONAL
2012	SEVERE
2013	ABNORMAL
2014	SEVERE
2015	EXTREME
2016	ABNORMAL
2017	NONE
2018	NONE
2019	NONE
2020	NONE
2021	NONE
2022	NONE

Source: United States Drought Monitor

No anecdotal information was available from the National Center for Environmental Information on droughts in Pearl River County.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that Pearl River County has a probability level of likely (between 10 and 100 percent annual probability) for future drought events. However, the extent (or magnitude) of drought and the amount of geographic area covered by drought, varies with each year. Historic information indicates that there is a much lower probability for extreme, long-lasting drought conditions.

FEMA NRI Expected Annual Loss Estimates

Table E.23: Pearl River County Expected Annual Loss Table

PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR DROUGHT EVENTS

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
14 events/year	n/a	n/a	n/a	$33,892	$33,892	55.5	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table E.24: Pearl River County Hazard Specific Risk Index Table

PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – DROUGHT	
Risk Index Score	**Risk Index Rating**
52.8/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Lightning

LOCATION AND SPATIAL EXTENT

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Pearl River County is uniformly exposed to lightning.

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, there have been six recorded lightning events in Pearl River County since 1996. These events resulted in nearly $133,000 in damages.c Furthermore, lightning has caused one injury in the county. A summary of these events is presented in Table E.25. Detailed information on historical lightning events can be found in Table E.26.

It is certain that more than six events have impacted the county. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE E.25: SUMMARY OF LIGHTNING OCCURRENCES IN PEARL RIVER COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Picayune	3	0/0	$0	$0
Poplarville	1	0/0	$132,986	$5,115
Unincorporated Area	2	0/1	$0	$0
PEARL RIVER COUNTY TOTAL	6	0/1	$132,986	$5,115

Source: National Center for Environmental Information

TABLE E.26: HISTORICAL LIGHTNING OCCURRENCES IN PEARL RIVER COUNTY

Location	Date	Deaths/ Injuries	Property Damage*	Details
Picayune				
PICAYUNE	12/29/1996	0/0	$0	Lightning struck a utility transmission line causing a power outage over a large area. Heavy rain (5 to 6 inches) over a few hours caused several streets to flood.
PICAYUNE	8/8/2002	0/0	$0	Lightning struck a house in the North Hill subdivision.
PICAYUNE	8/5/2004	0/0	$0	Lightning strikes damaged two houses in the North Hill subdivision.
Poplarville				
POPLARVILLE	3/7/1998	0/0	$132,986	A house fire started by lightning caused extensive damage.
Unincorporated Area				
CARRIERE	5/3/1998	0/1	$0	Lightning struck a man while he was in a swimming pool.
CARRIERE	5/3/1998	0/0	$0	Pearl River County Sheriff's Office reported that a lightning strike ignited a house fire.

Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

Although there was not a high number of historical lightning events reported in Pearl River County via NCEI data, it is a regular occurrence accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN), Pearl River County is located in an area of the country that experienced an average of 4 to 12 lightning flashes per square kilometer per year between 2005 and 2014. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table E.27: Pearl River County Expected Annual Loss Table

PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR LIGHTNING EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
114.8 events/year	0.00	$57,56	$16,009	n/a	$73,57 3	44.7	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table E.28: Pearl River County Hazard Specific Risk Index Table

PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – LIGHTNING	
Risk Index Score	Risk Index Rating
43.4/100	Relatively Low

FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.*

FEMA Hazard-Type ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*

Source: FEMA National Risk Index (2023)

Wildfire

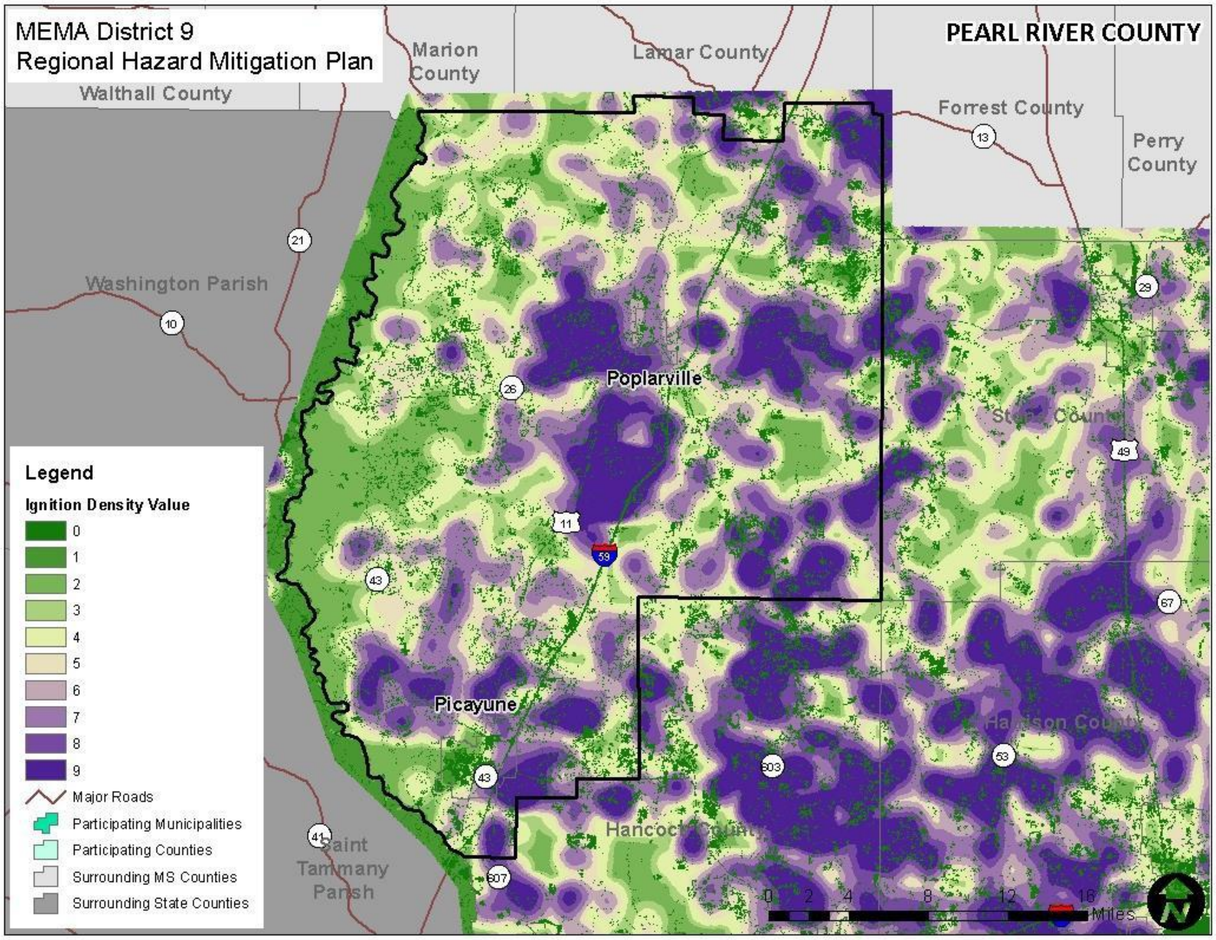
LOCATION AND SPATIAL EXTENT

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban- wildland interface are particularly susceptible to fire hazard as populations abuot formerly undeveloped areas. The Wildfire Ignition Density data shown in the figure below give an indication of historic location.

HISTORICAL OCCURRENCES

Figure E.12 shows the Wildfire Ignition Density in Pearl River County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.

FIGURE E.12: WILDFIRE IGNITION DENSITY IN PEARL RIVER COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the Mississippi Forestry Commission from 2007 to 2022, Pearl River County experiences an average of 93 wildfires annually which burn a combined 1,876 acres, on average per year.. Table E.29 provides a summary of wildfire occurrences in Pearl River County and Table E.30 lists the number of reported wildfire occurrences in the county between the years 2007 and 2022.

TABLE E.29: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2007 -2022)

	Pearl River County
Average Number of Fires per year	92.9
Average Number of Acres Burned per year	1,876
Average Number of Acres Burned per fire	23.6

Source: Mississippi Forestry Commission

TABLE E.30: HISTORICAL WILDFIRE OCCURRENCES IN PEARL RIVER COUNTY

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Pearl River County																
Number of Fires	140	111	123	95	199	61	134	127	119	81	49	25	40	43	48	91
Number of Acres Burned	2,863	2,020	1,559	2,070	4,118	630	1,442	986	1,199	2,675	2,152	453	1,098	3,031	1,150	2,574

Source: Mississippi Forestry Commission

PROBABILITY OF FUTURE OCCURRENCES

Wildfire events will be an ongoing occurrence in Pearl River County. Figure E.13 shows that there is some probability a wildfire will occur throughout the county. However, the likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Pearl River County for future wildfire events is highly likely (100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table E.31: Pearl River County Expected Annual Loss Table

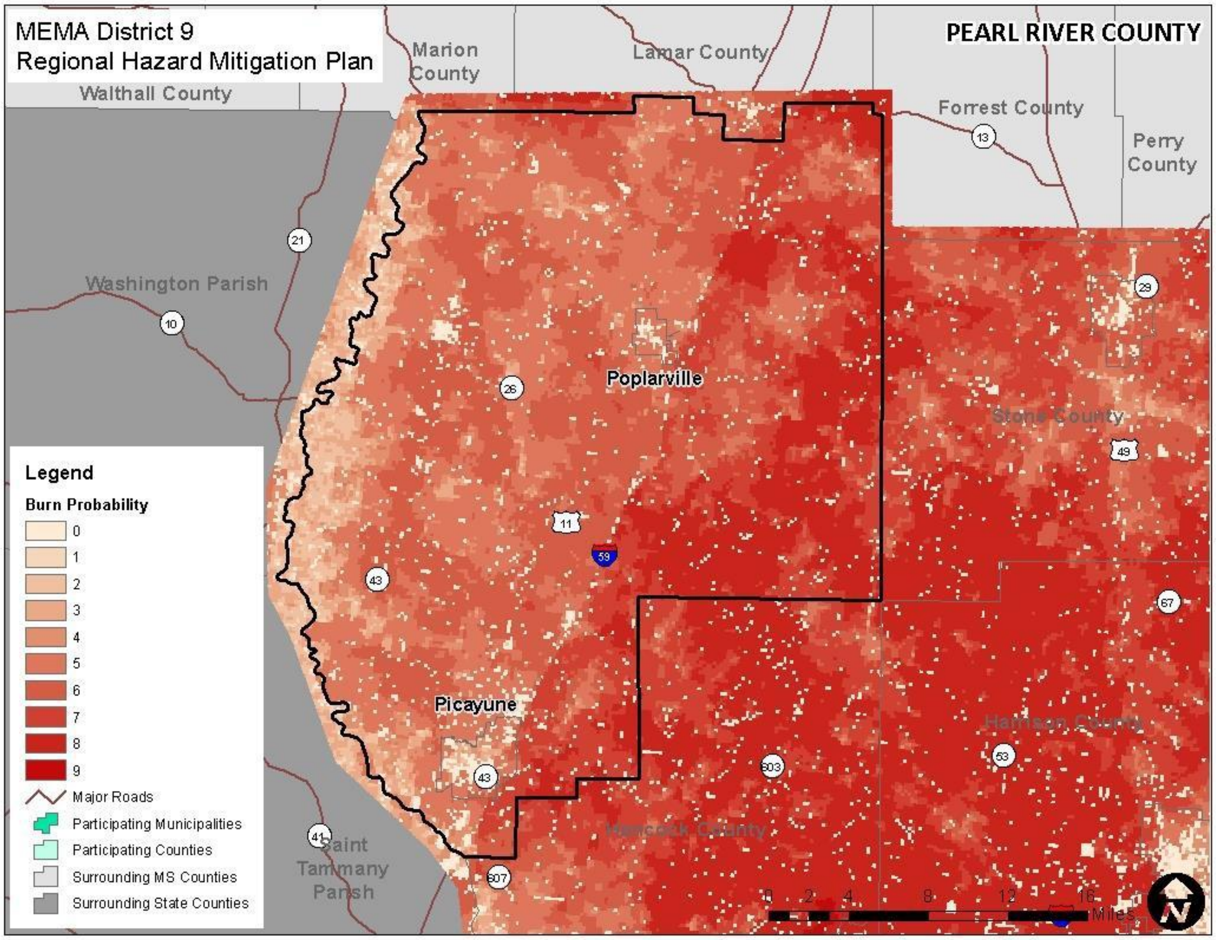
PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WILDFIRE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.331% chance/year	0.01	$155,352	$1,251,633	$97	$1,407, 081	89.7	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table E.32: Pearl River County Hazard Specific Risk Index Table

PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WILDFIRE	
Risk Index Score	Risk Index Rating
88.7/100	Relatively Moderate
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

FIGURE E.13: BURN PROBABILITY IN PEARL RIVER COUNTY



Source: Southern Wildfire Risk Assessment

Figure E.14: Wildfire Hazard Potential

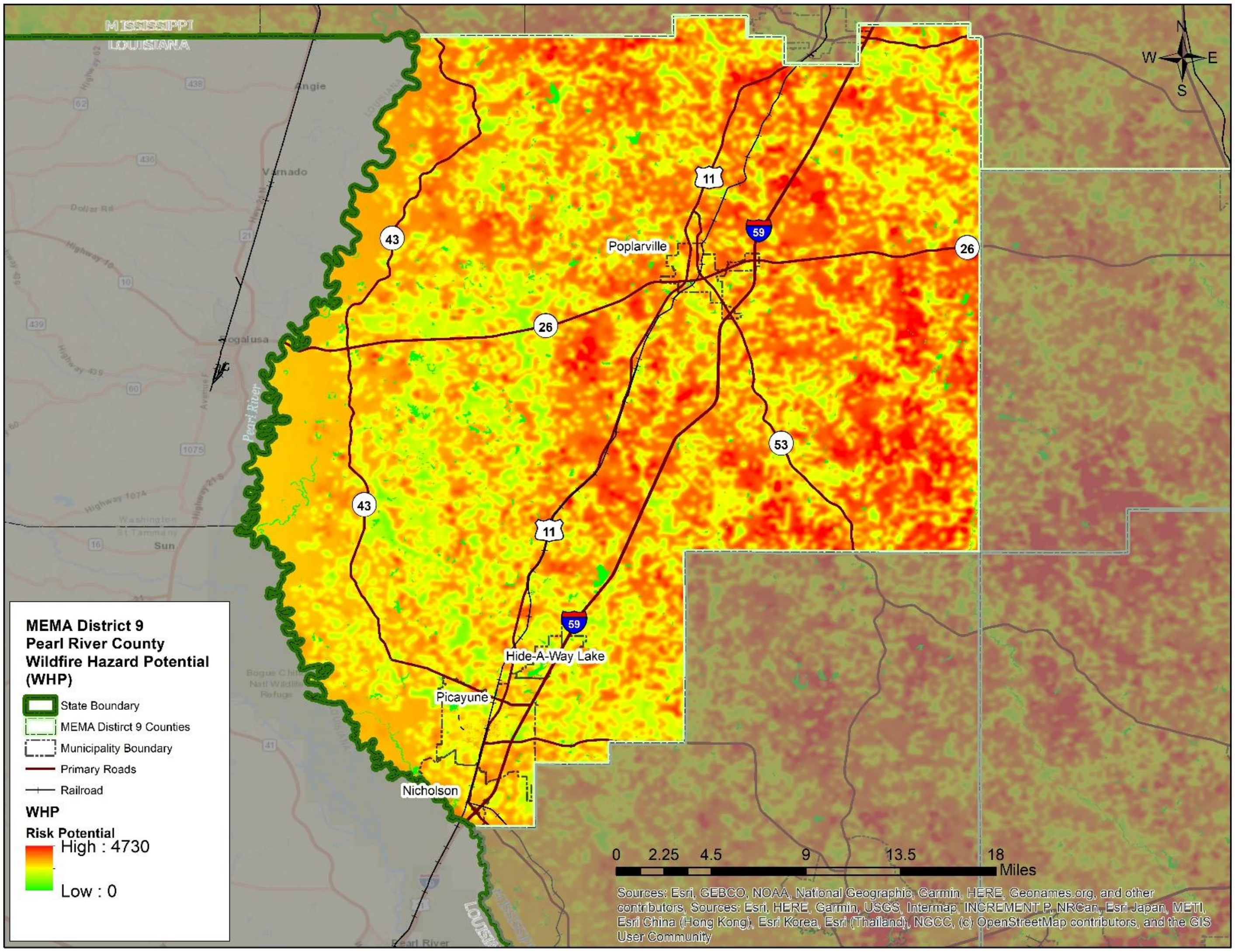
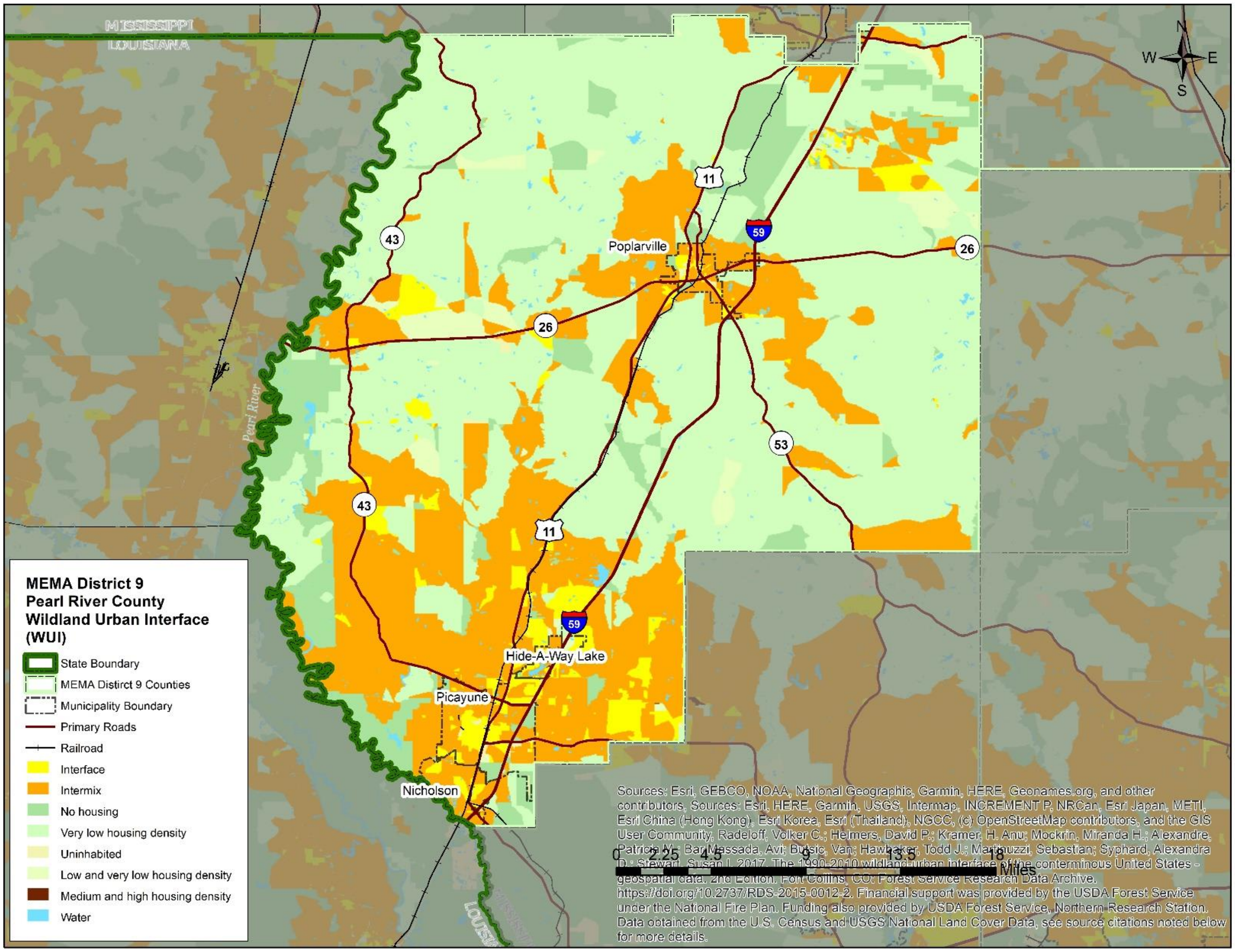


Figure E.15: Wildland Urban Interface



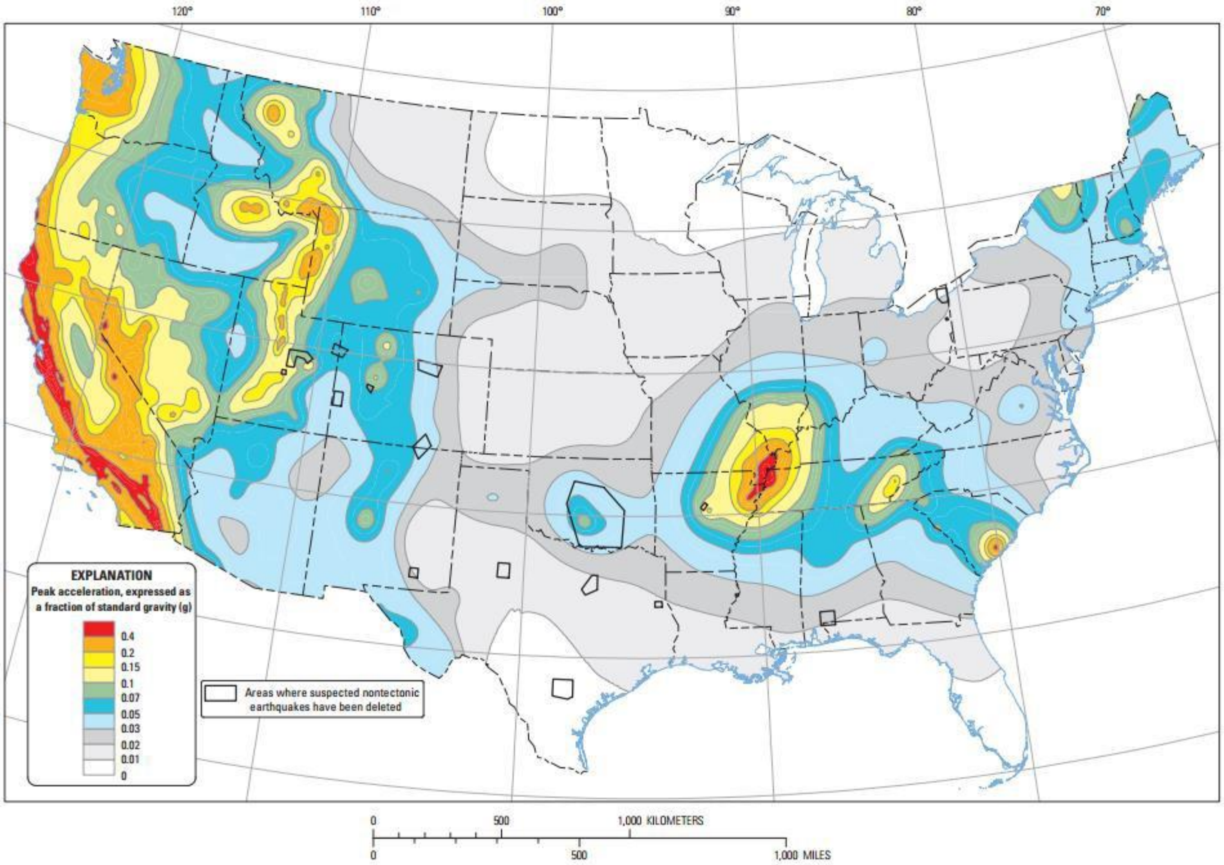
GEOLOGIC HAZARDS

Earthquake

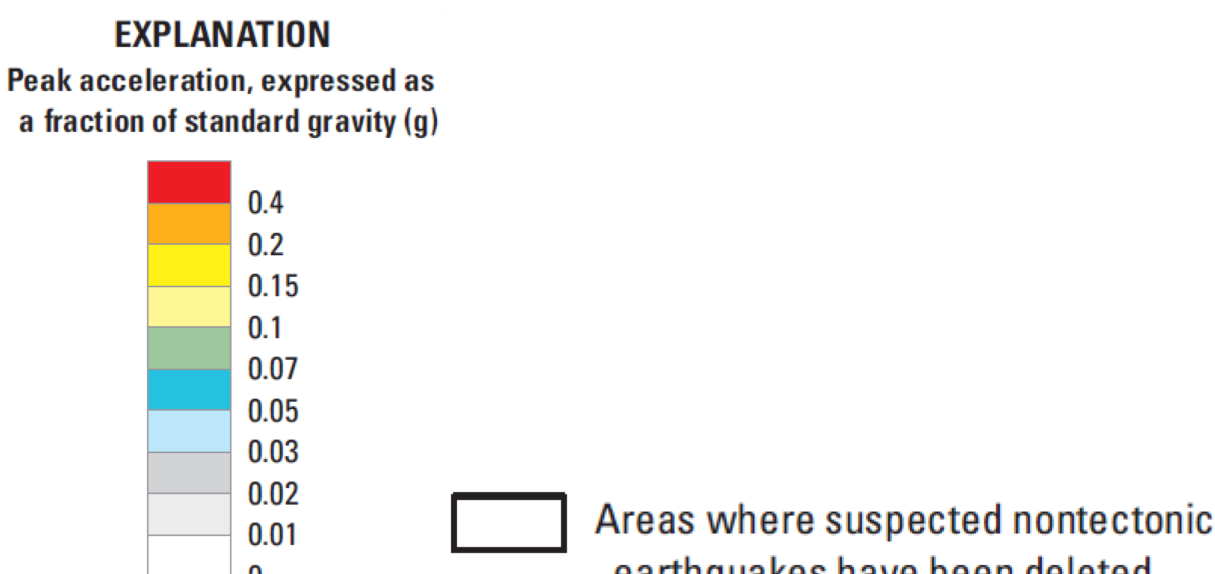
LOCATION AND SPATIAL EXTENT

Figure E.16 shows the intensity level associated with Pearl River County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Pearl River County lies within an approximate zone of level “1” to “3” ground acceleration. This indicates that the county exists within an area of low seismic risk.

FIGURE E.16: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



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



Source: United States Geological Survey, 2014

The primary source of potential damage to Pearl River County from an earthquake is the New Madrid Seismic Zone (NMSZ). Historically, a series of earthquakes in 1811 and 1812 demonstrated that this fault zone can produce high magnitude seismic events, sometimes on the scale of a 7.5-8.0 on the Richter scale. The biggest challenge with earthquakes that occur in this area of seismic activity is predicting the recurrence of earthquakes emanating from this zone. Although the magnitude of earthquakes from the NMSZ can be large, they occur very irregularly and fairly infrequently. This makes it extremely difficult to project when they will occur.

It should also be noted that the State of Mississippi Hazard Mitigation Plan identifies certain areas of concern for liquefaction and lists the counties and corresponding zones within those counties that have the highest liquefaction potential. Pearl River County does not have any identified liquefaction potential risk.

HISTORICAL OCCURRENCES

No earthquakes are known to have affected Pearl River County since 1638. Table E.33 provides a summary of earthquake events reported by the National Centers for Environmental Information (formerly National Geophysical Data Center) between 1638 and 1985, and Figure E.17 presents a map showing earthquakes whose epicenters have occurred near the county between 1985 and 2022 (no earthquakes occurred within the county boundaries during this period). A detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known) can be found in Table E.34.

TABLE E.33: SUMMARY OF SEISMIC ACTIVITY IN PEARL RIVER COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Picayune	0	--	--
Poplarville	0	--	--
Unincorporated Area	0	--	--
PEARL RIVER COUNTY TOTAL	0	--	--

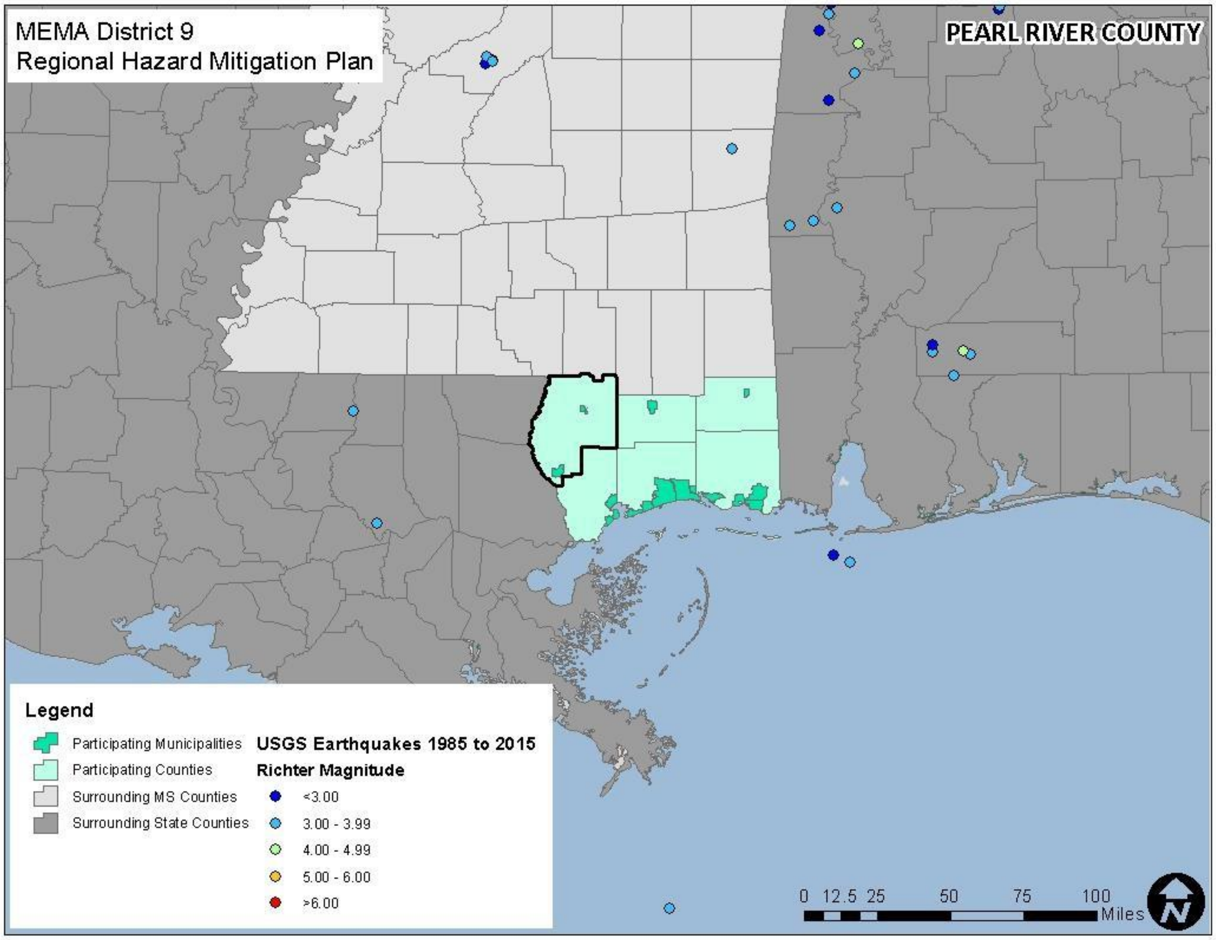
Source: National Geophysical Data Center

TABLE E.34: SIGNIFICANT SEISMIC EVENTS IN PEARL RIVER COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Picayune				
None reported	--	--	--	--
Poplarville				
None reported	--	--	--	--
Unincorporated Area				
None reported	--	--	--	--

Source: National Geophysical Data Center

FIGURE E.17: HISTORIC EARTHQUAKES WITH EPICENTERS NEAR PEARL RIVER COUNTY (1985-2022)



Source: United States Geological Survey

PROBABILITY OF FUTURE OCCURRENCES

The probability of significant, damaging earthquake events affecting Pearl River County is unlikely. However, it is possible that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated to be between 1 and 10 percent (possible).

FEMA NRI Expected Annual Loss Estimates

Table E.35: Pearl River County Expected Annual Loss Table

PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR EARTHQUAKE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.036% chance/year	0.00	$29,032	$89,796	n/a	$118,828	47.8	Very Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table E.36: Pearl River County Hazard Specific Risk Index Table

PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – EARTHQUAKE	
Risk Index Score	**Risk Index Rating**
48.8/100	Very Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

WIND-RELATED HAZARDS

Extreme Cold

Extreme cold typically impacts a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme cold conditions.

HISTORICAL OCCURRENCES

Data from the National Center for Environmental Information was used to determine historical extreme cold events in Pearl River County. Two events were reported:

February 2, 1996 – Cold/Wind Chill – An arctic airmass overspread much of south Mississippi bringing the longest extended period of cold weather since 1989. In Amite County, 4SW Gillsburg, a 67 year old man died from hypothermia on the 4th after the fire in a wood burning heater went out. Considerable property damage resulted from broken pipes due to the extended period of subfreezing temperatures. In Jackson County, Moss Point and Gautier had broken pipes in 100 and 147 houses, respectively.

December 18, 1996 – Cold/Wind Chill – An arctic airmass overspread south Mississippi resulting in three consecutive nights with subfreezing minimum temperatures. Temperatures lowered into the mid-teens over the southwest section of the state and near 20 degrees along the Gulf Coast.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of Pearl River County has a probability level of possible (between 1 and 10 percent annual probability) for future extreme cold events to impact the county.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not anticipate any losses due to extreme cold.

Extreme Heat

Heat waves typically impact a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme heat conditions.

HISTORICAL OCCURRENCES

The National Center for Environmental Information was used to determine historical heat wave occurrences in the county. No events specific to Pearl River County were reported, however, several events were reported elsewhere in the region. Similar events and impacts can be expected in Pearl River County.

July 2000 – July was a hot and dry month in Southeast Mississippi. In Beaumont the temperature was 100 degrees or higher eleven days during the month with the hottest being 105 degrees. In Richton the temperature was 100 degrees or higher three days during the month with the hottest being 102 degrees. In Waynesboro the temperature was 100 degrees or higher four days during the month with the hottest being 103 degrees. In Wiggins the temperature was 100 degrees or higher nine days during the month with 105 degrees being the hottest. In addition to being hot is was also a dry month across the area. Most stations ended up with below normal rainfall totals for the month. In Jackson County, a 68 year old man died from heat exhaustion while sitting in his pickup truck in a parking lot with the windows rolled up, and 10 days later, a 58 year old male was found dead from heat exhaustion while sitting in his truck in the driveway of his home with the windows rolled up.

August 2007 – Heat advisories were issued for a combination of high temperatures and high humidities. Heat index vales were between 110 and 115 degrees. Several public buildings and churches allowed people to come in and cool off during the heat of the day.

July 2010 – Several days of temperatures near 100 degrees contributed to two deaths from heat stroke in the Gulfport area. The Harrison County Coroner stated that two deaths in a mobile home on Smith Road near Canal Road were caused by heat stroke. High temperatures at Gulfport Airport, approximately 3 miles away, were between 98 and 102 degrees from July 29 through August 2. Bodies were discovered on August 4, but deaths occurred several days prior to that. Date of deaths was estimated.

August 2010 – Hot and humid conditions produced heat index values between 110 and 115 degrees over coastal Mississippi. A 48 year old construction worker collapsed and died while working on a highway construction project. Jackson County coroner classified the fatality as heat related with the cause of death as hyperthermia.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of Pearl River County has a probability level of highly likely (100 percent annual probability) for future heat wave events.

FEMA NRI Expected Annual Loss Estimates

Table E.37: Pearl River County Expected Annual Loss Table

PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR EXTREME HEAT EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.9 events/year	0.02	$228,248	$29	$17	$228,294	70.1	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table E.38: Pearl River County Hazard Specific Risk Index Table

PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – EXTREME HEAT	
Risk Index Score	Risk Index Rating
68.4/100	Relatively Low

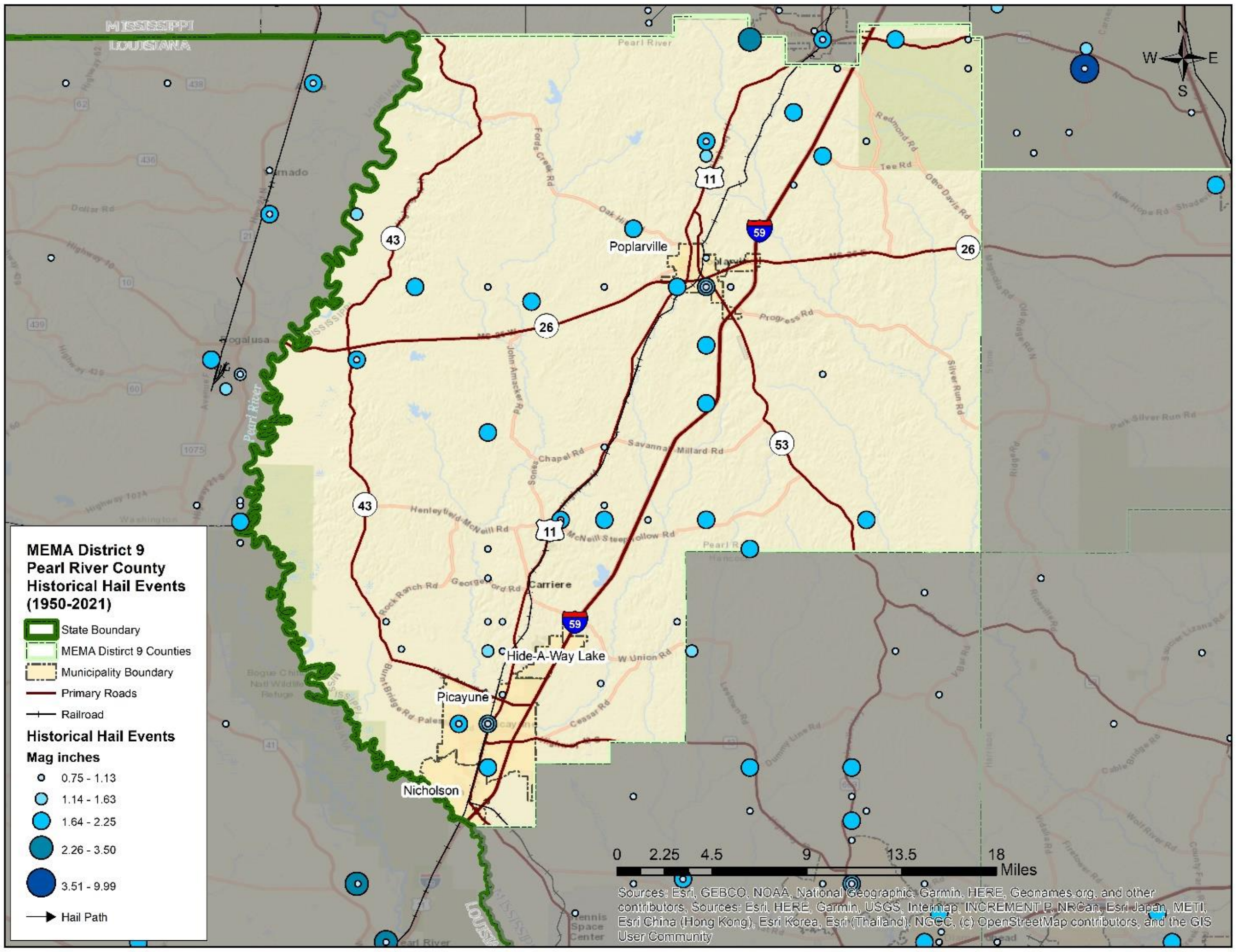
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*
Source: FEMA National Risk Index (2023)

Hailstorm

LOCATION AND SPATIAL EXTENT

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that Pearl River County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms. With that in mind, Figure E.18 shows the location of hail events that have impacted the county between 1955 and 2022.

FIGURE E.18: HAILSTORM TRACKS IN PEARL RIVER COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, 65 recorded hailstorm events have affected Pearl River County since 1968. In all, hail occurrences did not result in any property damages. Hail ranged in diameter from 0.25 inches to 2.00 inches. Table E.39 provides a summary of the hail events in Pearl River County. Detailed information about each event that occurred in the county is provided in Table E.40.

It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Center for Environmental Information. Therefore, it is likely that damages are greater than the reported value.

TABLE E.39: SUMMARY OF HAIL OCCURRENCES IN PEARL RIVER COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Picayune	13	0/0	$0	$0
Poplarville	16	0/0	$0	$0
Unincorporated Area	34	0/0	$0	$0
PEARL RIVER COUNTY TOTAL	63	0/0	$0	$0

Source: National Center for Environmental Information

TABLE E.40: HISTORICAL HAIL OCCURRENCES IN PEARL RIVER COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Picayune				
Picayune	2/11/1993	0.75 in.	0/0	$0
Picayune	3/15/1995	0.25 in.	0/0	$0
PICAYUNE	4/15/1996	1.00 in.	0/0	$0
PICAYUNE	3/29/1997	0.75 in.	0/0	$0
PICAYUNE	5/28/1997	0.88 in.	0/0	$0
PICAYUNE	8/14/1999	0.75 in.	0/0	$0
PICAYUNE	2/25/2004	0.88 in.	0/0	$0
PICAYUNE	3/31/2005	0.88 in.	0/0	$0
PICAYUNE	4/1/2005	1.75 in.	0/0	$0
PICAYUNE	8/3/2008	1.00 in.	0/0	$0
PICAYUNE	7/2/2009	0.88 in.	0/0	$0
PICAYUNE	2/07/2017	2.00 in.	0/0	$0
PICAYUNE	10/04/2019	0.75 in.	0/0	$0
Poplarville				
Poplarville	5/9/1995	0.75 in.	0/0	$0
Poplarville	11/2/1995	1.75 in.	0/0	$0
POPLARVILLE	1/8/1997	0.88 in.	0/0	$0
POPLARVILLE	7/10/1998	1.50 in.	0/0	$0
POPLARVILLE	4/24/2003	1.75 in.	0/0	$0
POPLARVILLE	4/24/2003	1.75 in.	0/0	$0
POPLARVILLE	8/20/2003	1.00 in.	0/0	$0
POPLARVILLE	3/26/2005	0.88 in.	0/0	$0
POPLARVILLE	3/31/2005	0.88 in.	0/0	$0
POPLARVILLE	4/26/2005	0.75 in.	0/0	$0
POPLARVILLE	4/26/2005	1.00 in.	0/0	$0
POPLARVILLE	6/17/2005	1.75 in.	0/0	$0
POPLARVILLE	5/8/2006	0.75 in.	0/0	$0
POPLARVILLE	5/11/2007	1.75 in.	0/0	$0
POPLARVILLE	4/15/2011	1.00 in.	0/0	$0
POPLARVILLE	3/31/2013	1.00 in.	0/0	$0
Unincorporated Area				
PEARL RIVER CO.	3/11/1968	1.50 in.	0/0	$0
PEARL RIVER CO.	3/18/1972	1.75 in.	0/0	$0

PEARL RIVER CO.	8/4/1978	1.75 in.	0/0	$0
PEARL RIVER CO.	7/1/1979	1.75 in.	0/0	$0
Location	Date	Magnitude	Deaths/Injuries	Property Damage*
PEARL RIVER CO.	7/27/1980	1.75 in.	0/0	$0
PEARL RIVER CO.	5/22/1983	1.75 in.	0/0	$0
PEARL RIVER CO.	4/15/1985	0.75 in.	0/0	$0
PEARL RIVER CO.	5/1/1985	0.88 in.	0/0	$0
PEARL RIVER CO.	6/16/1986	1.25 in.	0/0	$0
PEARL RIVER CO.	4/18/1988	0.75 in.	0/0	$0
PEARL RIVER CO.	5/10/1988	1.75 in.	0/0	$0
PEARL RIVER CO.	5/10/1988	0.75 in.	0/0	$0
PEARL RIVER CO.	5/24/1988	1.00 in.	0/0	$0
PEARL RIVER CO.	7/28/1989	0.75 in.	0/0	$0
PEARL RIVER CO.	4/19/1991	1.25 in.	0/0	$0
Crossroads	2/11/1993	1.00 in.	0/0	$0
Lumberton	3/25/1994	1.75 in.	0/0	$0
Silver Run	3/15/1995	1.75 in.	0/0	$0
CROSSROADS	3/29/1997	1.75 in.	0/0	$0
MC NEIL	11/21/1997	1.75 in.	0/0	$0
MILLARD	3/6/1999	0.75 in.	0/0	$0
MC NEIL	3/29/2000	0.75 in.	0/0	$0
CARRIERE	8/31/2000	0.88 in.	0/0	$0
CROSSROADS	2/25/2004	0.88 in.	0/0	$0
CROSSROADS	5/8/2006	0.75 in.	0/0	$0
MC NEIL	8/4/2006	0.75 in.	0/0	$0
CROSSROADS	8/5/2006	1.75 in.	0/0	$0
MC NEIL	5/12/2009	1.75 in.	0/0	$0
MC NEIL	5/13/2011	1.00 in.	0/0	$0
CAESAR	6/6/2011	1.00 in.	0/0	$0
CAESAR	6/6/2011	1.25 in.	0/0	$0
HILLSDALE	6/10/2011	1.00 in.	0/0	$0
CROSSROADS	3/29/2016	1.00 in.	0/0	$0
HILLSDALE	3/29/2016	1.50 in.	0/0	$0
CARRIERE	1/09/2022	1.25 in.	0/0	$0
Mill CREEK	5/14/2022	1.00 in.	0/0	$0

Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard, it is assumed that Pearl River County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table E.41: Pearl River County Expected Annual Loss Table

PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HAIL EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
2.6 events/year	0.00	$51,399	$184,402	$9	$235,810	70.2	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table E.42: Pearl River County Hazard Specific Risk Index Table

PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HAIL	
Risk Index Score	Risk Index Rating
69.1/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Hurricane and Tropical Storm

LOCATION AND SPATIAL EXTENT

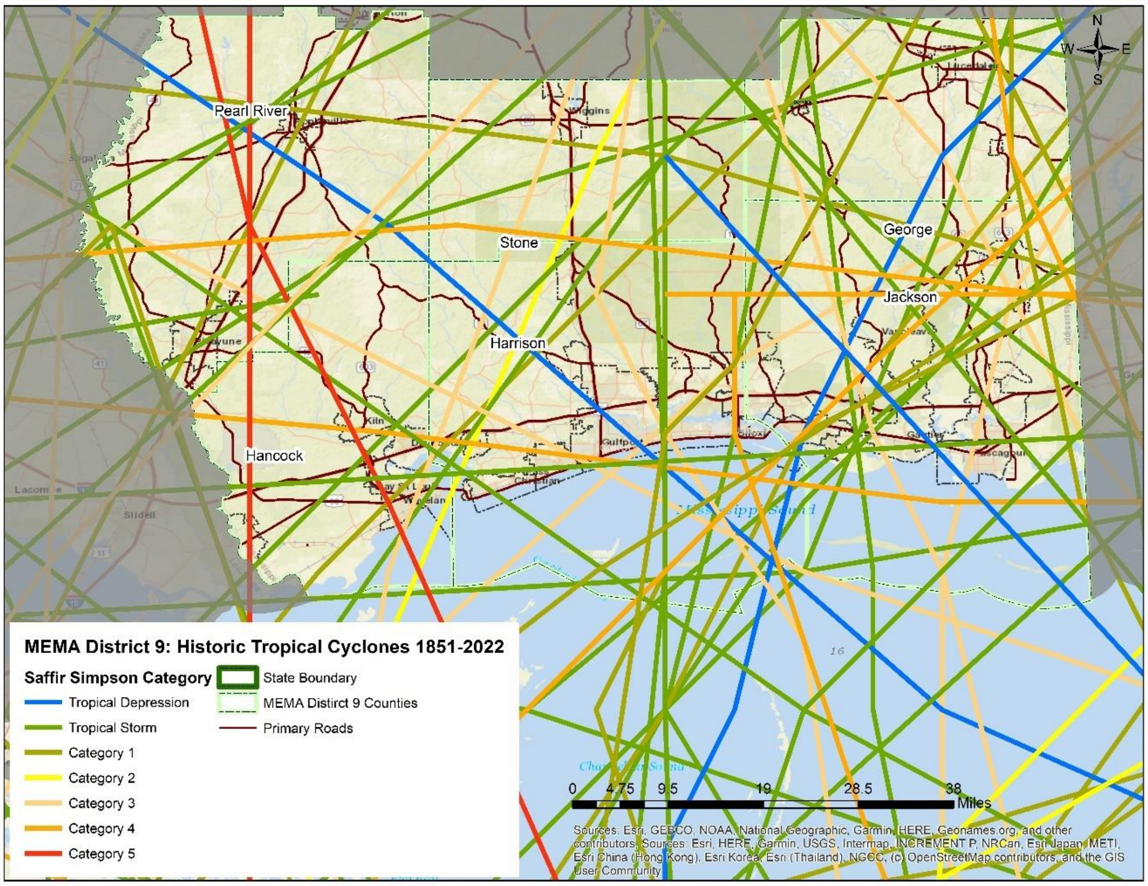
Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States, and while coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland. Pearl River County is located in a region of the country that is susceptible to all of the hazards wrought by hurricanes and tropical storms. All areas throughout Pearl River County are susceptible to the accompanying hazard effects of extreme wind, flooding, and tornadoes.

HISTORICAL OCCURRENCES

According to the National Hurricane Center's historical storm track records, 122 hurricane or tropical storm/depression tracks have passed within 100 miles of the MEMA District 9 Region since 1855. This includes: 4 Category 3 hurricanes, 16 Category 2 hurricanes, 29 Category 1 hurricanes, 30 tropical storms, and 43 tropical depressions. Additionally, four other major storms had large-scale impacts on the region and are not included in these totals. These storms are listed below and range in Category from 1 to 4.

Of the recorded storm events, 61 hurricane or tropical storm/depression events traversed directly through the region as shown in Figure E.19. Notable storms include Hurricane Camille (1969), Hurricane Frederic (1979), and Hurricane Katrina (2005). Table E.43 provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 100 miles of the MEMA District 9 Region) and category of the storm based on the Saffir-Simpson Scale.

FIGURE E.19: HISTORICAL HURRICANE STORM TRACKS WITHIN 100 MILES OF THE MEMA DISTRICT 9 REGION



Source: National Oceanic and Atmospheric Administration, National Hurricane Center

TABLE E.43: HISTORICAL STORM TRACKS WITHIN 100 MILES OF THE MEMA 9 DISTRICT REGION (1842–2022)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/25/1852	UNNAMED	93	Category 2
8/3/1855	NOT NAMED	--	Tropical Depression
9/16/1855	UNNAMED	96	Category 2
6/24/1857	NOT NAMED	--	Tropical Depression
9/15/1859	UNNAMED	79	Category 1
8/11/1860	UNNAMED	96	Category 2
9/15/1860	UNNAMED	89	Category 2

8/17/1861	NOT NAMED	--	Tropical Depression
11/1/1861	NOT NAMED	--	Tropical Depression
9/15/1862	NOT NAMED	--	Tropical Depression
9/16/1862	NOT NAMED	--	Tropical Depression
10/1/1863	UNNAMED	43	Tropical Storm

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
6/3/1866	NOT NAMED	--	Tropical Depression
9/16/1867	NOT NAMED	--	Tropical Depression
10/5/1867	UNNAMED	89	Category 2
10/3/1868	NOT NAMED	--	Tropical Depression
9/5/1869	UNNAMED	79	Category 1
7/30/1870	NOT NAMED	--	Tropical Depression
7/11/1872	UNNAMED	59	Tropical Storm
9/18/1875	UNNAMED	18	Tropical Depression
9/18/1877	UNNAMED	79	Category 1
9/1/1879	UNNAMED	89	Category 2
10/7/1879	UNNAMED	59	Tropical Storm
8/31/1880	UNNAMED	70	Category 1
8/2/1881	NOT NAMED	--	Tropical Depression
8/3/1881	UNNAMED	59	Tropical Storm
8/30/1885	UNNAMED	59	Tropical Storm
9/26/1885	UNNAMED	70	Category 1
6/15/1886	UNNAMED	50	Tropical Storm
6/14/1887	UNNAMED	33	Tropical Depression
10/19/1887	UNNAMED	82	Category 1
6/27/1888	NOT NAMED	--	Tropical Depression
9/23/1889	UNNAMED	79	Category 1
8/27/1890	UNNAMED	43	Tropical Storm
9/21/1891	NOT NAMED	--	Tropical Depression
9/12/1892	UNNAMED	59	Tropical Storm
9/7/1893	UNNAMED	79	Category 1
10/2/1893	UNNAMED	97	Category 3
8/7/1894	UNNAMED	59	Tropical Storm
8/15/1895	UNNAMED	59	Tropical Storm
9/13/1900	UNNAMED	43	Tropical Storm
8/14/1901	UNNAMED	82	Category 1
10/9/1905	UNNAMED	43	Tropical Storm
9/27/1906	UNNAMED	93	Category 2
9/21/1907	UNNAMED	43	Tropical Storm
8/11/1911	UNNAMED	79	Category 1
6/13/1912	UNNAMED	59	Tropical Storm
7/17/1912	UNNAMED	5	Tropical Depression
9/13/1912	UNNAMED	82	Category 1
9/18/1914	UNNAMED	33	Tropical Depression
9/29/1915	UNNAMED	96	Category 2
7/5/1916	UNNAMED	95	Category 2
10/17/1922	UNNAMED	18	Tropical Depression

6/26/1923	UNNAMED	43	Tropical Storm
10/17/1923	UNNAMED	59	Tropical Storm
9/20/1926	UNNAMED	93	Category 2
9/1/1932	UNNAMED	82	Category 1
10/15/1932	UNNAMED	59	Tropical Storm

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
7/27/1936	UNNAMED	43	Tropical Depression
8/22/1936	UNNAMED	5	Tropical Depression
6/16/1939	UNNAMED	59	Tropical Storm
9/26/1939	UNNAMED	50	Tropical Depression
9/24/1940	UNNAMED	18	Tropical Depression
9/10/1944	UNNAMED	64	Category 1
9/5/1945	UNNAMED	18	Tropical Depression
9/19/1947	UNNAMED	92	Category 2
9/4/1948	UNNAMED	79	Category 1
9/4/1949	UNNAMED	43	Tropical Storm
8/31/1950	BAKER	82	Category 1
8/1/1955	BRENDA	70	Category 1
8/27/1955	UNNAMED	50	Tropical Storm
9/24/1956	FLOSSY	82	Category 1
9/18/1957	ESTHER	64	Category 1
10/8/1959	IRENE	43	Tropical Storm
9/15/1960	ETHEL	85	Category 2
9/26/1960	FLORENCE	1	Tropical Depression
10/4/1964	HILDA	70	Category 1
9/10/1965	BETSY	117	Category 4
9/29/1965	DEBBIE	33	Tropical Depression
8/18/1969	CAMILE	100	Category 3
8/8/1971	UNNAMED	5	Tropical Depression
9/4/1971	FERN	5	Tropical Depression
9/16/1971	EDITH	70	Category 1
7/29/1975	UNNAMED	18	Tropical Depression
10/17/1975	UNNAMED	5	Tropical Depression
9/24/1976	UNNAMED	5	Tropical Depression
7/19/1977	UNNAMED	18	Tropical Depression
9/6/1977	BABE	18	Tropical Depression
10/25/1977	UNNAMED	18	Tropical Depression
8/10/1978	UNNAMED	5	Tropical Depression
7/11/1979	BOB	74	Category 1
9/12/1979	FREDERIC	97	Category 3
7/20/1980	UNNAMED	5	Tropical Depression
10/27/1984	UNNAMED	18	Tropical Depression
9/2/1985	ELENA	95	Category 2

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
10/31/1985	JUAN	64	Category 1
8/12/1987	UNNAMED	5	Tropical Depression
8/8/1988	BERYL	5	Tropical Depression
8/9/1988	BERYL	50	Tropical Storm
9/10/1988	FLORENCE	79	Category 1
8/3/1995	ERIN	82	Category 1
7/19/1997	DANNY	79	Category 1
9/27/1998	GEORGES	92	Category 2
9/20/1998	HERMINE	33	Tropical Depression
6/11/2001	ALLISON	43	Tropical Storm
8/5/2002	BERTHA	33	Tropical Depression
9/14/2002	HANNA	59	Tropical Storm
9/26/2002	ISIDORE	64	Category 1
6/30/2003	BILL	59	Tropical Storm
7/1/2003	BILL	18	Tropical Depression
9/16/2004	IVAN	96	Category 2
6/11/2005	ARLENE	59	Tropical Storm
7/6/2005	CINDY	74	Category 1
7/10/2005	DENNIS*	100	Category 3
8/29/2005	KATRINA	98	Category 3
9/22/2007	TEN	5	Tropical Depression
8/24/2008	FAY	18	Tropical Depression
9/1/2008	GUSTAV*	87	Category 2
11/10/2009	IDA	70	Category 1
7/25/2010	BONNIE	5	Tropical Depression
8/12/2010	FIVE	5	Tropical Depression
9/5/2011	LEE	43	Tropical Storm
8/28/2012	ISAAC*	70	Category 1
10/07/2017	Nate	85	Category 1
9/04/2018	Gordon	70	Tropical Storm
10/28/2020	Zeta	110	Category 2

*It should be noted that the track of several major hurricanes that impacted the region fell outside of the 100-mile buffer. These storms were included in the table due to their significant impact (Betsy, 1965; Dennis, 2005; Gustav, 2008; and Isaac, 2012), but it should be noted that wind speed and storm category are estimated based on anecdotal information.

Source: National Hurricane Center

Federal records indicate that 12 disaster declarations were made in 1965 (Hurricane Betsy), 1969 (Hurricane Camille), 1979 (Hurricane Frederic), 1985 (Hurricane Elena), 1998 (Hurricane Georges), 2001 (Tropical Storm Allison), 2002 (Tropical Storm Isidore), 2004 (Hurricane Ivan), 2005 (Hurricane Dennis and Hurricane Katrina), 2008 (Hurricane Gustav), 2012 (Hurricane Isaac) 2017 (Hurricane Nate) and 2021 (Hurricane Ida). Hurricane and tropical storm events can cause substantial damage in the area due to high winds and flooding.

Flooding and high winds from hurricanes and tropical storms can cause damage throughout the county. Anecdotes are available from NCEI for the major storms that have impacted the county as found below:

Hurricane Georges – September 25-29, 1998

Hurricane Georges, a strong Category 2 hurricane moved slowly northwest across the Gulf of Mexico toward southeast Louisiana and coastal Mississippi on the September 25 and September 26. As the hurricane approached the mouth of the Mississippi River on September 27, it slowly turned toward the north making landfall along the Mississippi Coast just to the east of Biloxi, MS at 0400 CST on September
28. The hurricane moved only slowly north during the morning hours, at times becoming nearly stationary. The hurricane finally was downgraded to a tropical storm at 1500CST on September 28 when it was located north of Biloxi. The tropical storm then moved very slowly eastward into southern Alabama on September 29.

The greatest affect from the hurricane occurred over Jackson County which experienced the intense eastern portion of the hurricanes eyewall and highest storm surge.

Due to the slow forward speed of the hurricane very heavy rainfall occurred over eastern Harrison County and Jackson County leading to record flooding on streams and rivers. The barrier islands in the Mississippi Sound were also heavily damaged by wind and storm surge. A new three quarter mile cut developed in the east portion of Ship Island. Total insured property damage in Mississippi was estimated at near 310 million dollars by insurance industry sources. When uninsured losses and public property damage considered, total damages in Mississippi will likely approach $620 million.

Pearl River County - Damage was mainly confined to downed tree limbs and trees, minor to moderate roof damage to homes and businesses, and power outages from downed power lines. Several secondary highways and roadways in the county were blocked by fallen trees. Storm total rainfall was fairly light with amounts of 2 to 4 inches common. About 200 people were sheltered in public hurricane evacuations shelters in the county.

Hurricane Katrina – August 24-30, 2005

Hurricane Katrina was one of the strongest and most destructive hurricanes on record to impact the coast of the United States. It will likely be recorded as one the worst natural disaster in the history of the United States to date resulting in catastrophic damage and numerous casualties in southeast Louisiana and along the Mississippi coast. Damage and casualties resulting from Hurricane Katrina extended as far east as Alabama and the panhandle of Florida. Katrina developed from a tropical depression southeast of the Bahamas on August 24th. After moving through the Bahamas as a tropical storm, Katrina strengthened to a category 1 hurricane prior to landfall in south Florida around the Miami area on the 25th of August. Katrina crossed south Florida and entered the Gulf of Mexico and began to strengthen. Hurricane Katrina strengthened to a category 5 storm on August 28th about 250 miles south southeast of the mouth of the Mississippi River with winds reaching their peak intensity of 175 mph and a central pressure of 902 mb. Post event analysis by the National Hurricane Center indicates that Katrina weakened slightly before making landfall as a strong category 3 storm in initial landfall in lower Plaquemines Parish. Maximum sustained winds were estimated at 110 knots or 127 mph and a central pressure of 920 mb around 610 AM CDT on August 29th in southeast Louisiana just south of Buras in Plaquemines Parish. The storm continued on a north northeast track with the center passing about 40 miles southeast of New Orleans with a second landfall occurring near the Louisiana and Mississippi border around 945 AM CDT as a category 3 storm with maximum sustained winds estimated around 105 knots or 121 mph. Katrina continued to weaken as it moved north northeast across Mississippi during the day, but remained at hurricane strength 100 miles inland near Laurel, Mississippi. Katrina weakened to a tropical depression near Clarksville, Tennessee on August 30th.

Damage across coastal Mississippi was catastrophic. The storm surge associated with Hurricane Katrina approached or exceeded the surge associated with Hurricane Camille and impacted a much more extensive area. Almost total destruction was observed along the immediate coast in Hancock and Harrison Counties with storm surge damage extending north along bays and bayous to Interstate 10. Thousands of homes and businesses were destroyed by the storm surge. Hurricane force winds also caused damage to roofs, power lines, signage, downed trees, and some windows were broken by wind and wind driven debris in areas away from storm surge flooding, wind damage was widespread with fallen trees taking a heavy toll on houses and power lines. Damage was less extensive in southwest Mississippi. Excluding losses covered by the Federal Flood Insurance Program, insured property losses in Mississippi were estimated at 9.8 billion dollars. Uninsured and insured losses combined were estimated to exceed 100 billion dollars across the Gulf Coast.

Due to the failure of power and equipment prior to the peak of the storm, data for wind, storm surge, pressure, and rainfall are incomplete. The lowest pressure on the Mississippi coast was estimated to be 928 mb where the hurricane made landfall near the Louisiana Mississippi border. A pressure of 976 mb was recorded at 0951 CDT by a university weather station deployed in Pascagoula, well east of the landfall location. At approximately the same time, the pressure at the NWS office in Slidell, just to the west of landfall location, recorded a pressure of 934.1 mb at 0938 AM CDT.

The highest wind gusts recorded in Mississippi and the adjacent coastal waters were 117 knots (134 mph) at the Pearl River County EOC office in Poplarville and 102 knots (118 mph) at 1000AM CDT by a university wind tower deployed at the Stennis Space Center in Hancock County. Maximum sustained winds in Mississippi were estimated around 105 knots (121 mph) near the storm's second landfall along the Mississippi and Louisiana border. Unofficial wind observations before the gage failed included a wind gust of 106 kt, (122 mph) at 0615 CDT by an amateur radio operator in Long Beach and a wind gust of 108 kt (124 mph) at the EOC in Pascagoula.

Storm total rainfall amounts generally ranged from 10 to 16 inches across coastal and south Mississippi with much lower amounts observed over southwest Mississippi. The highest observed storm total rainfall was 11 inches at Stennis Space Center and near Picayune.

PROBABILITY OF FUTURE OCCURRENCES

According to NOAA statistical data, the region is located in an area with an annual probability of a named storm between 30 and 42 percent as presented in Figure E.20. This illustration was created by the National Oceanic and Atmospheric Administration’s Hurricane Research Division using data from 1944 to 1999 and counting hits when a storm or hurricane was within approximately 100 miles (165 km) of each location. As a reference point, the tip of Florida’s outline can be found near the 25N, 80W intersection, and the MEMA District 9 Region is near the 30N, 90W intersection. This empirical probability is fairly consistent with other scientific studies and observed historical data made available through a variety of federal, state, and local sources.

FEMA NRI Expected Annual Loss Estimates

Table E.44: Pearl River County Expected Annual Loss Table

PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HURRICANE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.2 events/year	0.10	$1,119,869	$31,425,351	$254,624	$32,79 9,844	94.7	Relatively Moderate

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

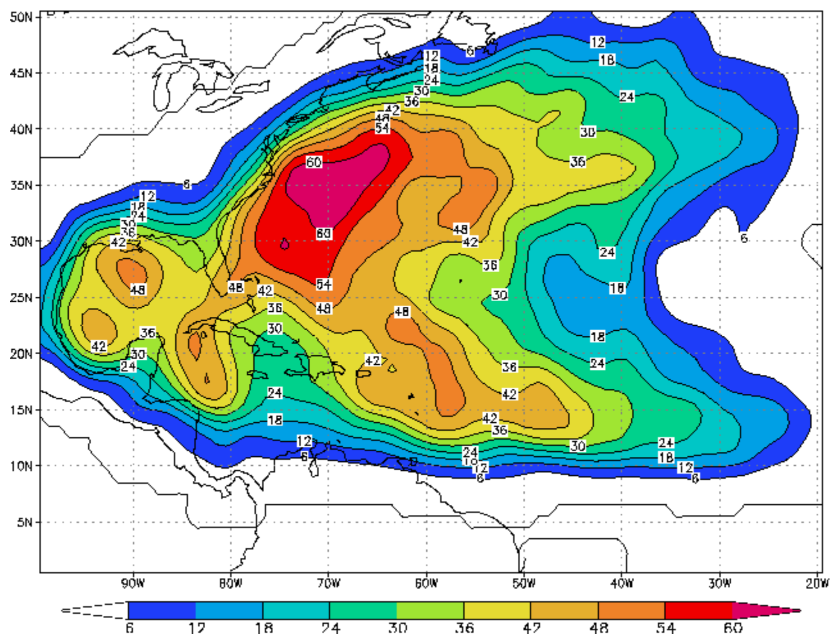
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table E.45: Pearl River County Hazard Specific Risk Index Table

PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HURRICANE	
Risk Index Score	Risk Index Rating
94.9/100	Relatively Moderate
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

FIGURE E.20: EMPIRICAL PROBABILITY OF A NAMED HURRICANE OR TROPICAL STORM



Source: National Oceanic and Atmospheric Administration

The probability of storm occurrences will vary significantly based on the return interval for different categories of magnitude. The probability of less intense storms (lower return periods) is higher than more intense storms (higher return periods). Table E.46 profiles the potential peak gust wind speeds that can be expected in the MEMA District 9 Region during a hurricane event for various return periods according to FEMA's HAZUS-MH®.

TABLE E.46: POTENTIAL PEAK GUST WIND SPEEDS PER RETURN PERIOD

50-Year	100-Year	500-Year	1,000-Year

119.4 mph	133.9 mph	160.3 mph	170.0

Source: Federal Emergency Management Agency (Hazus-MH 3.2)

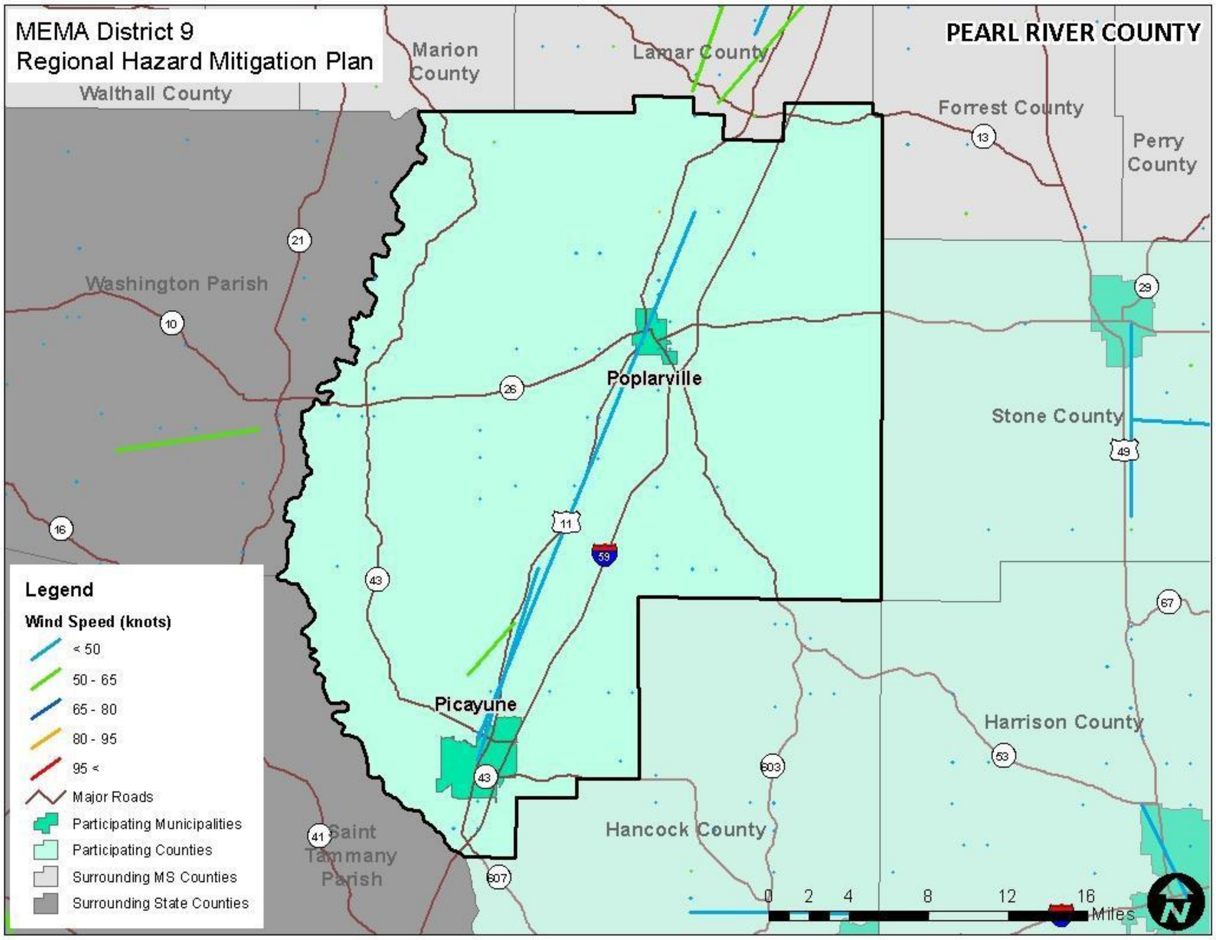
Overall, the probability level of future hurricane and tropical storm occurrence for Pearl River County is highly likely (100 percent annual probability).

Severe Thunderstorm/High Wind

LOCATION AND SPATIAL EXTENT

A thunderstorm event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. It is assumed that Pearl River County has uniform exposure to an event and the spatial extent of an impact could be large. With that in mind, Figure E.21 shows the location of wind events that have impacted the county between 1955 and 2015.

FIGURE E.21: SEVERE THUNDERSTORM TRACKS IN PEARL RIVER COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Severe storms were at least partially responsible for six disaster declarations in Pearl River County in 1983, 1991, 1995, 2001, 2003, and 2016. According to NCEI, there have been 156 reported thunderstorm and high wind events since 1960 in Pearl River County. These events caused over $7.4 million in damages. There were also reports of three injuries and one death. Table E.47 summarizes this information. Detailed thunderstorm and high wind event reports including date, magnitude, and associated damages for each event are presented in Table E.48.

TABLE E.47: SUMMARY OF THUNDERSTORM/HIGH WIND OCCURRENCES IN PEARL RIVER COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Picayune	22	0/2	$6,844,811	$110,400
Poplarville	38	0/1	$213,304	$3,440
Unincorporated Area	85	0/0	$349,287	$5,634
PEARL RIVER COUNTY TOTAL	145	0/3	$7,397,402	$119,474

Source: National Center for Environmental Information

TABLE E.48: HISTORICAL THUNDERSTORM/HIGH WIND OCCURRENCES IN PEARL RIVER COUNTY

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
Picayune					
PICAYUNE	1/24/1997	Thunderstorm Wind	--	0/0	$750
PICAYUNE	5/28/1997	Thunderstorm Wind	--	0/0	$1,501
PICAYUNE	7/24/1998	Thunderstorm Wind	--	0/0	$739
PICAYUNE	8/14/1999	Thunderstorm Wind	--	0/2	$72,285
PICAYUNE	7/22/2000	Thunderstorm Wind	--	0/0	$25,176
PICAYUNE	9/5/2000	Thunderstorm Wind	--	0/0	$1,399
PICAYUNE	6/11/2001	Thunderstorm Wind	--	0/0	$27,200
PICAYUNE	11/24/2001	Thunderstorm Wind	--	0/0	$1,020
PICAYUNE	8/8/2002	Thunderstorm Wind	--	0/0	$1,004
PICAYUNE	10/29/2002	Thunderstorm Wind	--	0/0	$6,694,080
PICAYUNE	12/31/2002	Thunderstorm Wind	--	0/0	$1,004
PICAYUNE	11/18/2003	Thunderstorm Wind	50 kts. EG	0/0	$654
PICAYUNE	6/2/2004	Thunderstorm Wind	50 kts. EG	0/0	$638
PICAYUNE	8/5/2004	Thunderstorm Wind	50 kts. EG	0/0	$10,200
PICAYUNE	2/2/2006	Thunderstorm Wind	50 kts. EG	0/0	$0
PICAYUNE	7/12/2007	Thunderstorm Wind	50 kts. EG	0/0	$1,742
PICAYUNE	3/27/2009	Thunderstorm Wind	50 kts. EG	0/0	$1,684
PICAYUNE	7/2/2009	Thunderstorm Wind	50 kts. EG	0/0	$1,684
PICAYUNE	3/9/2011	Thunderstorm Wind	61 kts. EG	0/0	$0
PICAYUNE	5/10/2013	Thunderstorm Wind	52 kts. EG	0/0	$1,034
PICAYUNE	4/8/2014	Thunderstorm Wind	52 kts. EG	0/0	$1,017
PICAYUNE	8/8/2015	Thunderstorm Wind	52 kts. EG	0/0	$0
PICAYUNE	3/25/2017	Thunderstorm Wind	60 kts. EG	0/0	$0
Poplarville					
Poplarville	1/27/1994	Thunderstorm Wind	0 kts.	0/0	$813
Poplarville	3/7/1995	Thunderstorm Wind	0 kts.	0/0	$3,161
Poplarville to	4/21/1995	Thunderstorm Wind	0 kts.	0/0	$0
Poplarville	8/20/1995	Thunderstorm Wind	0 kts.	0/0	$790
Poplarville	12/17/1995	Thunderstorm Wind	0 kts.	0/0	$15,804
POPLARVILLE	6/2/1996	Thunderstorm Wind	--	0/0	$154
POPLARVILLE	11/1/1997	Thunderstorm Wind	--	0/0	$300
POPLARVILLE	2/10/1998	Thunderstorm Wind	--	0/0	$7,388

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
POPLARVILLE	2/15/1998	Thunderstorm Wind	--	0/0	$14,776
POPLARVILLE	7/10/1998	Thunderstorm Wind	--	0/0	$7,388
POPLARVILLE	2/13/2000	Thunderstorm Wind	--	0/0	$2,797
POPLARVILLE	4/24/2000	Thunderstorm Wind	--	0/0	$140
POPLARVILLE	8/20/2000	Thunderstorm Wind	--	0/0	$699
POPLARVILLE	8/26/2000	Thunderstorm Wind	--	0/0	$140
POPLARVILLE	11/9/2000	Thunderstorm Wind	--	0/0	$55,947
POPLARVILLE	5/26/2001	Thunderstorm Wind	--	0/0	$2,040
POPLARVILLE	6/11/2001	Thunderstorm Wind	--	0/0	$6,800
POPLARVILLE	6/11/2001	Thunderstorm Wind	--	0/0	$20,400
POPLARVILLE	10/11/2001	Thunderstorm Wind	--	0/0	$680
POPLARVILLE	10/13/2001	Thunderstorm Wind	--	0/0	$2,720
POPLARVILLE	7/7/2002	Thunderstorm Wind	--	0/0	$1,339
POPLARVILLE	4/24/2003	Thunderstorm Wind	50 kts. EG	0/0	$1,963
POPLARVILLE	6/12/2003	Thunderstorm Wind	50 kts. EG	0/0	$1,963
POPLARVILLE	6/1/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,275
POPLARVILLE	6/22/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,275
POPLARVILLE	6/27/2004	Thunderstorm Wind	50 kts. EG	0/0	$1,275
POPLARVILLE	3/22/2005	Thunderstorm Wind	50 kts. EG	0/0	$1,850
POPLARVILLE	8/21/2005	Thunderstorm Wind	50 kts. EG	0/0	$2,466
POPLARVILLE	10/27/2006	Thunderstorm Wind	50 kts. EG	0/0	$1,195
POPLARVILLE	11/6/2006	Thunderstorm Wind	50 kts. EG	0/0	$1,792
POPLARVILLE	11/14/2006	Thunderstorm Wind	50 kts. EG	0/0	$11,947
POPLARVILLE	6/19/2007	Thunderstorm Wind	50 kts. EG	0/0	$1,742
POPLARVILLE	1/31/2008	Thunderstorm Wind	50 kts. EG	0/0	$839
POPLARVILLE	6/21/2008	Thunderstorm Wind	50 kts. EG	0/0	$2,237
POPLARVILLE	10/15/2009	Thunderstorm Wind	50 kts. EG	0/0	$1,684
POPLARVILLE	4/24/2010	Thunderstorm Wind	52 kts. EG	0/0	$0
POPLARVILLE	8/12/2010	Thunderstorm Wind	52 kts. EG	0/0	$5,523
POPLARVILLE	10/2/2014	Thunderstorm Wind	70 kts. EG	0/1	$0
POPLARVILLE	1/02/2017	Thunderstorm Wind	55 kts. EG	0/0	$0
POPLARVILLE	4/24/2021	Thunderstorm Wind	50 kts. EG	0/0	$30,000
Unincorporated Area					
PEARL RIVER CO.	5/6/1960	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	12/27/1968	Thunderstorm Wind	65 kts.	0/0	$0
PEARL RIVER CO.	4/13/1969	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	2/1/1970	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	2/1/1970	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	5/26/1973	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	1/10/1975	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	1/10/1975	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	5/27/1976	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	5/31/1977	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	5/7/1979	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	7/1/1979	Thunderstorm Wind	84 kts.	0/0	$0

PEARL RIVER CO.	4/13/1980	Thunderstorm Wind	65 kts.	0/0	$0
PEARL RIVER CO.	4/13/1980	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	4/13/1980	Thunderstorm Wind	0 kts.	0/0	$0

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
PEARL RIVER CO.	5/18/1980	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	7/7/1980	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	9/25/1980	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	6/13/1982	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	12/11/1983	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	4/26/1985	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	5/21/1985	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	8/17/1986	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	8/17/1986	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	5/18/1989	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	4/14/1990	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	4/27/1990	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	12/3/1990	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	4/14/1991	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	6/4/1991	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	6/29/1992	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	6/29/1992	Thunderstorm Wind	0 kts.	0/0	$0
PEARL RIVER CO.	3/25/1994	Thunderstorm Wind	0 kts.	0/0	$8,126
CROSSROADS	2/21/1997	Thunderstorm Wind	--	0/0	$0
OZONA	5/3/1997	Thunderstorm Wind	--	0/0	$15,006
HILLSDALE	4/17/1998	Thunderstorm Wind	--	0/0	$1,478
COUNTYWIDE	6/5/1998	Thunderstorm Wind	--	0/0	$7,388
CARRIERE	9/7/1999	Thunderstorm Wind	--	0/0	$145
MC NEIL	6/24/2000	Thunderstorm Wind	--	0/0	$140
COUNTYWIDE	7/16/2000	Thunderstorm Wind	--	0/0	$1,399
CARRIERE	7/22/2000	Thunderstorm Wind	--	0/0	$699
COUNTYWIDE	7/27/2000	Thunderstorm Wind	--	0/0	$350
COUNTYWIDE	8/20/2000	Thunderstorm Wind	--	0/0	$1,049
COUNTYWIDE	1/19/2001	Thunderstorm Wind	--	0/0	$10,880
DERBY	3/12/2001	Thunderstorm Wind	--	0/0	$54,399
NICHOLSON	11/29/2001	Thunderstorm Wind	--	0/0	$1,360
COUNTYWIDE	4/8/2002	Thunderstorm Wind	--	0/0	$20,082
MC NEIL	4/8/2002	Thunderstorm Wind	--	0/0	$2,008
CAESAR	4/8/2002	Thunderstorm Wind	--	0/0	$2,008
CAESAR	4/8/2002	Thunderstorm Wind	--	0/0	$13,388
MC NEIL	8/19/2002	Thunderstorm Wind	--	0/0	$2,008
SAVANNAN	3/13/2003	Thunderstorm Wind	50 kts. EG	0/0	$654
COUNTYWIDE	8/20/2003	Thunderstorm Wind	50 kts. EG	0/0	$2,618
CROSSROADS	12/16/2003	Thunderstorm Wind	50 kts. EG	0/0	$15,708
COUNTYWIDE	6/6/2004	Thunderstorm Wind	50 kts. EG	0/0	$2,550
COUNTYWIDE	4/30/2005	Thunderstorm Wind	50 kts. EG	0/0	$2,466
MC NEIL	8/21/2005	Thunderstorm Wind	50 kts. EG	0/0	$1,233
CROSSROADS	5/8/2006	Thunderstorm Wind	50 kts. EG	0/0	$1,792

CROSSROADS	5/8/2006	Thunderstorm Wind	50 kts. EG	0/0	$1,792
COUNTYWIDE	7/16/2006	Thunderstorm Wind	50 kts. EG	0/0	$2,389
MC NEIL	8/4/2006	Thunderstorm Wind	50 kts. EG	0/0	$597
Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
MC NEIL	10/19/2006	Thunderstorm Wind	50 kts. EG	0/0	$1,195
NICHOLSON	10/19/2006	Thunderstorm Wind	50 kts. EG	0/0	$2,389
MC NEIL	10/27/2006	Thunderstorm Wind	50 kts. EG	0/0	$1,195
CROSSROADS	11/14/2006	Thunderstorm Wind	50 kts. EG	0/0	$1,195
CROSSROADS	2/12/2008	Thunderstorm Wind	50 kts. EG	0/0	$2,237
HILLSDALE	2/12/2008	Thunderstorm Wind	50 kts. EG	0/0	$2,797
MC NEIL	3/3/2008	Thunderstorm Wind	50 kts. EG	0/0	$1,678
MC NEIL	5/15/2008	Thunderstorm Wind	50 kts. EG	0/0	$8,949
MC NEIL	8/3/2008	Thunderstorm Wind	50 kts. EG	0/0	$1,678
MC NEIL	8/12/2008	Thunderstorm Wind	50 kts. EG	0/0	$2,237
SAVANNAN	8/12/2008	Thunderstorm Wind	50 kts. EG	0/0	$1,119
CARRIERE	3/26/2009	Thunderstorm Wind	50 kts. EG	0/0	$1,684
HILLSDALE	4/12/2009	Thunderstorm Wind	61 kts. EG	0/0	$0
PEARL RIVER (ZONE)	3/1/2010	Strong Wind	45 kts. EG	0/0	$5,523
HILLSDALE	4/4/2011	Thunderstorm Wind	55 kts. EG	0/0	$1,071
SILVER RUN	4/4/2011	Thunderstorm Wind	70 kts. EG	0/0	$16,061
HILLSDALE	6/10/2011	Thunderstorm Wind	60 kts. EG	0/0	$10,707
MC NEIL	6/28/2011	Thunderstorm Wind	60 kts. EG	0/0	$2,142
CYBUR	2/18/2012	Thunderstorm Wind	52 kts. EG	0/0	$5,245
CARRIERE	2/18/2012	Thunderstorm Wind	52 kts. EG	0/0	$10,490
MC NEIL	8/9/2012	Thunderstorm Wind	55 kts. EG	0/0	$20,981
TYLER	5/12/2015	Thunderstorm Wind	60 kts. EG	0/0	$0
CARRIERE	10/31/2015	Thunderstorm Wind	60 kts. EG	0/0	$0
MC NEIL	10/31/2015	Thunderstorm Wind	60 kts. EG	0/0	$0
MILLARD	4/03/2017	Thunderstorm Wind	60 kts. EG	0/0	$0
SILVER RUN	4/14/2018	Thunderstorm Wind	70 kts. EG	0/0	$0
CAESER	6/09/2018	Thunderstorm Wind	50 kts. EG	0/0	$0
SAVANAN	11/01/2018	Thunderstorm Wind	75 kts. EG	0/0	$75,000
NICHOLSON	5/04/2019	Thunderstorm Wind	55 kts. EG	0/0	$0
MC NEIL	2/06/2020	Thunderstorm Wind	50 kts. EG	0/0	$0
HILLSDALE	6/13/2021	Thunderstorm Wind	50 kts. EG	1/0	$0
RICHARDSON	10/27/2021	Thunderstorm Wind	50 kts. EG	0/0	$0

†E = estimated; EG = estimated gust; ES = estimated sustained; MG = measured gust; MS = measured sustained
Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

Given the high number of previous events, it is certain that thunderstorm events, including straight-line wind events, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for the entire county.

FEMA NRI Expected Annual Loss Estimates

Table E.49: Pearl River County Expected Annual Loss Table

PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HIGH WIND EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
2 events/year	0.01	$85,047	$128,946	$61	$214,053	38.8	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table E.50: Pearl River County Hazard Specific Risk Index Table

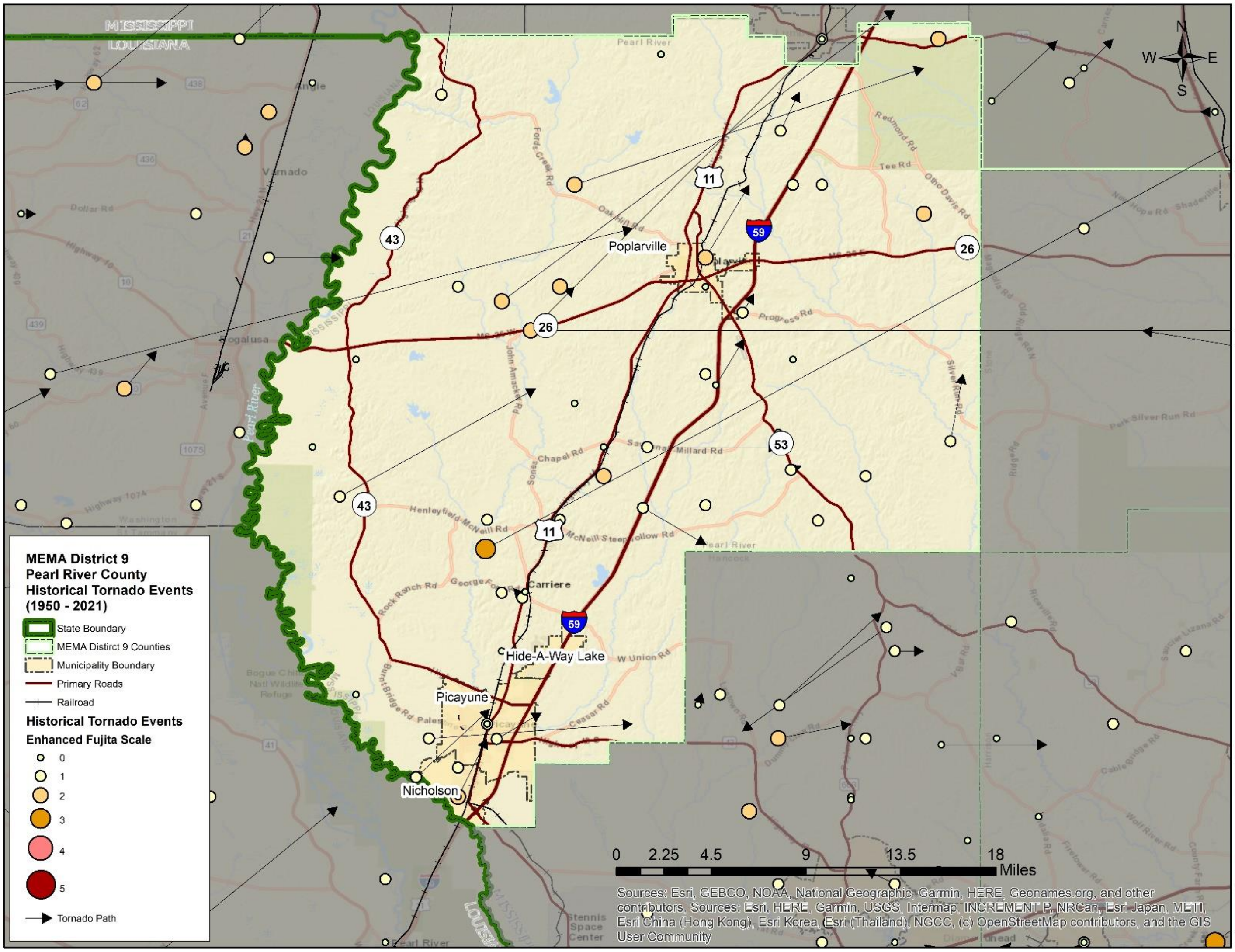
PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HIGH WIND	
Risk Index Score	Risk Index Rating
36.2/100	Relatively Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Tornado

LOCATION AND SPATIAL EXTENT

Tornadoes occur throughout the state of Mississippi, and thus in Pearl River County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Pearl River County is uniformly exposed to this hazard. With that in mind, Figure E.22 shows tornado track data for many of the major tornado events that have impacted the county between 1950 and 2022. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE E.22: HISTORICAL TORNADO TRACKS IN PEARL RIVER COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Tornadoes were at least partially responsible for five disaster declarations in Pearl River County in 1983, 1991, 1995, 2001, and 2003. According to the National Center for Environmental Information, there have been a total of 61 recorded tornado events in Pearl River County since 1956, resulting in $9.5 million) in property damages. In addition, 37 injuries were reported. The magnitude of these tornadoes ranged from F0 to F2 and EF0 to EF3 in intensity. A summary of these events is presented in Table E.51. Detailed information on historic tornado events can be found in Table E.52.

TABLE E.51: SUMMARY OF TORNADO OCCURRENCES IN PEARL RIVER COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Picayune	4	0/0	$189,531	$2,872
Poplarville	14	0/1	$287,680	$4,359
Unincorporated Area	43	0/36	$9,028,220	$136,791
PEARL RIVER COUNTY TOTAL	61	0/37	$9,505,431	$144,022

Source: National Center for Environmental Information

TABLE E.52: HISTORICAL TORNADO IMPACTS IN PEARL RIVER COUNTY

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Picayune					
PICAYUNE	6/4/2001	Funnel Cloud	0/0		Sheriff's Office personnel sighted funnel clouds in several locations, some extending to near the tree top level. No damage was reported.
PICAYUNE	4/7/2003	F1	0/0	$130,898	A weak tornado produced intermittent damage along a path from 2.5 miles west southwest of Picayune to 6 miles east of Picayune along Highway 43. Most of the damage occurred as the tornado moved across the southern portions of Picayune where a number of large commercial signs were damaged, a semi-trailer was blown over, the roof of a business was partially ripped off, numerous trees were knocked down and damaged, and several service station canopies were heavily damaged. Several homes were damaged by falling trees.
PICAYUNE	1/13/2005	F0	0/0	$8,633	A weak tornado touched down briefly along Memorial Boulevard causing minor damage to the windows and roofs of three businesses and knocking out the windows of 16 vehicles in parking lots.
PICAYUNE	10/27/2021	EF1	0/0	$50,000	A brief EF-1 tornado touched down just west of Bales Ave in Picayune, MS. This tornado quickly traveled northeast, with widespread tree damage in the eastern part of the town. Many trees were snapped at the base with multiple tin roofs ripped off as well as minor

					structural damage. The worst damage was to two trailers just west of the highway. One was spun 180 degrees and flipped with extensive damage and another rolled 100 yards and was completely obliterated. The tornado crossed the highway with other straight line wind damage noted along the damage path on the east side of the highway. The tornado seems to have lifted near Northwood drive where a small shed was destroyed along with minor structural damage and multiple trees and branches snapped. On both sides of the path there was evidence of straight line wind damage which was consistent with radar at the time. The width that was estimated was due to a wider swath seen in the east part of the city. It was difficult to distinguish tornado vs. straight line wind at times.
Poplarville					
Poplarville	5/19/1995	F1	0/0	$0	Sheriff’s office reported a tornado touched down south of Poplarville damaging a mobile home and downing trees. Tornado path length and width estimated.
POPLARVILLE	1/15/1997	F1	0/0	$0	The Office of Emergency Preparedness reported that a tin roof was blown off a house on Ott Davis Road. Downed power lines caused a house fire. A large tree was uprooted and a short swath of pine trees were snapped off.
POPLARVILLE	10/25/1997	F1	0/0	$90,039	The Sheriff's Office reported one mobile home destroyed, two others damaged and the roof of a house damaged.
POPLARVILLE	9/20/1998	F1	0/1	$110,822	A tropical depression that formed in the central Gulf of Mexico on September 17th

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					strengthened to a minimal tropical storm named Hermine on the morning of the 18th. Tropical Storm Hermine meandered in the Gulf of Mexico for a period of time before beginning a slow north northeast motion that brought it ashore in the early morning hours of the 20th near Cocodrie, LA in Terrebonne Parish. Tropical Storm Hermine then drifted north over southeast Louisiana and was downgraded to a tropical depression 50 miles northwest of New Orleans during the evening of the 20th. Winds associated with Hermine were of minimal tropical storm force and were mainly contained in squalls. A peak wind gust of 46 mph in a squall was measured just off the southeast coast of Louisiana at the Burrwood NOAA C-MAN station near the mouth of the Mississippi River at 1139 CST on September 19th. Two tornadoes developed in rainbands associated with Tropical Storm Hermine on September 20th. The first tornado occurred around 0730 CST 10 miles south of Poplarville, MS and destroyed two mobile homes, damaged seven cars, and caused one injury. A second weak tornado briefly touched down near Bay St. Louis, MS around 0850 CST resulting in only minor damage. Isolated flash flooding also occurred with Tropical Storm Hermine on September 20th when 4 to 5 inches of rain fell on areas of Walthall county. Sections of a few roadways in southern Walthall county were briefly under water including Mississippi Highway 27 which was covered by up to a foot of water in places.

POPLARVILLE	7/22/2000	F0	0/0	$0	A weak tornado briefly touched down resulting in no damage.
POPLARVILLE	6/4/2001	Funnel Cloud	0/0	$0	Sheriff's Office personnel sighted funnel clouds in several locations, some extending to near the tree top level. No damage was reported.
POPLARVILLE	4/24/2003	F0	0/0	$2,618	A weak tornado knocked down stadium lights at Poplarville High School and downed trees nearby.
POPLARVILLE	6/3/2004	Funnel Cloud	0/0	$0	A funnel cloud was observed near McNeill- McHenry Road.
POPLARVILLE	8/22/2005	Funnel Cloud	0/0	$0	A funnel cloud was observed just southeast of Poplarville.
POPLARVILLE	2/13/2007	EF0	0/0	$1,742	A weak tornado briefly touched down near Highway 53 knocking down trees, but causing no other significant damage.

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
POPLARVILLE	3/1/2007	Funnel Cloud	0/0	$0	Multiple sightings of a funnel cloud were reported from the Millard area.
POPLARVILLE	5/4/2009	EF1	0/0	$8,981	A tornado traveled a two-mile path north northeast of Poplarville uprooting several large trees and knocking down power lines. The tornado also moved a mobile home off of its blocks and tore off the steeple of a church.
POPLARVILLE	4/4/2011	EF1	0/0	$32,122	Multiple trees were snapped off, a few soft woods and one hard wood tree. Two hard wood trees were uprooted. Forty percent of a metal roof was blown off a house with a few roof beams broken off. The beams and metal roof were blown about 150 yards to the east. Maximum estimated winds 95 mph, maximum width about 50 yards, and a path length of 400 yards.
POPLARVILLE	1/13/2013	EF1	0/0	$41,356	A storm survey confirmed a tornado touchdown. The tornado touched down on Progress Road just east of Interstate 59 and traveled approximately 1 mile. The path width was approximately 150 yards. Over one dozen hardwood and softwood trees were snapped, one of which severely damaged a pickup truck. A metal workshop building had significant roof damage in which half of it was removed. A trampoline was lifted and thrown approximately 200 yards. The damage was consistent with EF-1 intensity. Winds were estimated at 95 mph.
Unincorporated Area					
PEARL RIVER CO.	7/23/1956	F0	0/0	$0	--
PEARL RIVER CO.	5/2/1957	F0	0/0	$257	--
PEARL RIVER CO.	2/26/1958	F2	0/4	$2,083,503	--
PEARL RIVER CO.	10/3/1964	F2	0/0	$0	--

PEARL RIVER CO.	11/3/1968	F2	0/0	$173,027	Radar indicated a line of thunderstorms at 4:25 PM from near Bogalusa, La. to Columbia, Miss. moving rapidly toward the east. From 4:50 to 5:30 PM people reported during cloudy rainy weather storm moved from W towards E; one funnel observed aloft most of the time; some heard road like jet airplane. PEARL RIVER COUNTY: At White Sands 8 WSW Poplarville man reported thunder began about 4 PM, and tornado "came through very swift" about 4:50 PM, and "was gone in seconds." There was "hard thunder and roaring before...then funnel formed about 5 miles West of my house, it swept through 3/4 mile of my place, about 1/4 mile wide Blew down

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					20 acres tung trees, 40 acres pine timber, 1 house (tenant) and 1 feed shed, tin off 2 other barns, much damage to 200 pecan trees, lots of fence down." He reported one funnel "bouncing up and down...from ground to 20 ft. high." He estimated $5,000 damage on his place. In the area of Derby and Savannah, there was high wind damage to trees, shelters and some buildings. No injuries from the winds were reported. Woman saw tornado cross Highway 59, she said, "There was lots of funnels, looked like fingers pointed down; also rotating counter clockwise, very dark clouds with a large tail trailing." STONE COUNTY: In the western part of the county, at Smith Community man reported storm was traveling east along township line between 2 and 3, it did not vary over 1 mile..." Damage occurred along a 1/4 mile wide. At about 5 PM, "Trees and other debris on side was felled NE; center of path felled east; on north side of path it felled toward SE. There is evidence there was several small funnels." Red Creek Community (in western Stone County) had houses damaged but no injuries. The worst damage was a house chimney blown down and roof caved in, corn crop flattened, tung orchard damaged; at another place roof was blown off. Damage occurred over 450 yard wide path, one funnel observed touching ground, and some heard roar. Storm reported to have begun at 4:45 PM, ended 5:15 PM. About 15 miles away, at Big Level Community, 4 SE Wiggins, one funnel observed during rainy weather remained aloft most of time. Man reported storm 5:15-5:"0 PM at nursery, width of path 100 yds; equipment and tool sheds badly damaged, room attached to house

					carried 1/2 mile, weather instruments damaged, debris closed road. A couple and son, age 11, received lacerations and bruises 5:25-5:30 PM when one end of their house was destroyed; path 200 ft. wide. In area SE of Wiggins, other signs of damage to barns and outhouses were reported; trees up to 3 ft. in diameter uprooted; house trailer about 10 miles east of Big Level moved about 4 ft. off foundation. Damage in the Wiggins area estimated at $15,000. Radar at Mobile indicated a single thunderstorm cell (in Stone County) but no hook was observed. Authorities said 7 homes were damaged in Stone County.
PEARL RIVER CO.	11/3/1968	F2	0/5	$0	Radar indicated a line of thunderstorms at 4:25 PM from near Bogalusa, La. to Columbia,

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					Miss. moving rapidly toward the east. From 4:50 to 5:30 PM people reported during cloudy rainy weather storm moved from W towards E; one funnel observed aloft most of the time; some heard road like jet airplane. PEARL RIVER COUNTY: At White Sands 8 WSW Poplarville man reported thunder began about 4 PM, and tornado "came through very swift" about 4:50 PM, and "was gone in seconds." There was "hard thunder and roaring before...then funnel formed about 5 miles West of my house, it swept through 3/4 mile of my place, about 1/4 mile wide Blew down 20 acres tung trees, 40 acres pine timber, 1 house (tenant) and 1 feed shed, tin off 2 other barns, much damage to 200 pecan trees, lots of fence down." He reported one funnel "bouncing up and down from ground to 20 ft. high." He estimated $5,000 damage on his place. In the area of Derby and Savannah, there was high wind damage to trees, shelters and some buildings. No injuries from the winds were reported. Woman saw tornado cross Highway 59, she said, "There was lots of funnels, looked like fingers pointed down; also rotating counter clockwise, very dark clouds with a large tail trailing." STONE COUNTY: In the western part of the county, at Smith Community man reported storm was traveling east along township line between 2 and 3, it did not vary over 1 mile " Damage occurred along a 1/4 mile wide. At about 5 PM, "Trees and other debris on side was felled NE; center of path felled east; on north side of path it felled toward SE. There is evidence there was several small funnels." Red Creek Community (in western Stone County) had houses

					damaged but no injuries. The worst damage was a house chimney blown down and roof caved in, corn crop flattened, tung orchard damaged; at another place roof was blown off. Damage occurred over 450 yard wide path, one funnel observed touching ground, and some heard roar. Storm reported to have begun at 4:45 PM, ended 5:15 PM. About 15 miles away, at Big Level Community, 4 SE Wiggins, one funnel observed during rainy weather remained aloft most of time. Man reported storm 5:15-5:"0 PM at nursery, width of path 100 yds; equipment and tool sheds badly damaged, room attached to house carried 1/2 mile, weather instruments damaged, debris closed road. A couple and son, age 11, received lacerations and bruises 5:25-5:30 PM when one end of their house was destroyed; path 200 ft. wide. In area SE of Wiggins, other signs of damage to barns and outhouses were reported; trees up to 3 ft. in diameter uprooted; house trailer about 10 miles east of Big Level moved about 4 ft. off foundation. Damage in the Wiggins area estimated at $15,000. Radar at Mobile indicated a single thunderstorm cell (in Stone County) but no hook was observed. Authorities said 7 homes were damaged in Stone County.

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
PEARL RIVER CO.	5/8/1969	F2	0/0	$164,069	--
PEARL RIVER CO.	8/25/1971	F1	0/0	$148,675	Storm moved from E towards W. Small twister touched down in West Union community near Carriere (lat. 30.6º N, long. 89.7º W). During rainy weather, there were 2 funnels, one remained aloft and one touched down. There was a roaring sound as a train makes. Many trees were broken off, a trailer was picked up, turn over and thrown against the top of a car. Property damage estimated $13,000, crop damages $200.
PEARL RIVER CO.	5/7/1972	F1	0/0	$1,441	A funnel cloud aloft was sighted by a National Guard unit to the south of Poplarville. It touched down a little later about 1:04 p.m. CST near a city dump 2 S Poplarville (lat. 30.8º N, long. 89.5º W) uprooting some trees and breaking others. It left the ground a short distance then dipped twice near a Poplarville housing project. About 13 houses were damaged, some losing part or all of their tin roof. Several power lines downed with power failure in small areas. Several persons heard the wind roar, a man said it sounded like a train attempting to turn around in town. The path was from SSW towards NWE, length in town 2 to 2 1/2 miles, width in town not over 150 feet. Damages estimated $25,000-$30,0000. No damage reported beyond Poplarville; greatest damage in town 1/2 to 3/4 mile section.

PEARL RIVER CO.	5/7/1972	F2	0/0	$144,051	A funnel cloud aloft was sighted by a National Guard unit to the south of Poplarville. It touched down a little later about 1:04 p.m. CST near a city dump 2 S Poplarville (lat. 30.8º N, long. 89.5º W) uprooting some trees and breaking others. It left the ground a short distance then dipped twice near a Poplarville housing project. About 13 houses were damaged, some losing part or all of their tin roof. Several power lines downed with power failure in small areas. Several persons heard the wind roar, a man said it sounded like a train attempting to turn around in town. The

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					path was from SSW towards NWE, length in town 2 to 2 1/2 miles, width in town not over 150 feet. Damages estimated $25,000- $30,0000. No damage reported beyond Poplarville; greatest damage in town 1/2 to 3/4 mile section.
PEARL RIVER CO.	5/26/1973	F2	0/4	$135,615	--
PEARL RIVER CO.	11/27/1973	F1	0/0	$135,615	Warehouse and several trailers damaged near Picayune.
PEARL RIVER CO.	4/2/1974	F1	0/0	$122,136	--
PEARL RIVER CO.	3/8/1976	F1	0/0	$10,582	A narrow, swirling black cloud accompanied by a "freight train sound" uprooted trees, raked shingles off several houses, cracked or broke 15 window panes, tore away parts of an iron fence, blew a mobile home and a storage shed off their blocks, destroyed a barn, broke 3 power line poles and left two others leaning badly. Heavy rain accompanied the storm. Witnesses said it did not have the characteristic funnel shape, but was a "black cloud going in circles."
PEARL RIVER CO.	3/27/1976	F2	0/1	$105,823	The tornado first touched down in the Spring Hill Community where 1 mobile home was damaged and the occupant injured. Moving NE it crossed Hwy 11 at Hillsdale's crossroads and I-59 causing one truck to overturn on the interstate when a pine tree was hurled onto the pavement. In the Red Top Community 3 S Lumberton 2 barns and shed were destroyed, 1 house roof was blown off, a cemetery and 3 dairy barns damaged, and trees uprooted. The last evidence was in the Pistol Ridge Community E of Lumberton. Damage $45,000.
PEARL RIVER CO.	3/7/1980	F1	0/0	$73,074	--

PEARL RIVER CO.	5/19/1980	F2	0/0	$73,074	A small tornado touched down briefly in the White Sands area of Pearl River County 6 miles west of Poplarville. The tornado struck the farm of Don Oldmixon, destroying a barn and uprooting two large trees, one of which fell through the roof of the Oldmixon house. The Oldmixons saw the tornado approaching.
PEARL RIVER CO.	2/15/1987	F2	0/2	$530,046	A strong tornado destroyed one home and damaged several others. A couple of house trailers were overturned, and several mobile homes destroyed. About 6 vehicles also were damaged. If the tornado had been about 150 yards further south, it would have tracked across a much more populated area including 3 trailer parks.
WHITE SAND	2/19/1996	F2	0/10	$1,074,551	A strong tornado touched down just northwest of the White Sand community. The

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					most significant damage occurred in the initial 2.2 miles just to the north of the White Sand community where ten people were injured; five seriously, requiring hospitalization. The most serious was a woman who suffered a broken back, broken ribs and a punctured lung. The tornado continued on the ground continuously to just north of Poplarville, then intermittently to near Hillsdale. The county suffered considerable property damage with five houses destroyed, 10 had major damage and 14 minor damage. Nine mobile homes were destroyed, 3 sustained major damage and 5 minor damage. Numerous barns and other buildings were damaged. Several farm animals were killed. Large areas of 8 to 12 inch diameter trees were downed. The tornado path was surveyed by National Weather Service employees.
MC NEIL	2/19/1996	F1	0/0	$153,507	A tornado touched down along a near continuous path. Several houses were damaged and several mobile homes were destroyed. Large trees were downed or uprooted, including a pecan tree with a trunk diameter of 36 inches. The tornado was visually spotted by emergency rescue crews on Interstate Highway 59 northeast of McNeil who were responding to the tornado damage in the north portion of the county. National Weather Service employees surveyed the tornado damage path.

NICHOLSON	11/21/1997	F1	0/2	$1,050,449	A severe thunderstorm moved out of St. Tammany Parish, Louisiana into extreme south Mississippi. Several short-lived tornadoes touched down as it crossed Pearl River, Hancock, and Harrison Counties. Near Nicholson, a tornado touched down near Nicholson, moving through a mobile home park and also passing across the Mississippi Visitors Center on Interstate Highway 59. Damage path was estimated at approximately four miles, due to lack of ground access in Pearl River drainage area to the west of Nicholson. Preliminary reports from Pearl River County and state officials indicated that 3 single family homes were destroyed and 18 others heavily damaged; and 21 mobile homes were destroyed and 8 others heavily damaged. Several car windows were blown out when the tornado passed through the Visitors Center. One person was injured in the mobile home park and another person suffered minor injuries in a nearby subdivision when their auto was hit by falling trees and limbs. Large hail was also reported by the

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					Sheriff's Office in McNeil. Two additional tornado touch-downs were reported in north Hancock County and north Harrison County as the severe thunderstorm moved northeast. In north Hancock County, civil defense reported two homes were damaged along with two mobile homes when a tornado touched down in a rural area. In north Harrison County, a tornado damaged a convenience store along with heavily damaging a couple of mobile homes. The tornado path lengths in Hancock and Harrison Counties were estimated from damage reports.
SAVANNAN	5/30/1999	F0	0/0	$0	A tornado was observed by fire department personnel touching down in open country near the community of Savannah. No damage was reported.
NICHOLSON	7/22/2000	F0	0/0	$4,196	A small tornado touched down briefly near Nicholson causing a trailer to lose its roof and tree damage.
MILLARD	3/12/2001	F0	0/0	$40,799	A small tornado caused severe to moderate structural damage to buildings, blew the windows out of several vehicles, and knocked down trees and power lines.
CYBUR	6/4/2001	Funnel Cloud	0/0	$0	Sheriff's Office personnel sighted funnel clouds in several locations, some extending to near the tree top level. No damage was reported.
CARRIERE	8/13/2001	F0	0/0	$1,360	A weak tornado touched down briefly knocking down a few trees.
CROSSROADS	10/3/2002	F0	0/0	$13,388	A weak tornado touched down downing trees.

CROSSROADS	4/24/2003	F1	0/0	$65,449	A weak tornado crossed into Pearl River County Mississippi from Washington Parish Louisiana about 3 miles north of Crossroads and produced intermittent damage along a path 8 miles long that ended four miles northwest of Poplarville. Most of the damage was to downed trees. Several houses and structures in Ford Creek Rd and Hilt Fornea Rd areas suffered damage.
MC NEIL	6/24/2004	Funnel Cloud	0/0	$0	A funnel cloud was observed along Interstate 59 just north of McNeill.
MC NEIL	5/8/2006	Funnel Cloud	0/0	$0	A funnel cloud was briefly observed.
MC NEIL	5/11/2007	Funnel Cloud	0/0	$0	A funnel cloud was observed along Highway 11 just north of McNeil.
NICHOLSON	3/9/2011	EF1	0/0	$21,415	A NWS Storm Survey has determined that damage in the Picayune area was a confirmed EF1 tornado with a path length of 3 miles and path width of 100 yards. This tornado was either the same tornado or formed from the same meso cyclone that produced damage

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					earlier in St Tammany Parish before it crossed the large Pearl River Basin swamp. The track started with mostly EF0 damage on Jackson Landing Road and continued northeast across South Beech Street and Goodyear Boulevard, where the EF1 damage was noted to a residence near 6th Street and Forest, due to a large pine tree snapping and landing on the home. The tornado began dissipating and only minor damage was found near Highway 11 and Carroll Street.
MC NEIL	9/4/2011	EF1	0/0	$53,537	A weak tornado moved along an intermittent path for approximately 0.6 miles. Large tree limbs were snapped and several trees were blown down. Shingles were peeled from a garage and aluminum fascia was peeled off of an eave. The tornado also tossed a single engine Cessna aircraft that had been chained to anchors about 35 yards, severely damaging it. Additionally, a pontoon boat that had been anchored to shore, was ripped from its mooring anchors and badly damaged. Path width was approximately 100 yards. Maximum rating was low end EF1.
HILLSDALE	1/26/2012	EF0	0/0	$10,490	A tornado touched down just off of Ott Stanford Road. A patio roof was peeled back and ripped off half of the roof of one home. The tornado traveled to the northeast and destroyed a small well shed and then tore another patio roof off of a second home. The tornado continued to the northeast, finally snapping one small pine tree before lifting. Maximum wind speed was estimated at 75 mph, path width was 100 yards, path length was 200 yards.

PEARL RIVER CO ARPT	12/9/2012	EF0	0/0	$10,490	A weak tornado touched down a couple of times just south of Poplarville, causing minor property damage. A pool was overturned and minor damage was reported to a mobile home on Dupont Harts Chapel Road. A porch and an outbuilding were damaged at a residence on Highway 53. Path length was approximately 1.5 miles and path width was 20 yards. Maximum winds were estimated at 70 mph.
MILL CREEK	12/25/2012	EF3	0/8	$2,622,597	The tornado initially touched down on Harris Road on the southwest side of McNeil causing EF0 and EF1 damage, where it snapped several pine trees. It moved northeastward and rapidly intensified, resulting in a small area of upper range EF-2 and low end EF-3 damage along Joe Smith Road and Sones Chapel Road. The worst damage occurred when a single-story brick veneer triplex dwelling was destroyed with only two small interior walls standing. The tornado weakened

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					after crossing Highway 11, causing mainly tree and minor roof damage, until it re-intensified in the far northeast corner of Pearl River County near Red Hill church Road. It caused upper range EF-1 damage as it was leaving Pearl River County into Stone County. County officials preliminary estimate of 22 homes destroyed, 8 homes with major damage, 16 homes with minor damage and an additional 9 homes affected. Eight people were transported by EMS to area hospitals, although additional minor injuries likely occurred. Maximum winds in Pearl River County were estimated around 140 mph. This tornado continued to track northeast across several more counties in south Mississippi for a total path length of 61 miles. Event times were based on radar and eyewitness accounts.
SAVANNAN	10/31/2015	EF1	0/0	$0	A tornado touched down just west of Mississippi Highway 53 and south of Mcneil- Mchenry Road in Pearl River County. Near where the tornado touched down, an outbuilding was destroyed and tree limbs were downed. As the tornado tracked east- northeast, more tree limbs were downed and a few wooden power poles and trees were snapped. Shortly after travelling east of Highway 53, a mobile home and outbuilding were damaged. Additional tree damage continued farther east-northeast before the tornado lifted.
CYBUR	2/23/2016	EF1	0/0	$0	A weak tornado touched down near Donley Burks Road west of Highway 43 and moved northeastward. Minor to moderate damage was noted on 5 homes with numerous trees downed and uprooted in rural parts of the County. A tin roof was also torn off of one home. The tornado lifted near Osborn Moody

					Road. Maximum wind speeds were estimated near 100 mph.
WHITE SAND	2/23/2016	EF1	0/0	$0	A weak tornado damaged a few mobile homes and shifted one mobile home off its foundation. It also snapped trees and large branches. It continued into Marion County before lifting. Maximum wind speeds in Pearl River County were estimated at 90 mph.
SILVER RUN	8/30/2017	EF1	0/0	$0	The tornado produced mostly EF-0 damage, but a large farmstead had two barns heavily damaged with EF-1 type damage with winds estimated at 100 mph. Large hardwood trees were split. Large encased walnuts were thrown as projectiles through airborne shingles. A small limb was wind driven and wedged between a window frame and the brick wall without breaking the glass. A social media photo was posted showing the tornado from the starting location vantage point.
CARRIERE	4/14/2018	EF)	0/0	$0	Public eyewitness accounts indicated a tornado touched down near a convenience store on U.S. Highway 11 near Carriere, where it removed a piece of the awning and struck a vehicle. The tornado moved across the highway and downed several large oak branches in a retail store parking lot. It then lifted and flung the deck awning of a branch bank building northeastward into nearby residence yards and suspended some of the metal in treetops, which also had limbs and branches broken. The tornado lifted while crossing the railroad tracks. Some debris was deposited in the fringes of the Stonebridge subdivision. Maximum winds were estimated at 75 mph, with the path width 25 yards.

MILLARD	4/19/2020	EF1	0/0	$0	Tornado began crossing Interstate 59 with one snapped softwood pine observed in the median of the interstate. The tornado continued southeast and likely continued to strengthen before crossing McNeil Steephollow Road. At that location, there were several snapped hardwood and softwood trees, a few uprooted, but no structural damage to homes. More damage was noted just to the south at the end of Elmer Lee Road, where a chicken coop was damaged along with more softwood tree damage. The tornado continued southeast toward Bouie Road. A softwood pine was observed completely stripped of branches with the top twisted off, giving the tornado it's likely peak maximum strength of 105 mph. A few other softwoods were snapped and uprooted in the vicinity. Minor structural damage was observed nearby to a home with a portion of the roof either damaged or missing. The survey continued southeast to Anner Road, but it appeared the storm lifted between Anner and Bouie Road.
SILVER RUN	12/14/2022	EF1	0/0	$5,000	Emergency management surveyed this area and reported multiple areas of tree damage along with two sheds damaged.

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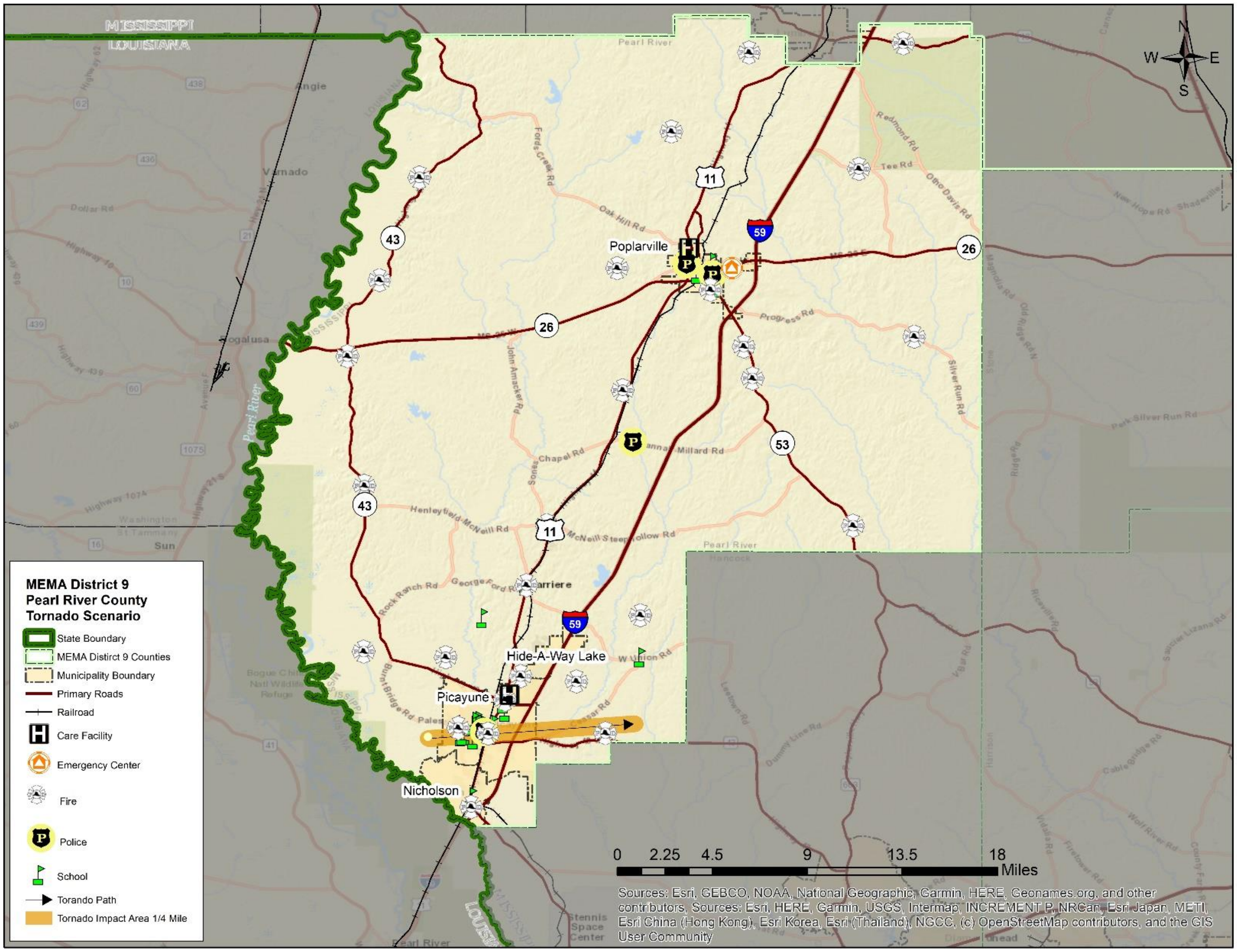
Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

According to historical information, tornado events pose a significant threat to Pearl River County. The probability of future tornado occurrences affecting Pearl River County is highly likely (100 percent annual probability). The following graphic demonstrates a potential scenario.

Figure E.23: Tornado Scenario



FEMA NRI Expected Annual Loss Estimates

Table E.53: Pearl River County Expected Annual Loss Table

PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR TORNADO EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.9 events/year	0.15	$1,721,711	$1,109,746	$1,224	$2,832,682	78.1	Relatively Moderate

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table E.54: Pearl River County Hazard Specific Risk Index Table

PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – TORNADO	
Risk Index Score	**Risk Index Rating**
76.7/100	Relatively Moderate
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Winter Weather

LOCATION AND SPATIAL EXTENT

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. Pearl River County is not accustomed to severe winter weather conditions and rarely receives severe winter weather, even during the winter months. Events tend to be mild in nature; however, even relatively small accumulations of snow, ice, or other wintery precipitation can lead to losses and damage due to the fact that these events are not commonplace. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, there have been a total of six recorded winter storm events in Pearl River County since 2008 with heaviest snow amounts ranging from 2-5 inches. These events did not result in any property damage. A summary of these events is presented in Table E.55. Detailed information on the recorded winter storm events can be found in Table E.56.

TABLE E.55: SUMMARY OF WINTER STORM EVENTS IN PEARL RIVER COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Pearl River County	4	0/0	$0	$0

Source: National Center for Environmental Information

TABLE E.56: HISTORICAL WINTER STORM IMPACTS IN PEARL RIVER COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Picayune				
None reported	--	--	--	--
Poplarville				
None reported	--	--	--	--
Unincorporated Area				
PEARL RIVER (ZONE)	12/11/2008	Heavy Snow	0/0	$0
PEARL RIVER (ZONE)	12/4/2009	Winter Storm	0/0	$0
PEARL RIVER (ZONE)	1/24/2014	Winter Weather	0/0	$0
PEARL RIVER (ZONE)	1/28/2014	Sleet	0/0	$0
PEARL RIVER (ZONE)	12/08/2017	Heavy Snow	0/0	$0
PEARL RIVER (ZONE)	1/16/2018	Winter Weather	0/0	$0

Source: National Center for Environmental Information

There have been several severe winter weather events in Pearl River County. The text below describes one of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

December 2008
A rare and widespread snowfall occurred across much of south Mississippi, beginning early in the morning of December 11th and continuing until around the noon hour, as an unusually strong and cold upper level storm system moved across the region. The snow, which was occasionally heavy, affected all but the coastal areas of south Mississippi. Snowfall amounts of 2 to 3 inches were common in this area; however, up to 6 inches of snow was reported in western Pearl River County.

December 2017
Low Pressure over the Gulf of Mexico drove moisture over a very cold airmass to aid in the development of a band of heavy snow across portions of southeast Louisiana and southern Mississippi. Numerous reports of 2 to 5 inches of snow was reported. Isolated areas of up to 8 inches of snow occurred over portions of southwest Mississippi, and up to 7 inches in small portion of southeast Louisiana near the Mississippi state line. In the areas from just west and southwest of the metro New Orleans area to the Mississippi Coast, generally snow amounts were around an inch to trace. Temperatures were generally around freezing in the areas experiencing snow. However, snow rates were intense enough to result in accumulations.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

PROBABILITY OF FUTURE OCCURRENCES

Winter storm events will continue to occur in Pearl River County. Based on historical information, the probability is likely (between 10 and 100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table E.57: Pearl River County Expected Annual Loss Table

PEARL RIVER COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WINTER WEATHER EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.4 events/year	0.00	$30,544	$24	$6	$30,575	39.9	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table E.58: Pearl River County Hazard Specific Risk Index Table

PEARL RIVER COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WINTER WEATHER	
Risk Index Score	Risk Index Rating
37.1/100	Relatively Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

OTHER HAZARDS

Climate Change/Sea Level Rise

LOCATION AND SPATIAL EXTENT

Climate Change

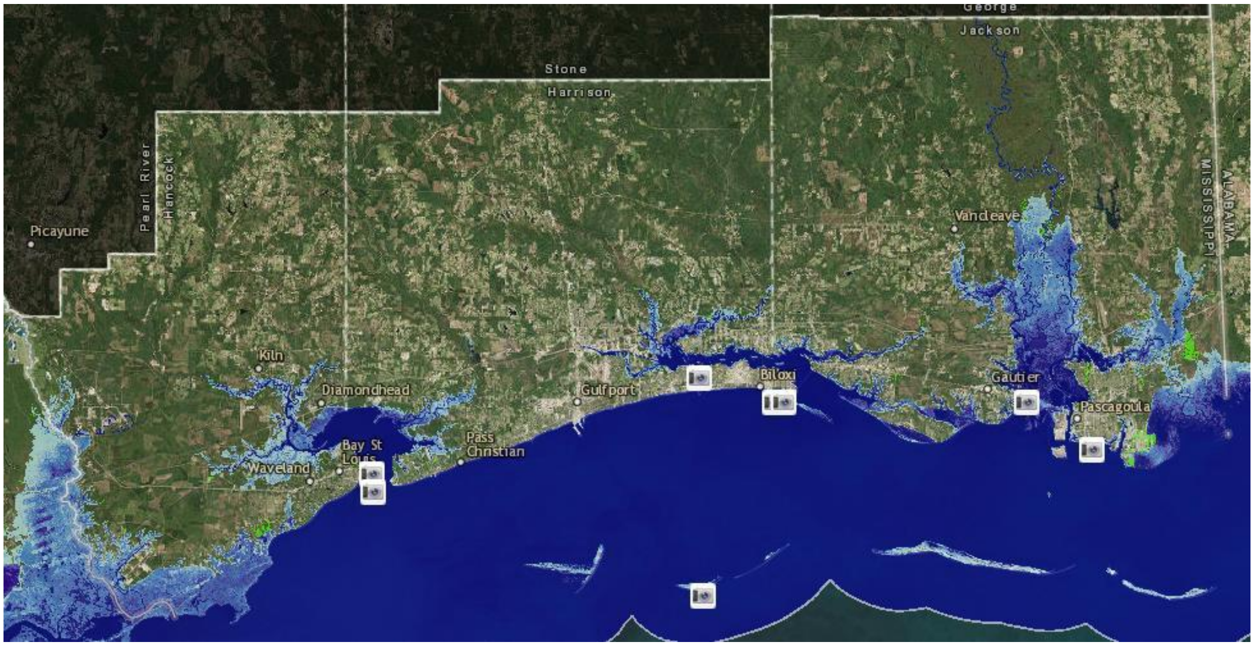
Climate change can have direct implications on many of the other hazards addressed in this plan since it has the potential to alter the nature and frequency of hazards, including increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, strong storms (wind, hurricane). Therefore, it is assumed that Pearl River County is uniformly exposed to this hazard.

Sea Level Rise

Sea level rise is occurring at a global scale. However, it does not affect areas uniformly and will be more severe in some places. Figure E.24 identifies areas in MEMA District 9 that would be inundated by water as a result of three feet in sea level rise as per projections by NOAA. The highest level of sea level rise projected by NOAA is shown in Figure E.25. This figure shows the inundation areas in the case of six feet of sea level rise. This demonstrates the additional areas that would be impacted beyond the three feet scenario.

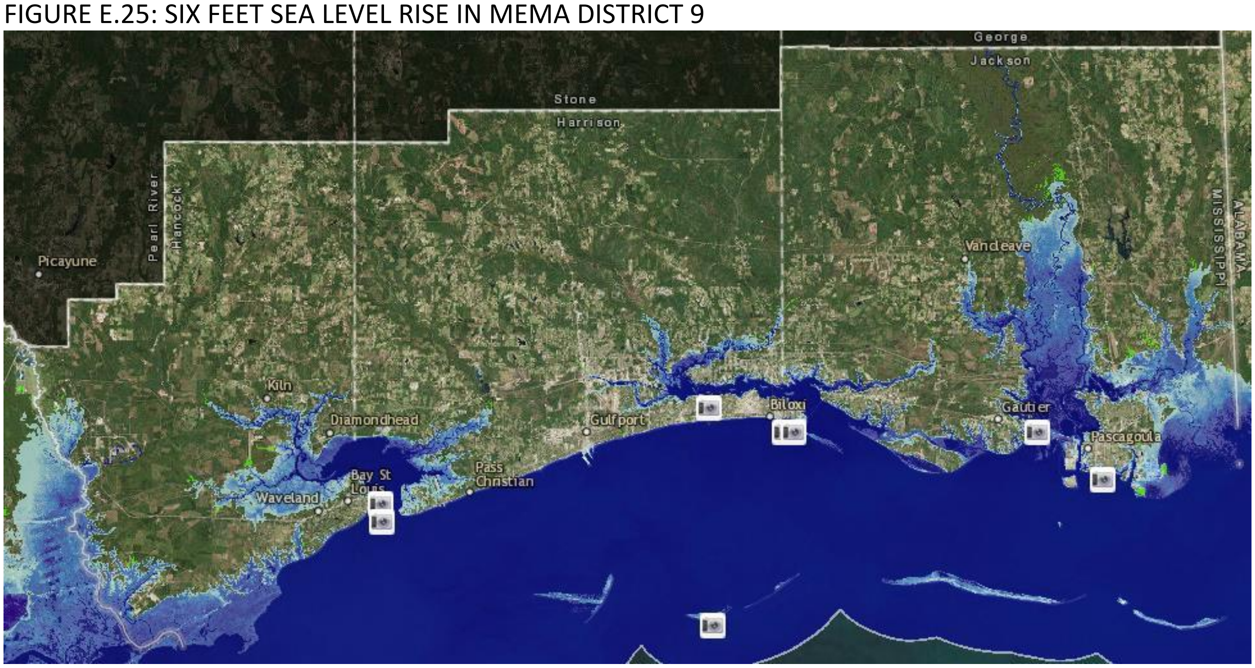
There are no areas in Pearl River County that would be impacted by projected sea level rise.

FIGURE E.24: THREE FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

FIGURE E.25: SIX FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

HISTORICAL OCCURRENCES

Climate Change
According to the National Climate Assessment, there have been increasing numbers of days above 95ºF and nights above 75ºF, and decreasing numbers of extremely cold days since 1970 in the Southeast. Daily and five-day rainfall intensities have also increased and summers have been either increasingly dry or extremely wet. The number of Category 4 and 5 hurricanes in the Atlantic basin has increased substantially since the early 1980s compared to the historic record that dates back to the mid-1880s. This can be attributed to both natural variability and climate change.

Sea Level Rise
Sea level rise is a slow-onset hazard and specific events/occurrences are not possible to determine.

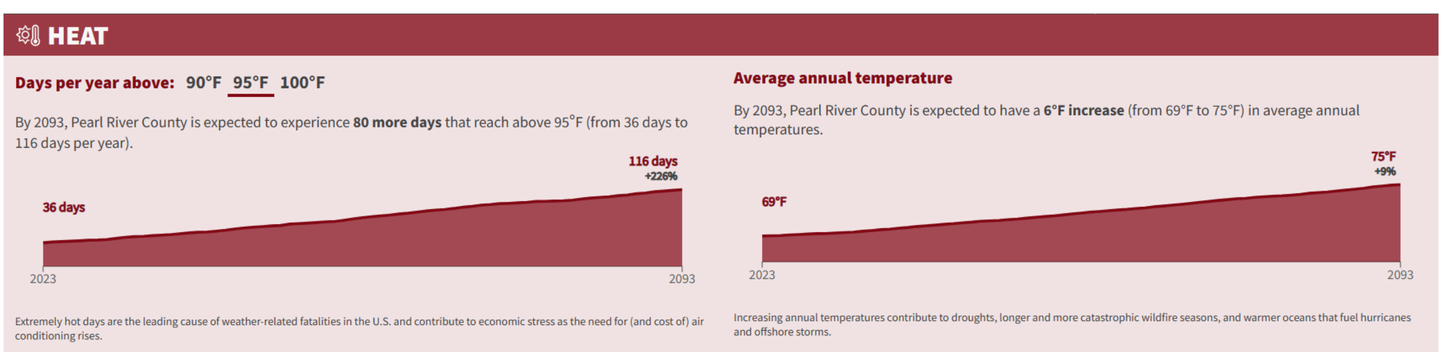
PROBABILITY OF FUTURE OCCURRENCES

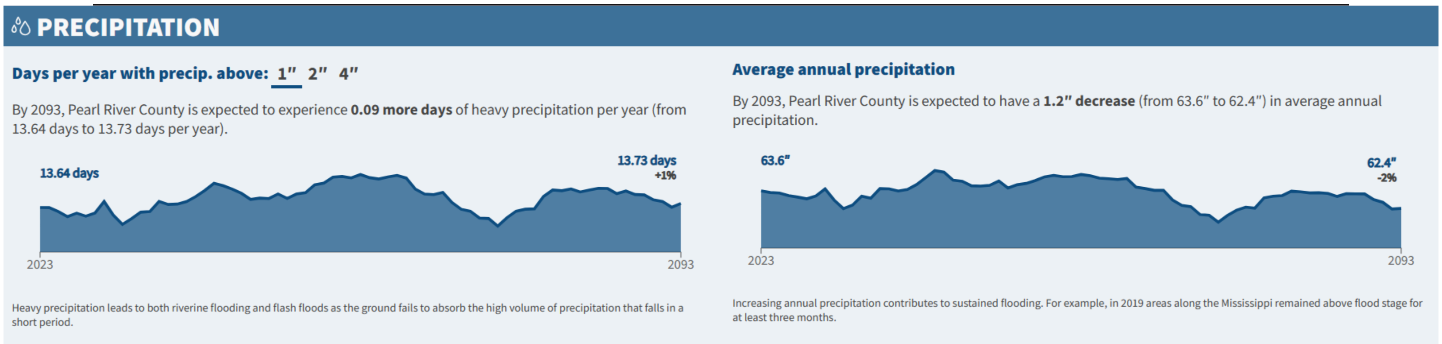
Climate Change
According to the National Climate Assessment, temperatures across the Southeast are expected to increase during this century, with shorter-term (year-to-year and decade-to-decade) fluctuations over time due to natural climate variability. Major consequences of warming include significant increases in the number of hot days (95ºF or above) and decreases in freezing events. Regional average increases are in the range of 4ºF to 8ºF by the year 2100.

Projections of future precipitation patterns are less certain than projections for temperature increases. Because the Southeast, is located in the transition zone between projected wetter conditions to the north and drier conditions to the southwest, many of the model projections show only small changes relative to natural variations. Additionally, projections further suggest that warming will cause tropical storms to be fewer in number globally, but stronger in force, with more Category 4 and 5 storms, and substantial further increases in extreme precipitation are projected as this century progresses.

Overall, future climate change is considered likely (between 10 and 100 percent annual probability).

According to Neighborhoods at Risk: George County can experience 80 more days per year reaching 95 degrees over the next 70 year projection with an overall 6 degree increase in average temperatures. In the same time period, the county is projected to experience 0.09 more days of heavy precipitation per year with 1.2” decrease in total annual precipitation.





Sea Level Rise
There is still much debate regarding the probability of future occurrence of sea level rise. This section will be updated as more information becomes available. Future sea level rise is considered likely (between 10 and 100 percent annual probability).

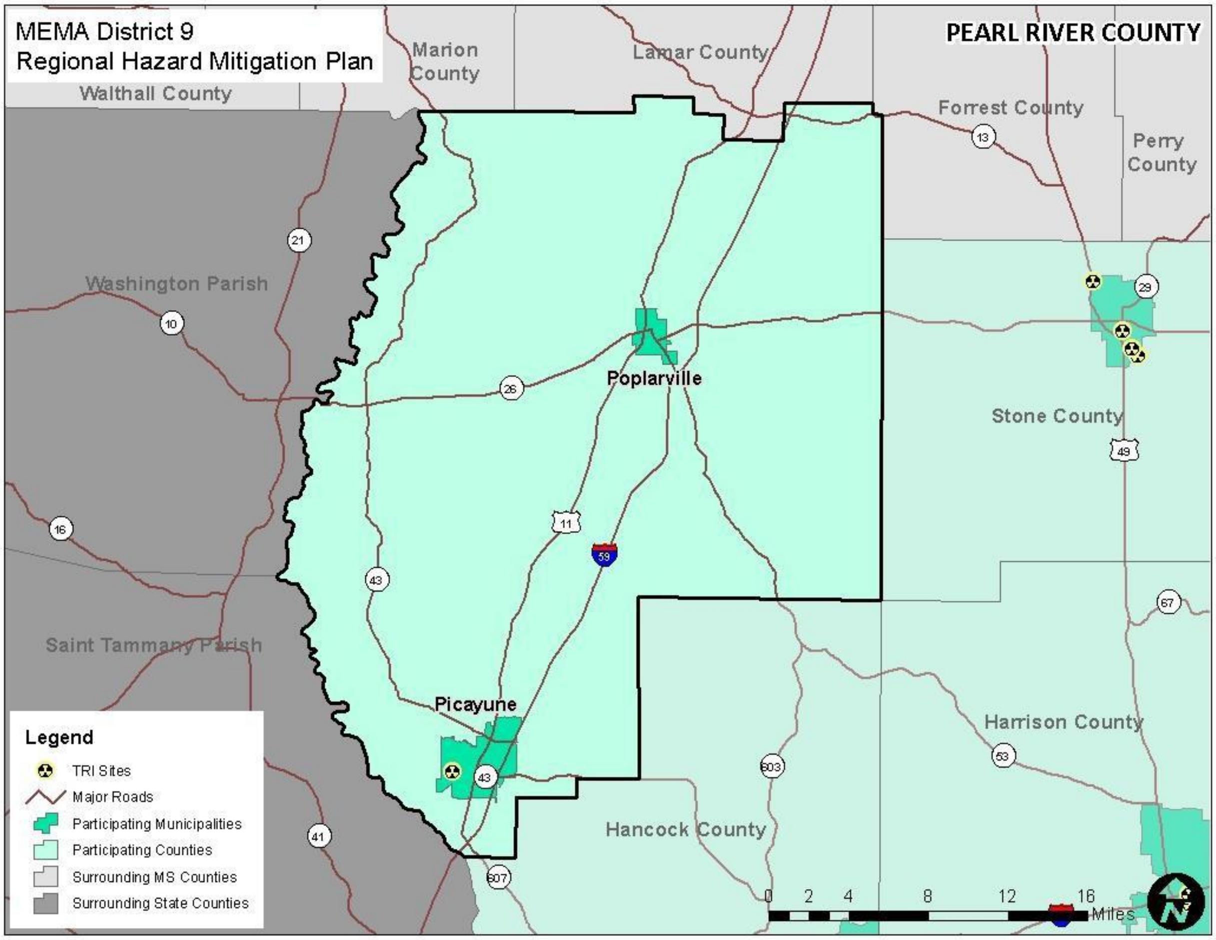
FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess climate change or sea level rise.

Hazardous Materials Incident/Train Derailment

LOCATION AND SPATIAL EXTENT

Pearl River County has one TRI site. This site is shown in Figure E.26.

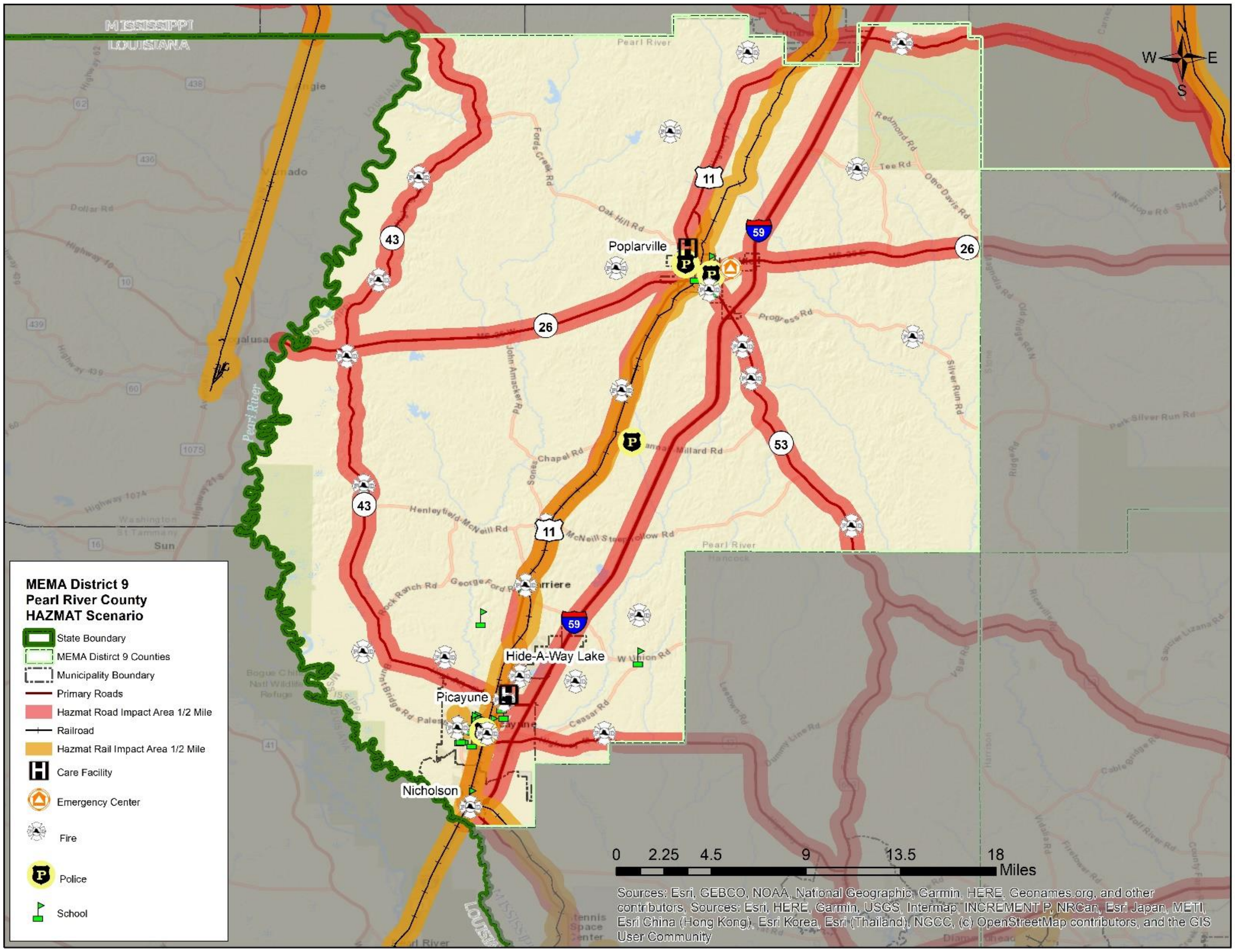
FIGURE E.26: TOXIC RELEASE INVENTORY (TRI) SITES IN PEARL RIVER COUNTY



Source: Environmental Protection Agency

In addition to “fixed” hazardous materials locations, hazardous materials may also impact the county via roadways and railways. Many roads and railways in the county are subject to hazardous materials transport and all roads and railways that permit hazardous material transport are considered potentially at risk to an incident.

Figure E.27: HAZMAT Scenario



HISTORICAL OCCURRENCES

There have been a total of 25 recorded HAZMAT incidents in Pearl River County since 1973. These events resulted in more than $315,000 (2016 dollars) in property damage as well as one injury. Table E.59 summarizes the HAZMAT incidents in Pearl River County as reported by PHMSA. Detailed information on these events is presented in Table E.60.

TABLE E.59: SUMMARY OF HAZMAT INCIDENTS IN PEARL RIVER COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2016)	Annualized Property Losses
Picayune	11	0/1	$142,745	$3,660
Poplarville	1	0/0	$14,168	$616
Unincorporated Area	13	0/0	$158,455	$3,685
PEARL RIVER COUNTY TOTAL	25	0/1	$315,368	$7,961

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE E.60: HAZMAT INCIDENTS IN PEARL RIVER COUNTY

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
Picayune							
I-1977071487	6/30/1977	PICAYUNE	Highway	No	0/0	$0	84 LGA
I-1979040925	3/16/1979	PICAYUNE	Highway	No	0/0	$0	75 LGA
I-1982090199	8/25/1982	PICAYUNE	Highway	No	0/0	$0	10 LGA
I-1985090477	9/6/1985	PICAYUNE	Highway	No	0/0	$0	3,000 GCF
I-1989070711	7/8/1989	PICAYUNE	Highway	Yes	0/0	$0	200 LGA
I-1990060757	6/14/1990	PICAYUNE	Highway	No	0/0	$0	75 LGA
I-1997110033	10/25/1997	PICAYUNE	Highway	No	0/0	$1,201	1 LGA
I-1998040304	3/24/1998	PICAYUNE	Highway	No	0/0	$1,064	16 SLB
I-2002030021	2/4/2002	PICAYUNE	Highway	No	0/0	$8	4 LGA
I-2002080951	7/16/2002	PICAYUNE	Highway	Yes	0/1	$139,398	2,875 LGA
Poplarville							
I-2016030078	2/24/2016	PICAYUNE	Highway	No	0/0	$1,075	25 LGA
I-1993110731	10/7/1993	POPLARVILLE	Highway	No	0/0	$14,168	35 LGA
I-1973120133	10/20/1973	NICHOLSON	Rail	No	0/0	$0	0
Unincorporated Area							
I-1980071620	4/13/1980	CARRIERE	Rail	Yes	0/0	$0	3,000 LGA
I-1980071619	4/13/1980	CARRIERE	Rail	Yes	0/0	$0	96,000 LGA
I-1980070734	7/6/1980	MCNEILL	Highway	No	0/0	$0	35 LGA
I-1981070740	7/15/1981	MCNEILL	Highway	No	0/0	$0	1 LGA
I-1991060029	5/4/1991	CARRIERE	Highway	No	0/0	$14,324	30 LGA
I-1992040277	3/10/1992	NICHOLSON	Highway	No	0/0	$86	50 LGA
I-1994061666	6/16/1994	MCNEIL	Highway	No	0/0	$7,352	5 LGA
I-1995030813	3/7/1995	NICHOLSON	Highway	No	0/0	$0	0.5 LGA
I-2000061620	2/16/2000	MCNEIL	Highway	No	0/0	$0	0.0625 LGA
I-2002101035	9/10/2002	MCNEIL	Highway	Yes	0/0	$136,559	0
I-2003010645	12/11/2002	MCNEIL	Highway	No	0/0	$134	1 LGA

*Property damage is reported in 2016 dollars; all damage may not have been reported.

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

PROBABILITY OF FUTURE OCCURRENCES

Given the location of one toxic release inventory site in Pearl River County and prior roadway and railway incidents, it is highly likely (100 percent annual probability) that a hazardous material incident may occur in the county. County and city officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess HAZMAT events.

Infectious Disease

LOCATION AND SPATIAL EXTENT

Due to the nature of a public health/emerging disease threat, it is difficult to identify a precise location where this type of event would occur. Moreover, a large-scale event would have impacts that spread throughout the county. Therefore, all areas in Pearl River County are considered equally susceptible to infectious diseases.

HISTORICAL OCCURRENCES

Mosquito-borne illness in Mississippi include West Nile virus, Chikungunya virus, and Zika virus. These illnesses affect birds, animals, and humans, causing flu-like symptoms in people who are bitten by infected mosquitoes. Occasionally illness can be severe, leading to meningitis or encephalitis. According to the Mississippi State Department of Health (MSDH), there have been no reported cases of mosquito-borne illnesses in Pearl River County as of November 2016. Table E.61 summarizes the mosquito-borne illnesses in humans reported in the county.

TABLE E.61: SUMMARY OF MOSQUITO-BORNE ILLNESSES IN PEARL RIVER COUNTY

Location	West Nile Virus	Chikungunya	Zika	Other*	Deaths
Pearl River County	0	0	0	0	0

*Other mosquito-borne illnesses include La Crosse encephalitis, St. Louis encephalitis, and Eastern Equine encephalitis.
Source: Mississippi State Department of Health

Diseases like influenza and norovirus are regularly occurring health issues in Pearl River County. These conditions are not legally reportable to county or state public health agencies, so data on disease incidence is not readily available. MSDH relies upon selected sentinel health practitioners across the state to report the percentage and total patient visits consistent with an influenza-like illness (ILI): fever of 100^{o}F or higher and cough or sore throat. Reports are used to estimate the state's ILI rate and the magnitude of state's influenza activity on a weekly basis. Reports represent only the distribution of flu in the state, not an actual count of all flu cases statewide.

PROBABILITY OF FUTURE OCCURRENCES

Due to some recent incidents that have been recorded across the State of Mississippi and in counties neighboring Pearl River County, future occurrences are considered possible (between 1 and 10 percent annual probability).

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess infectious diseases.

Conclusions on Hazard Risk

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

HAZARD EXTENT

Table E.62 describes the extent of each hazard identified for Pearl River County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE E.62: EXTENT OF PEARL RIVER COUNTY HAZARDS

<table>
<tr><th colspan="2">Flood-related Hazards</th></tr>
<tr><td>Dam and Levee Failure</td><td>Dam failure extent is defined using the Mississippi Division of Environmental Quality classifications which include Low, Significant, and High. Three dams are classified as high- hazard in Pearl River County.</td></tr>
<tr><td>Erosion</td><td>The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in Pearl River County.</td></tr>
<tr><td>Flood</td><td>Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest flood recorded for the county was at West Hobolochitto Creek near McNeill. The maximum historic crest was recorded at 29.96 feet, or
9.96 feet above the major flood stage (reported on July 5, 1916). Additional historic crest heights and the corresponding flood categories are in the table below.
<table>
<tr><th rowspan="2">Location/ Jurisdiction</th><th rowspan="2">Date</th><th rowspan="2">Maximum Historic Crest (ft)</th><th colspan="4">Flood categories</th></tr>
<tr><th>Action Stage (ft)</th><th>Flood Stage (ft)</th><th>Moderate Flood Stage (ft)</th><th>Major Flood Stage (ft)</th></tr>
<tr><td colspan="4">Pearl River County</td><td></td><td></td><td></td></tr>
<tr><td>WEST HOBOLOCHITTO CREEK NEAR MCNEILL</td><td>7/5/1916</td><td>29.96</td><td>12</td><td>15</td><td>18</td><td>20</td></tr>
<tr><td>EAST HOBOLOCHITTO CREEK NEAR CAESAR</td><td>9/2/2012</td><td>21.53</td><td>12</td><td>15</td><td>17</td><td>20</td></tr>
</table></td></tr>
<tr><td>Storm Surge</td><td>Storm surge can be defined by the depth of inundation which is defined by the category of hurricane/tropical storm. Since the MEMA District 9 Region could easily be impacted by a Category 3 storm, depth of inundation could be at least 9 feet in many areas. However, there
is only a small area in Pearl River County that could potentially be impacted.</td></tr>
<tr><th colspan="2">Fire-related Hazards</th></tr>
</table>

Drought	Drought extent is defined by the U.S. Drought Monitor classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought. According to the U.S. Drought Monitor classifications, the most severe drought condition is Exceptional. Pearl River County has received this ranking twice over the 17-year reporting period.
Lightning	According to the Vaisala's flash density map, Pearl River County is located in an area that experiences 4 to 12 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Wildfire	Wildfire data was provided by the Mississippi Forestry Commission and is reported annually by county from 2007-2022. The greatest number of fires to occur in Pearl River County in any year 199 in 2011. The greatest number of acres to burn in the county in a single year occurred in 2011 when 4,118 acres were burned. Information on specific occurrences of wildfire and the most severe fires in each jurisdiction is not available. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale, the Modified Mercalli Intensity (MMI) scale, and the distance of the epicenter from Pearl River County. According to data provided by the National Centers for Environmental Information, no earthquakes were reported in Pearl River County.
Wind-related Hazards	
Extreme Cold	The extent of extreme cold can be defined by the minimum temperature reached. Official long term temperature records are not kept for any areas in Pearl River County. However, the temperature has previously ranged from 15 to 20 degrees Fahrenheit in southwest and coastal Mississippi (reported on December 18, 1996).
Extreme Heat	The extent of extreme heat can be measured by the record high temperature recorded. Official long term temperature records are not kept for any areas in Pearl River County. However, the highest recorded temperature in Beaumont (northeast of the county) was 105°F and heat index values were recorded as high as 115°F (reported in July 2000).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Pearl River County was 1.75 inches (last reported on May 12, 2009). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5. The greatest classification of hurricane to traverse directly through Pearl River County was Hurricane Camille, a Category 3 storm which carried tropical force winds of 100 knots upon arrival in the county.
Severe Thunderstorm/High Wind	Thunderstorm extent is defined by wind speeds reported. The strongest recorded wind event in Pearl River County was 84 knots (reported on July 1, 1979). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by the Fujita/Enhanced Fujita. The greatest magnitude reported in Pearl River County was an EF3 (reported on December 25, 2012).
Winter Weather	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest snowfall reported in Pearl River County was 6 inches (reported on December 11, (2008).
Other Hazards	

Climate Change/Sea Level Rise	It is still uncertain what the extent of climate change will be in the future. However, increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, stronger storms (wind, hurricanes) can be expected. Sea level rise is defined by the areas impacted, but is more often associated with the amount of sea level rise that is expected to take place. Although it is difficult to predict an exact
	amount of rise, the Climate Change Surging Seas Report intermediate high sea level rise scenario projects 1 foot of rise locally by 2050 and 3.7 feet by 2100.
Hazardous Materials Incident/Train Derailment	According to USDOT PHMSA, the largest hazardous materials incident reported in Pearl River County was 96,000 LGA released on the railway (reported on April 13, 1980). It should be noted that larger events are possible.
Infectious Disease	An infectious disease threat could have large-scale effects throughout the county and may cause illness in many people. Possible impacts from a disease threat depend largely on the impacted population but might include anything from absenteeism and loss of productivity in the workplace to death or serious illness to humans or livestock. A serious disease threat could affect many thousands of people such as the Coronavirus COVID 19) did during the global pandemic.

PRIORITY RISK INDEX RESULTS

In order to draw some meaningful planning conclusions on hazard risk for Pearl River County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Risk Index" (RI). More information on the RI and how it was calculated can be found in Section 5.21.2.

Table E.63 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the RI. Assigned risk levels were based on the detailed hazard profiles developed for this subsection, as well as input from the Regional Hazard Mitigation Council. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE E.63: SUMMARY OF RI RESULTS FOR PEARL RIVER COUNTY

	Probability	Consequence				Total Risk
Hazard Event	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Factors	Sum of Weighted Impact Factors	Consequence Score	Total Risk Score (Probability x Consequence)
Dam and Levee Failure	1	1	6	15	22	14
Erosion	3	8	8	16	32	52
Flood	3	12	12	32	56	84
Storm Surge	3	8	5	23	36	57
Drought	2	8	11	18	37	41
Lightning	3	10	11	22	43	67
Wildfire	3	9	6	24	39	61
Earthquake	0	0	4	12	16	0
Extreme Cold	2	10	5	19	34	38

Extreme Heat/Heat Wave	3	12	10	27	49	75
Hailstorm	2	7	6	13	26	30
Hurricane Tropical Storm	3	12	17	39	68	99
Severe Thunderstorm/High Wind	3	10	16	32	58	86
Tornado	2	8	15	34	57	60
Winter Weather	3	9	7	26	42	65
Climate Change/Sea Level Rise	3	8	6	22	36	57
HAZMAT/Train Derailment	1	4	6	17	27	17

Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Pearl River County, including the PRI results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (Table E.64). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Pearl River County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: Vulnerability Assessment and below in Section E.3. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

Some priorities have changed since the previous plans were adopted due to the merging of multiple local plans to form this regional plan; however, most priorities remain the same.

TABLE E.64: CONCLUSIONS ON HAZARD RISK FOR PEARL RIVER COUNTY

HIGH RISK	Flood Lightning Wildfire Hurricane Tropical Storm Severe Thunderstorm/High Wind Tornado Winter Weather
MODERATE RISK	Erosion Storm Surge Drought Extreme Cold Hailstorm Climate Change/Sea Level Rise
LOW RISK	Dam and Levee Failure Earthquake Hazmat/Train Derailment

SECTION 24 PEARL RIVER COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Pearl River County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: Vulnerability Assessment.

Asset Inventory

Table E.65 lists the estimated number of buildings, parcels, and the total value of improvements for Pearl River County and its participating jurisdictions (study area of vulnerability assessment). Because digital parcel data was not available for every community, data obtained from Hazus-MH 3.2 inventory was utilized to supplement the analysis where gaps existed.

Table E.67 lists the critical facilities located in Pearl River County by type according to data provided by local government officials.

In addition, Figure E.18 shows the locations of critical facilities in Pearl River County. Table E.81, at the end of this subsection, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. Further, it should be noted that the table below may show that some communities do not have any critical facilities of in certain type, when in reality, that particular type of facility may actually be located within the community. This may occur because spatial data for that facility type was not available or because the facility may have been classified under a different category type for that particular community.

TABLE E.65: CRITICAL FACILITY INVENTORY IN PEARL RIVER COUNTY

Location	Communications	EOC	Fire Stations	Medical	Police Station	Power/ Gas	Private/Non-Profit
Picayune	0	0	7	1	1	0	0
Poplarville	0	1	10	1	2	0	0
Unincorporated Area	0	0	8	0	0	0	0
PEARL RIVER COUNTY TOTAL	0	1	25	2	3	0	0

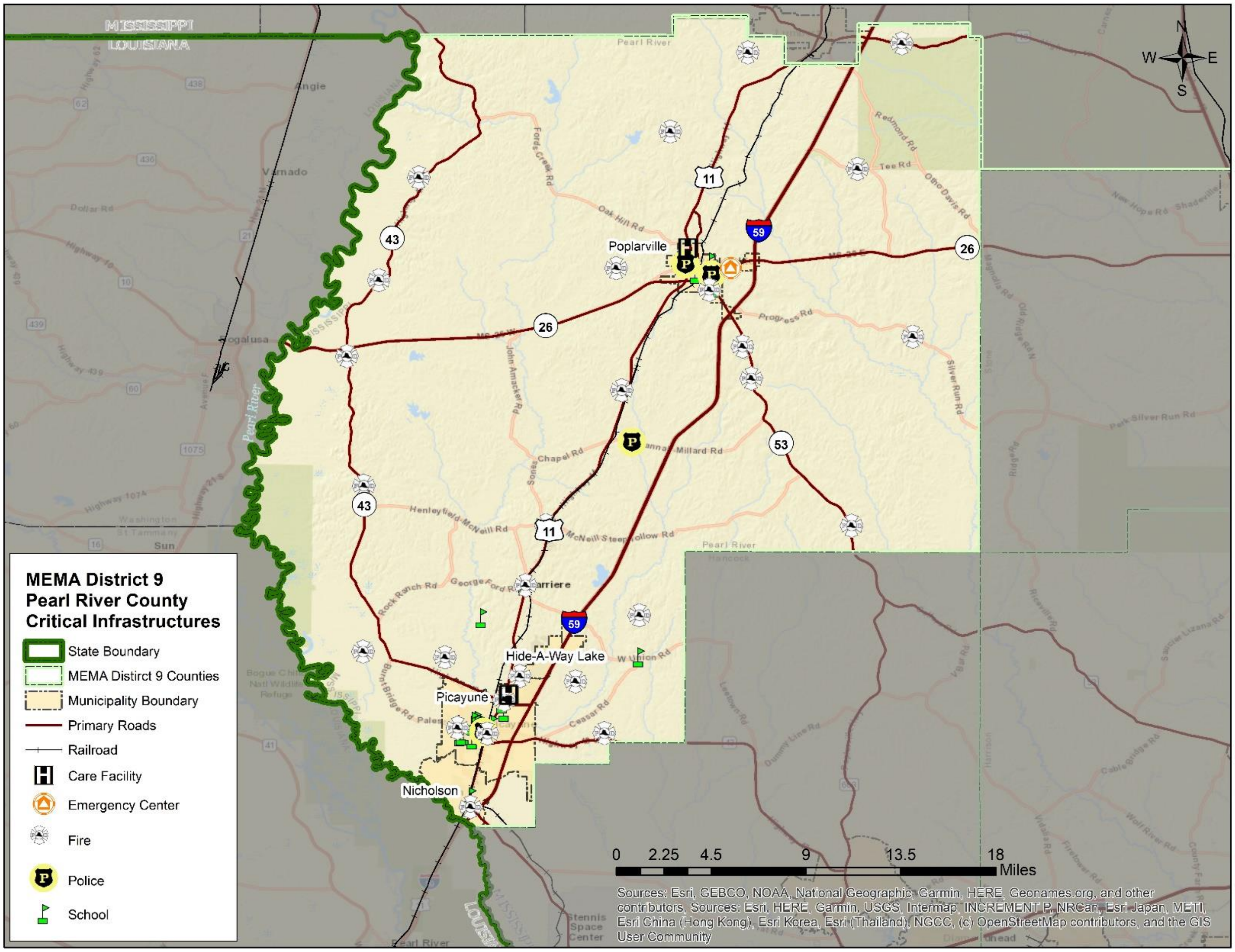
Source: Local Governments

TABLE E.66: CRITICAL FACILITY INVENTORY IN PEARL RIVER COUNTY (CONT.)

Location	Public Facility	School	Shelter	Special Populations	Transportation	Water/ Wastewater
Picayune	0	15	0	1	0	0
Poplarville	1	7	0	0	0	0
Unincorporated Area	0	5	0	0	0	0
PEARL RIVER COUNTY TOTAL	1	5	0	0	0	0

Source: Local Governments

FIGURE E.28: CRITICAL FACILITY LOCATIONS IN PEARL RIVER COUNTY



Source: Local Governments

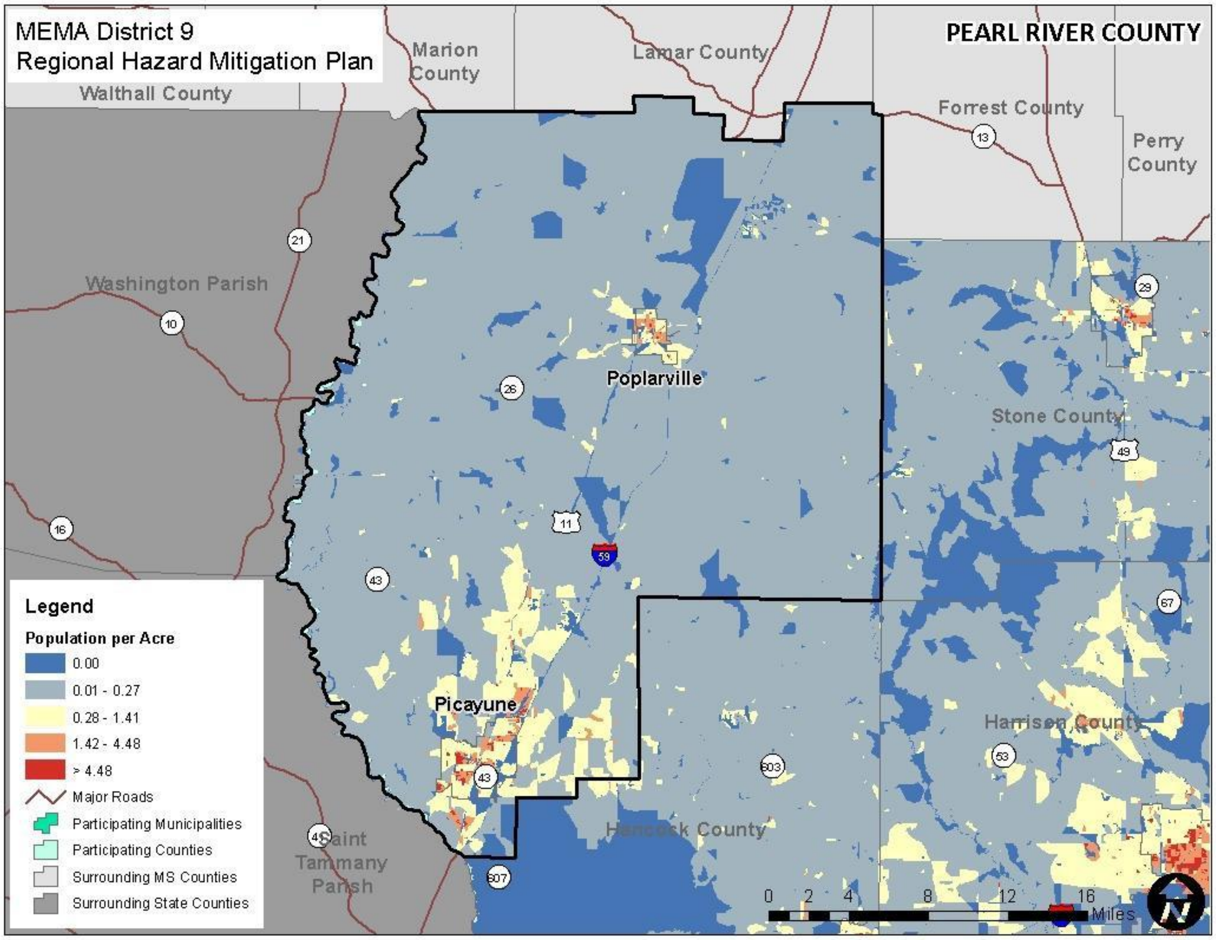
Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Pearl River County that are potentially at risk to these hazards.

Table E.68 lists the population by jurisdiction according to American Community Survey 2015 population estimates. The total population in Pearl River County according to Census data is 55,196 persons. Additional population estimates are presented above in Section E.1.

In addition, Figure E.29 illustrates the population density per acre by census block as it was reported by the U.S. Census Bureau in 2010. As can be seen in the figure, the population is spread out through most of the county, with a heavier concentration in Picayune and Poplarville.

FIGURE E.29: POPULATION DENSITY IN PEARL RIVER COUNTY



Source: United States Census Bureau, 2010 Census

Development Trends and Changes in Vulnerability

Since the previous local-level hazard mitigation plans were approved, Pearl River County has experienced moderate growth and development. Table E.67 shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

TABLE E.67: BUILDING COUNTS FOR PEARL RIVER COUNTY

Location	2010	2011	2012	2013	2014	2015	% Building Stock Built Post-2010
Picayune	5,106	4,901	4,864	4,850	4,785	4,854	-4.9%
Poplarville	937	1,108	1,095	1,063	1,021	1,006	7.4%

Location	2010	2011	2012	2013	2014	2015	% Building Stock Built Post-2010
Unincorporated Area	17,649	17,868	18,109	18,222	18,476	18,563	5.2%
PEARL RIVER COUNTY TOTAL	23,692	23,877	24,068	24,135	24,282	24,423	3.1%

Source: United States Census Bureau, American Community Survey

Table E.68 shows population growth estimates for the county from 2010 to 2015 based on the based on the American Community Survey's annual population estimates.

TABLE E.68: POPULATION GROWTH FOR PEARL RIVER COUNTY

Location	Population Estimates						% Change 2010-2015
	2010	2011	2012	2013	2014	2015	
Picayune	11,087	11,023	10,982	10,901	10,838	10,784	-2.7%
Poplarville	3,016	2,977	2,923	2,852	2,874	2,919	-3.2%
Unincorporated Area	41,820	42,042	41,981	41,816	41,581	41,493	-0.8%
PEARL RIVER COUNTY TOTAL	55,923	56,042	55,886	55,569	55,293	55,196	-1.3%

Source: United States Census Bureau, American Community Survey

Based on the data above, there has been a moderate rate of residential development in the county since 2010, and the some of the county has experienced slight increases in housing development, resulting in an increased number of structures that are vulnerable to the potential impacts of the identified hazards. However, the City of Picayune has experienced a slight decline in housing development since 2010 according to estimates. Additionally, there has been a slight decline in population since 2010 across the county. Therefore, development has impacted the county's vulnerability since the previous local hazard mitigation plans were approved and there has been an increase in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains or other identified areas of high risk.

Vulnerability Assessment Results

As noted in Section 6: Vulnerability Assessment, only hazards with a specific geographic boundary, available modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Pearl River County, are presented here. All other hazards are assumed to impact the entire planning region (e.g., drought) or, due to lack of data, analysis would not lead to credible results (e.g., infectious disease). The total county exposure, and thus risk to these hazards, was presented in Table E.64.

The hazards to be further analyzed in this subsection include: flood, wildfire, earthquake, hurricane and tropical storm winds and storm surge, hazardous materials incident, dam and levee failure, and sea level rise.

The annualized loss estimate for all hazards is presented near the end of this subsection in Table E.81.

FLOOD

Historical evidence indicates that Pearl River County is susceptible to flood events. A total of 20 flood events have been reported by the National Center for Environmental Information resulting in $3.6 million (2016 dollars) in property damage. On an annualized level, these damages amounted to $191,132 for Pearl River County.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with improved property records for Pearl River County. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified floodplain.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table E.69 shows the results of the analysis.

TABLE E.69: ESTIMATED EXPOSURE OF PROPERTY TO THE FLOOD HAZARD

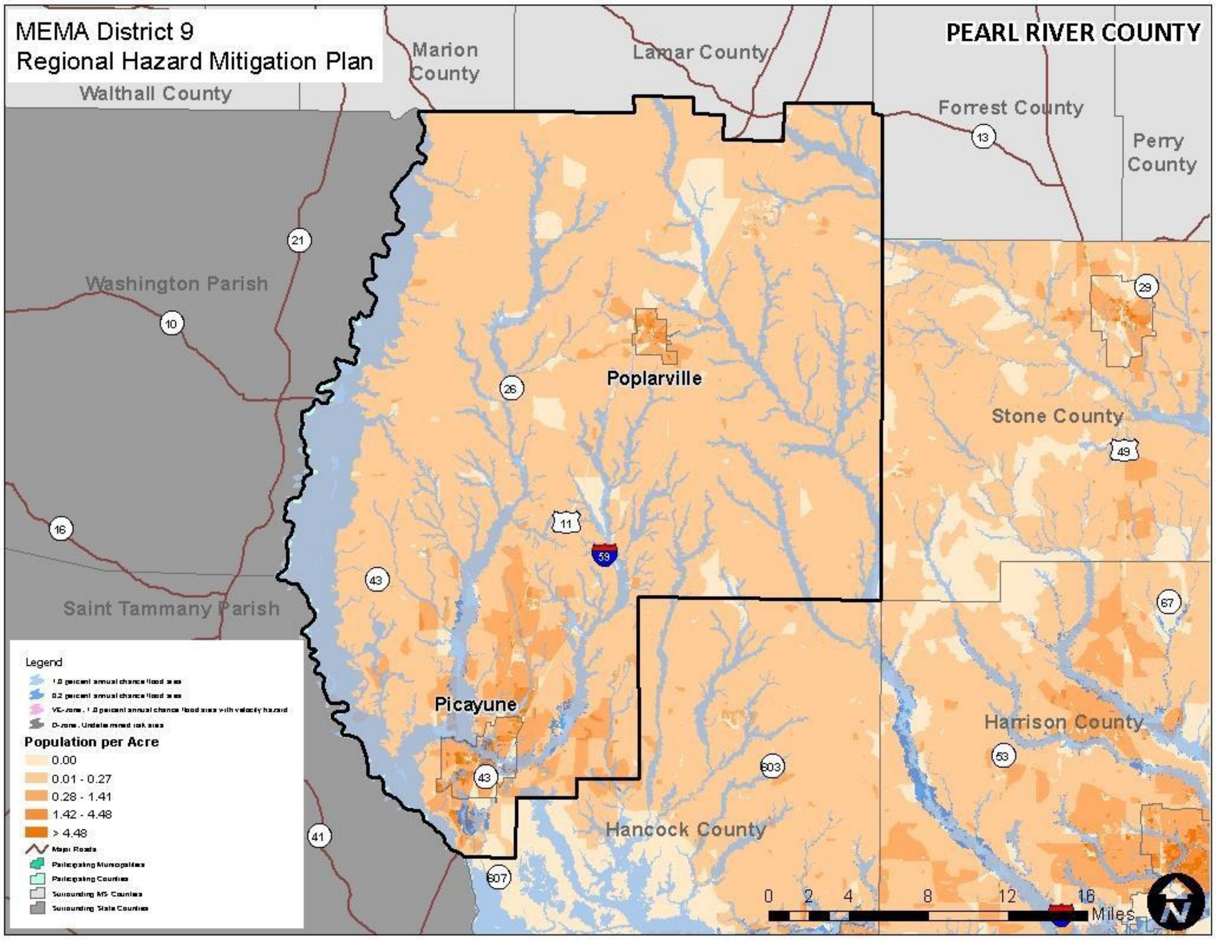
Location	1.0-percent ACF		0.2-percent ACF		VE Zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Picayune	576	$549,169,000	629	$394,185,000	0	$0
Poplarville	0	$0	0	$0	0	$0
Unincorporated Area	3,280	$1,140,592,000	778	$208,993,000	0	$0
PEARL RIVER COUNTY TOTAL*	3,856	$1,689,761,000	1,407	$603,178,000	0	$0

* As noted above, parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.
Source: Federal Emergency Management Agency DFIRM, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Figure E.30 is presented to gain a better understanding of at-risk population by evaluating census block level population data against mapped floodplains. There are areas of concern in several of the population centers in the county. Therefore, there is significant population vulnerability to flooding.

FIGURE E.30: POPULATION DENSITY NEAR FLOODPLAINS IN PEARL RIVER COUNTY



Source: Federal Emergency Management Agency DFIRM, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are 7 facilities located in one of the identified floodplain zones. (Please note, as previously indicated, this analysis does not consider building elevation, which may negate risk.) All 7 of these facilities are located in the 1.0 percent annual chance flood zone. A list of specific critical facilities and their associated risk can be found in Table E.81 at the end of this subsection.

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in Pearl River County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. Such site-specific vulnerability determinations are outside the scope of this assessment but may be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

WILDFIRE

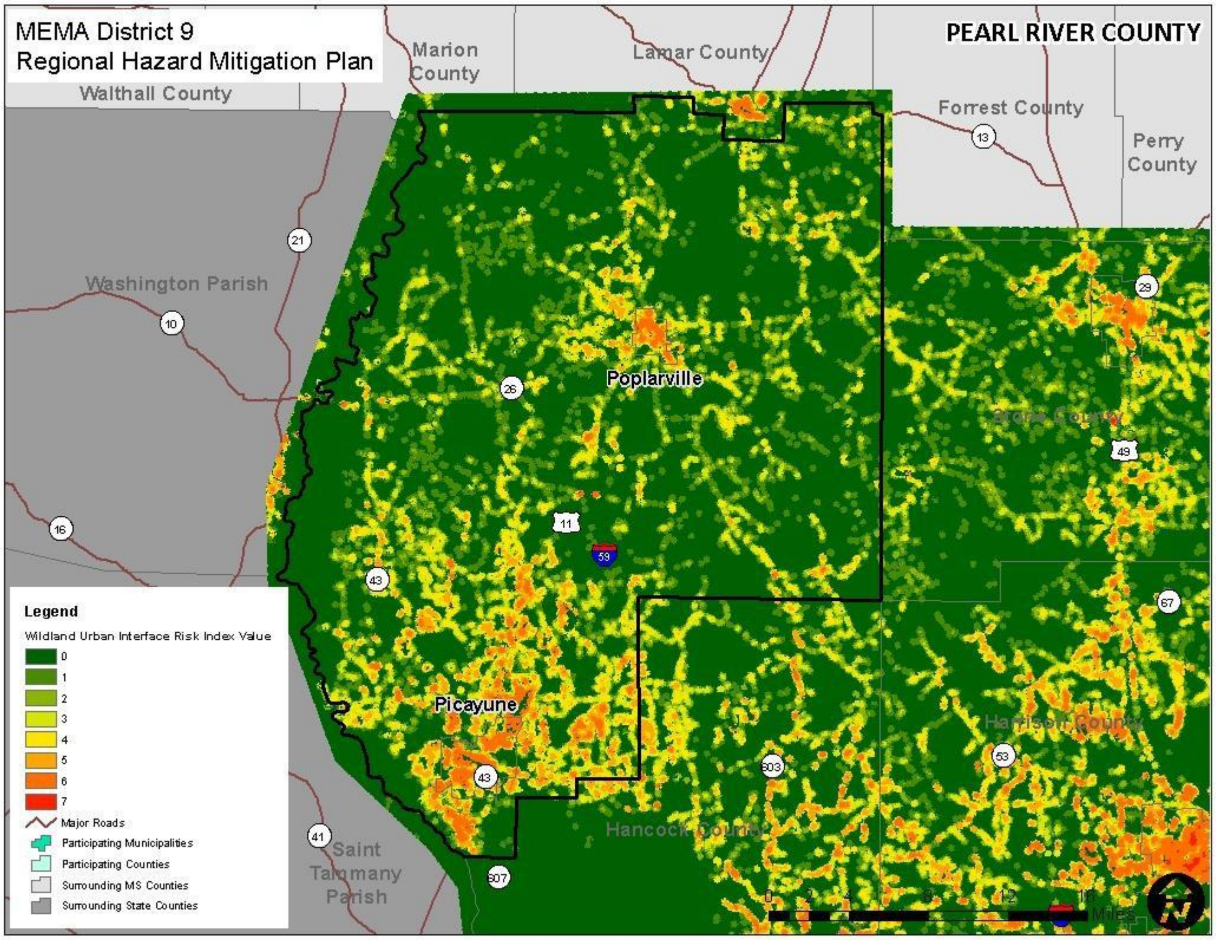
Although historical evidence indicates that Pearl River County is susceptible to wildfire events, there are few reports which include information on historic dollar losses. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered relatively low, though it should be noted that a single event could result in significant damages throughout the county.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones. For the critical facility analysis, areas of concern were intersected with critical facility locations.

Figure E.31 shows the Wildland Urban Interface Risk Index (WUIRI) data, which is a data layer that shows a rating of the potential impact of a wildfire on people and their homes. The key input, Wildland Urban Interface (WUI), reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the WUI and rural areas is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, it was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to 7 with higher values being most severe (as noted previously, this is only a measure of relative risk). Figure E.32 shows the areas of analysis where any grid cell is less than 3. Areas with a value below 3 were chosen to be displayed as areas of risk because this showed the upper echelon of the scale and the areas at highest risk.

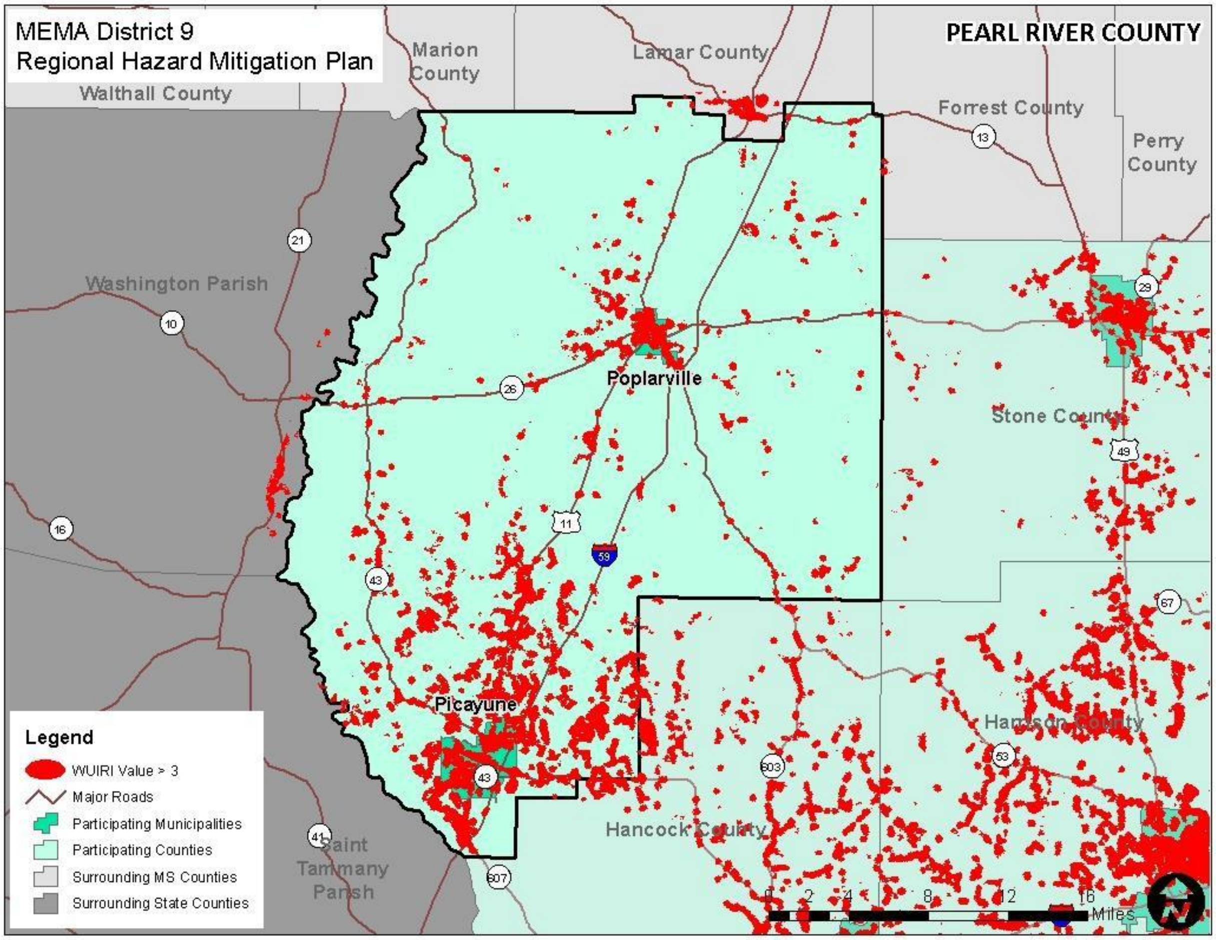
Table E.70 shows the results of the analysis.

FIGURE E.31: WUI RISK INDEX AREAS IN PEARL RIVER COUNTY



Source: Southern Wildfire Risk Assessment Data

FIGURE E.32: WILDFIRE RISK AREAS IN PEARL RIVER COUNTY



Source: Southern Wildfire Risk Assessment Data

TABLE E.70: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE RISK AREAS

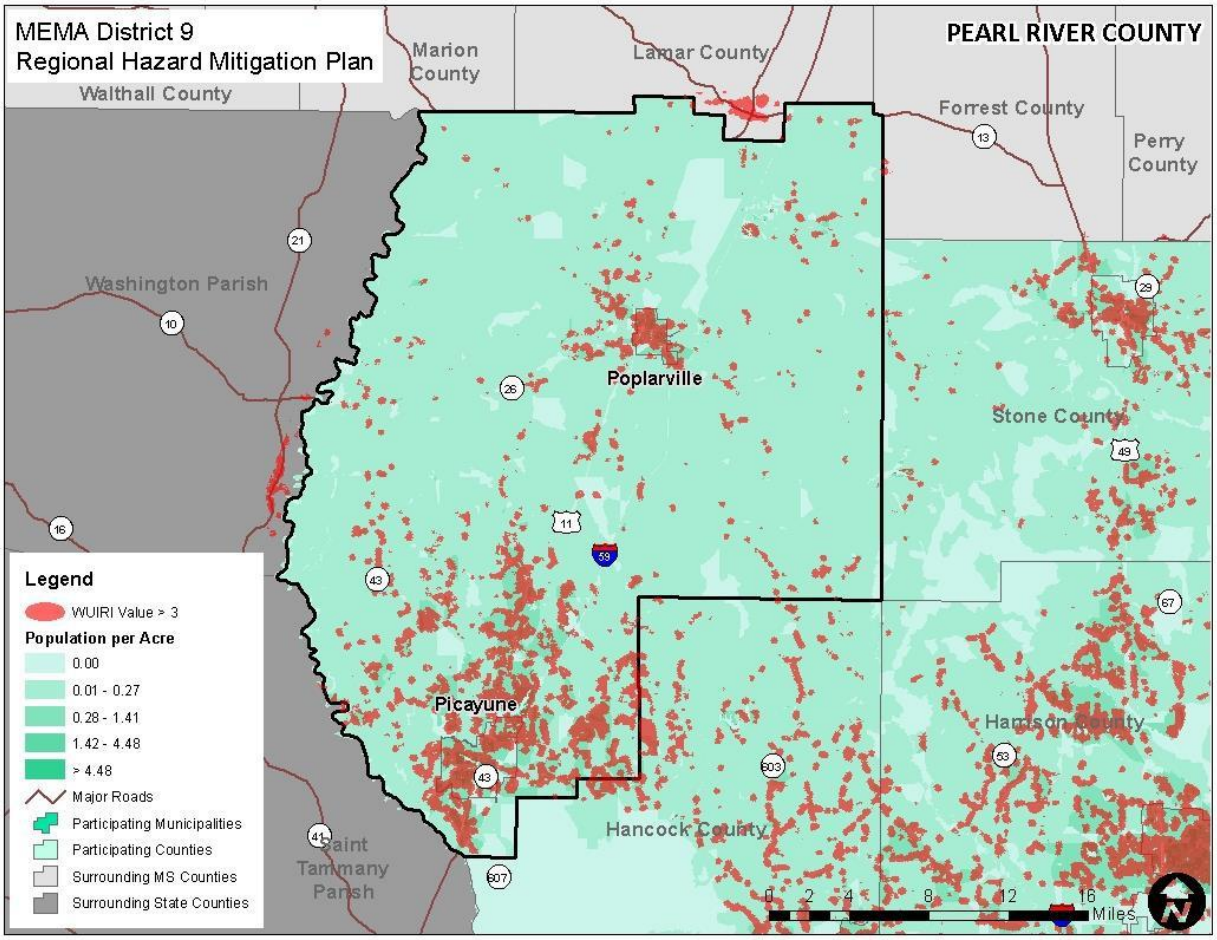
Location	Wildfire Risk	
	Approx. Number of Buildings	Approx. Improved Value
Picayune	6,411	$1,357,763,000
Poplarville	1,846	$319,907,000
Unincorporated Area	21,492	$2,674,471,000
PEARL RIVER COUNTY TOTAL*	29,749	$4,352,141,000

* As noted above, parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.
Source: SWRA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Given some level of susceptibility across the entire county, it is assumed that the total population is at risk to the wildfire hazard. Figure E.33 shows an overlay of the wildfire risk areas identified above with the population density by census block. This shows that many of the areas of high population concentration are susceptible to wildfire because of their proximity to the wildland urban interface.

FIGURE E.33: WILDFIRE RISK AREAS IN PEARL RIVER COUNTY



Source: Southern Wildfire Risk Assessment Data; United States Census

Critical Facilities

The critical facility analysis revealed that there are 43 critical facilities located in wildfire areas of concern, including 1 EOC, 17 fire stations, 2 medical, 3 police stations, 7 public facilities, 4 shelters, 1 transportation, and 8 water/wastewater. It should be noted, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in Table E.81 at the end of this subsection.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Pearl River County.

EARTHQUAKE

As the Hazus-MH model suggests below, and historical occurrences confirm, any earthquake activity in the area is likely to inflict only minor to moderate damage to the county. Hazus-MH 3.2 estimates a total annualized loss of $20,000 which includes buildings, contents, and inventory throughout the county.

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the average annualized loss for the county. The results of the analysis are generated at the Census Tract level within Hazus-MH and then aggregated to the county level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to structure failure, building loss, contents damage, and inventory loss. They do not include losses to business interruption, lost income, or relocation. Table E.71 summarizes the findings with results rounded to the nearest thousand.

TABLE E.71: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Structural Damage	Non-Structural Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Pearl River County	$5,000	$12,000	$3,000	$0	$20,000

Source: Hazus-MH 3.2

Social Vulnerability

It can be assumed that all existing and future populations are at risk to the earthquake hazard.

Critical Facilities

The Hazus-MH probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Pearl River County. The Hazus-MH scenario indicates that minimal to moderate damage is expected from an earthquake occurrence. While Pearl River County may not experience a large earthquake, localized damage is possible with an occurrence. A list of specific critical facilities and their associated risk can be found in Table E.81 at the end of this subsection.

HURRICANE AND TROPICAL STORM

Historical evidence indicates that Pearl River County has very significant risk to the hurricane and tropical storm hazard. There have been 12 disaster declarations due to hurricanes or tropical storms ((Hurricanes Betsy, Camille, Frederic, Elena, Georges, Ivan, Dennis, Katrina, Gustav, and Isaac, as well as Tropical Storms Allison and Isidore). A large number tracks have come near or traversed through the county, as shown and discussed in Section E.2.12. Hazus-MH 3.2 estimates a total annualized loss of $10,541,000 which includes buildings, contents, and inventory throughout the county.

Hurricane Winds

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and storm surge and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore, only these two aspects of hurricane losses are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to hurricane and tropical storm wind hazard. Hazus-MH 3.2 was used to determine average annualized losses for the county as shown below in Table E.72. Only losses to buildings, inventory, and contents are included in the results.

TABLE E.72: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Pearl River County	$7,495,000	$3,020,000	$26,000	$10,541,000

Source: Hazus-MH 3.2

Storm Surge

In addition, although it was treated as a separate hazard throughout this plan, storm surge is most often associated with hurricanes and tropical storms. Indeed, Hazus incorporates the storm surge model for estimating damage from storm surge as part of the hurricane model. The storm surge model can only be run as part of a historic hurricane model run and not as part of an annualized loss model. Unfortunately, in this model, storm surge impacts are calculated as part of the total damage from the historic event and thus could not be separated out and evaluated solely in terms of storm surge loss. As such, the estimated losses presented below are combined losses from hurricane winds and storm surge. The historic Hurricane Katrina model was utilized as this was certainly one of the most impactful storms in the region and therefore estimates the potential losses that are possible from a large hurricane event. Table E.73 presents the losses from this modeled event.

TABLE E.73: POTENTIAL LOSS ESTIMATIONS FOR LARGE HURRICANE EVENT

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Pearl River County	$205,561,000	$75,831,000	$628,000	$282,020,000

Source: Hazus-MH 3.2

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population, both current and future, is at risk to the hurricane and tropical storm wind hazard. In terms of social vulnerability to storm surge, coastal populations are at much higher risk than inland populations. Since Pearl River County is not located on the coast, there is lower social vulnerability to storm surge compared to the rest of the region.

Critical Facilities

Given equal vulnerability across Pearl River County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among factors. Determining individual building response to wind and storm surge is beyond the scope of this plan. However, this plan will consider mitigation action for especially vulnerable structures and/or critical facilities to mitigate against the effects of the hurricane hazard. A list of specific critical facilities can be found in Table E.81 at the end of this subsection.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Pearl River County.

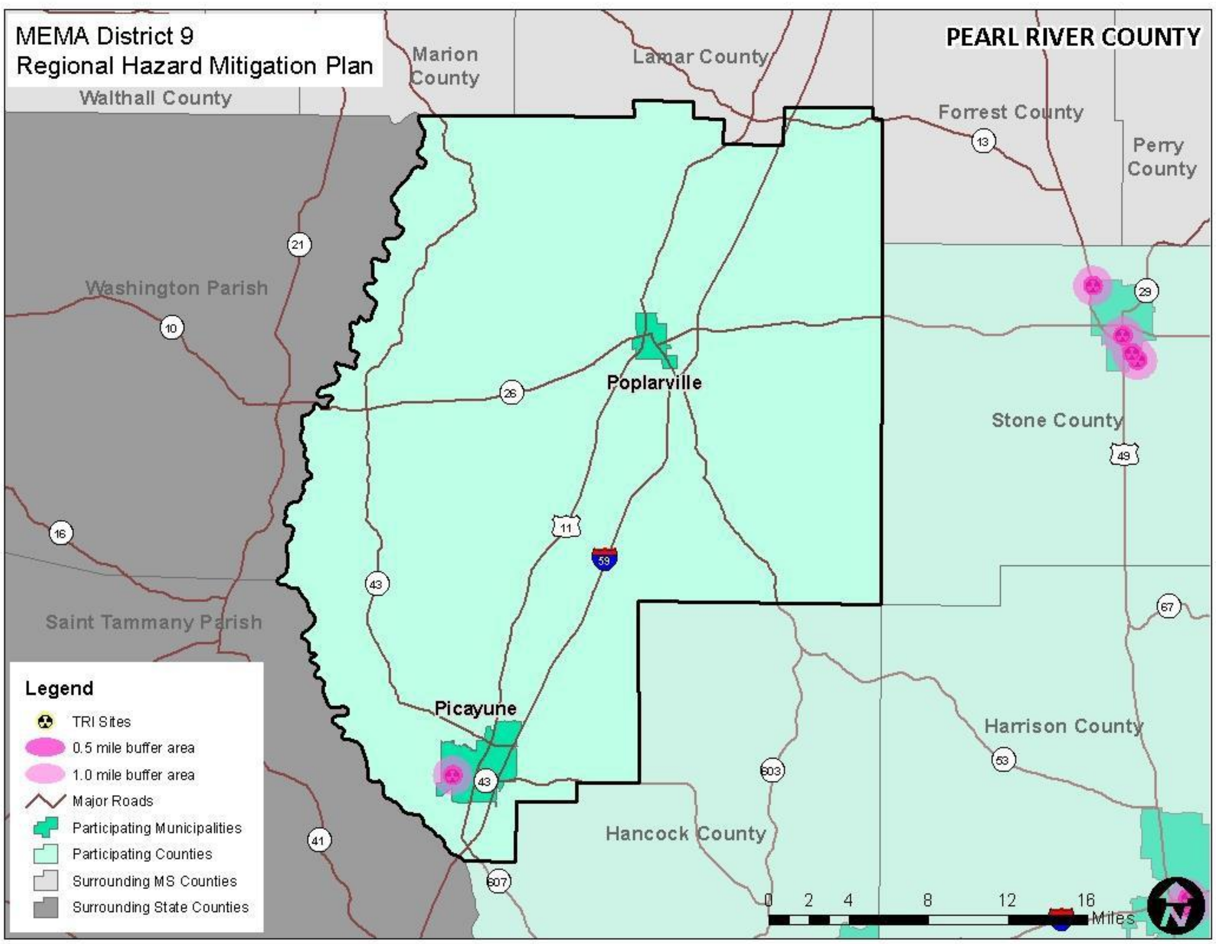
HAZARDOUS MATERIALS INCIDENT

Historical evidence indicates that Pearl River County is susceptible to hazardous materials events. A total of 25 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration, resulting in $315,368 (2016 dollars) in property damage as well as 1 injury. On an annualized level, these damages amount to $7,961 for the county.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities, and cause affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and building footprints/parcels where available and Census block data where footprints/parcels were not available. In both scenarios, two sizes of buffers—0.5-mile and 1.0-mile— were used. These areas are assumed to represent the different levels of effect: immediate (primary) and secondary. Primary and secondary impact zones were selected based on guidance from the PHMSA Emergency Response Guidebook. For the fixed site analysis, geo-referenced TRI sites in the region, along with buffers, were used for analysis as shown in Figure E.34. For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. Figure E.35 shows the areas used for mobile road toxic release buffer analysis and Figure E.36 shows the areas used for the mobile railroad toxic release buffer analysis. The results indicate the approximate number of improved properties and improved value, as shown in Table E.74 (fixed sites), Table E.75 (mobile roads), and Table E.76 (mobile railroad sites).

FIGURE E.34: TRI SITES WITH BUFFERS IN PEARL RIVER COUNTY



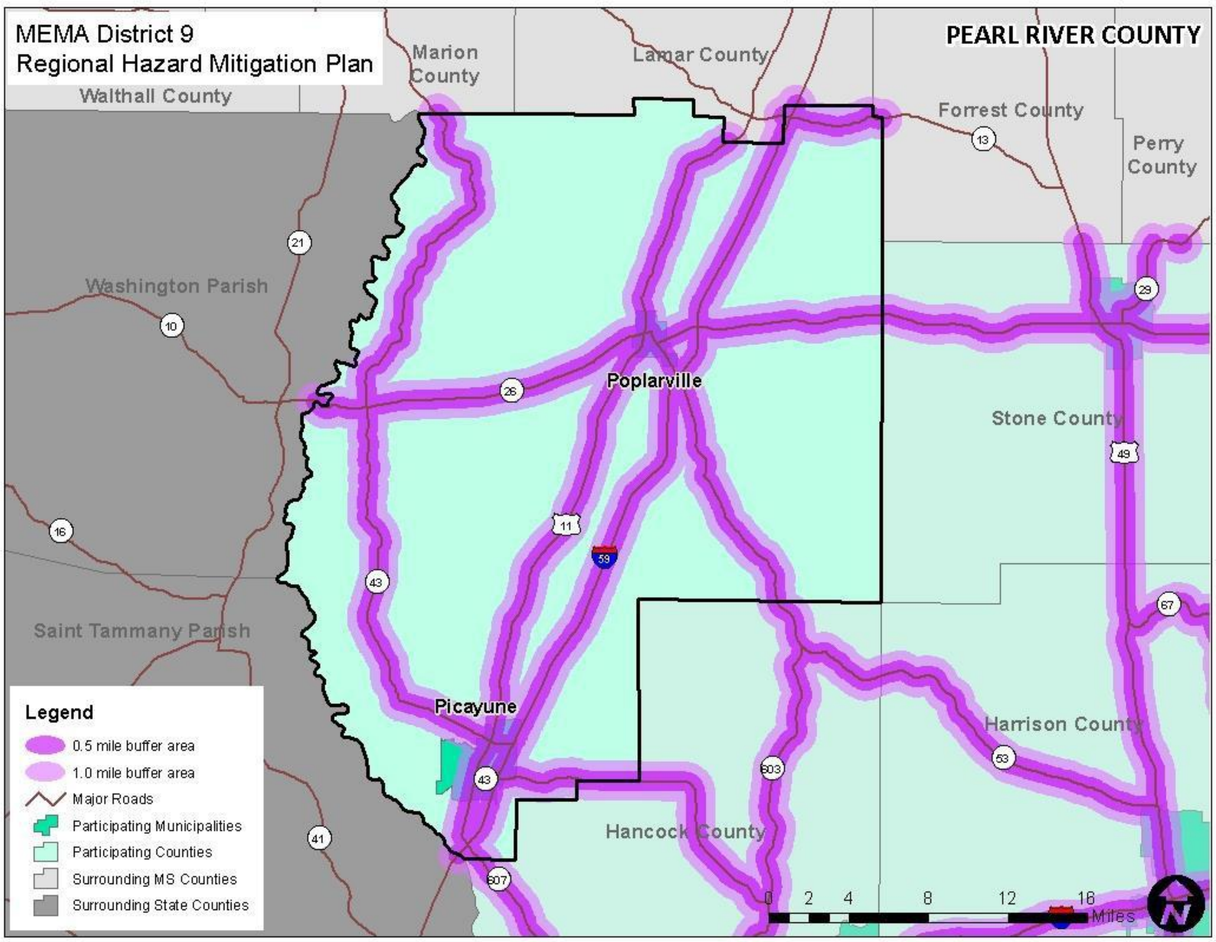
Source: Environmental Protection Agency

TABLE E.74: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Picayune	489	$106,765,000	2,196	$399,979,343
Poplarville	0	$0	0	$0
Unincorporated Area	0	$0	69	$12,567,657
PEARL RIVER COUNTY TOTAL*	489	$106,765,000	2,265	$412,547,000

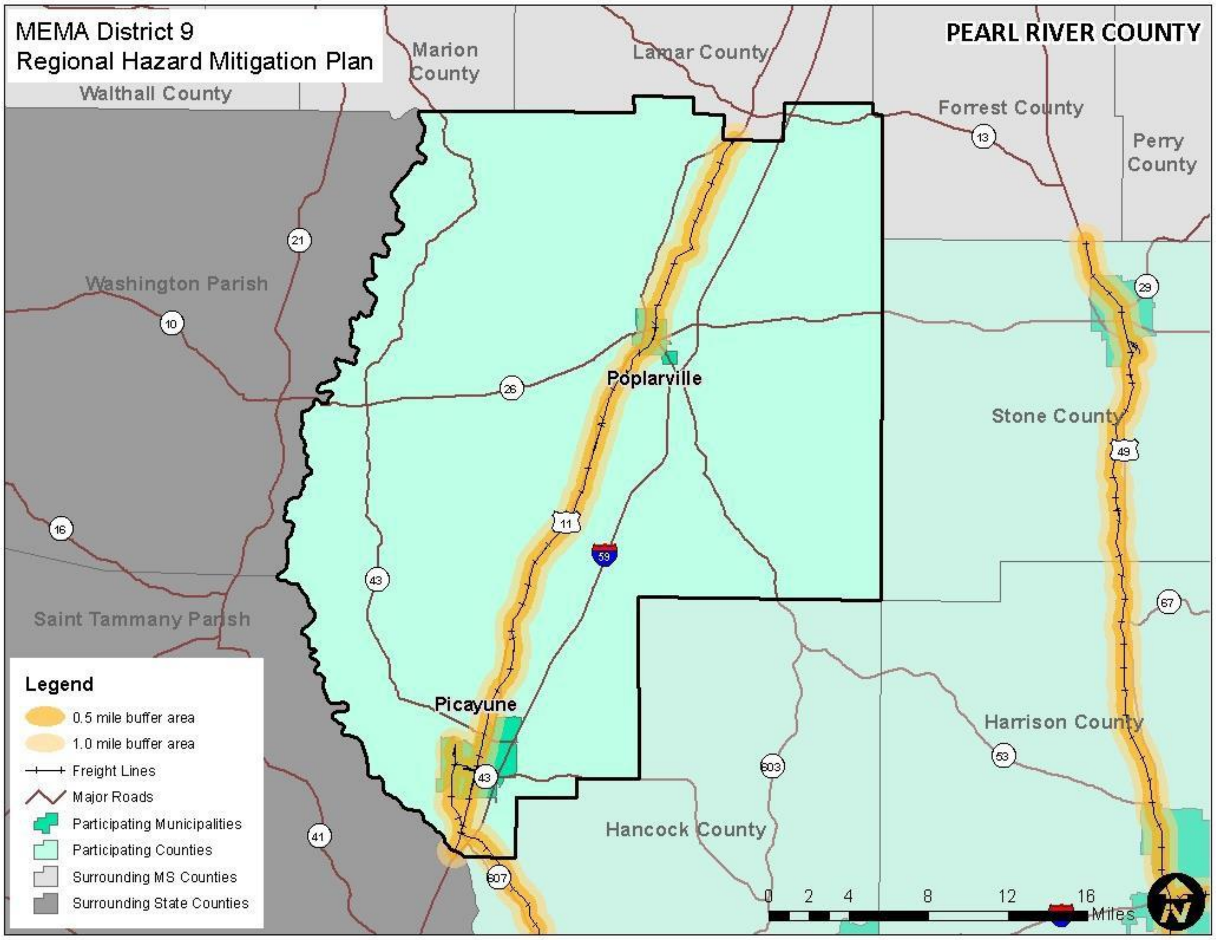
* As noted above, parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary. Source: EPA, MDEQ, Hazus MH 3.2 Data

FIGURE E.35: MOBILE (ROAD) HAZMAT BUFFERS IN PEARL RIVER COUNTY



Source: Federal Highway Administration National Highway Planning Network

FIGURE E.36: MOBILE (RAIL) HAZMAT BUFFERS IN PEARL RIVER COUNTY



Source: U.S. Department of Transportation Federal Railroad Administration

TABLE E.75: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Picayune	4,438	$1,133,195,000	5,927	$1,244,649,000
Poplarville	1,941	$315,740,000	1,964	$321,992,000
Unincorporated Area	14,482	$1,662,491,000	22,611	$2,065,877,000
PEARL RIVER COUNTY TOTAL*	20,861	$3,111,426,000	30,502	$3,632,518,000

* As noted above, parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary. Source: NHPN, MDEQ, Hazus MH 3.2 Data

TABLE E.76: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Picayune	3,863	$855,158,000	5,742	$1,159,817,000
Poplarville	1,163	$189,638,000	1,704	$287,734,000
Unincorporated Area	5,102	$606,959,000	8,123	$806,004,000
PEARL RIVER COUNTY TOTAL*	10,128	$1,651,755,000	15,569	$2,253,555,000

* As noted above, parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary. Source: USDOT FRA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 5 facilities located in a fixed HAZMAT risk zone. Of these, 4 facilities are in the primary (0.5 mile) risk area including 1 fire station and 3 water/wastewater. A list of specific critical facilities and their associated risk can be found in Table E.81 at the end of this subsection.

Mobile Analysis:

The critical facility analysis for transportation corridors revealed that there are 42 facilities located in the primary and secondary road HAZMAT buffer areas. Of these, there were 38 critical facilities located in the primary risk zone including 1 EOC, 12 fire stations, 4 medical, 3 police stations, 7 public facilities, 5 shelters,
1 transportation, and 5 water/wastewater.

For the rail line buffer areas, there were a total of 36 critical facilities located in primary and secondary buffer areas. Of these, 27 facilities are located within the primary buffer area including 5 fire stations, 1 medical, 3 police stations, 7 public facilities, 3 shelters, 1 transportation, and 7 water/wastewater.

A list of specific critical facilities and their associated risk can be found in Table E.81 at the end of this subsection.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Pearl River County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in condition that could alter the impact area (i.e., direction and speed of wind, volume of release, etc.).

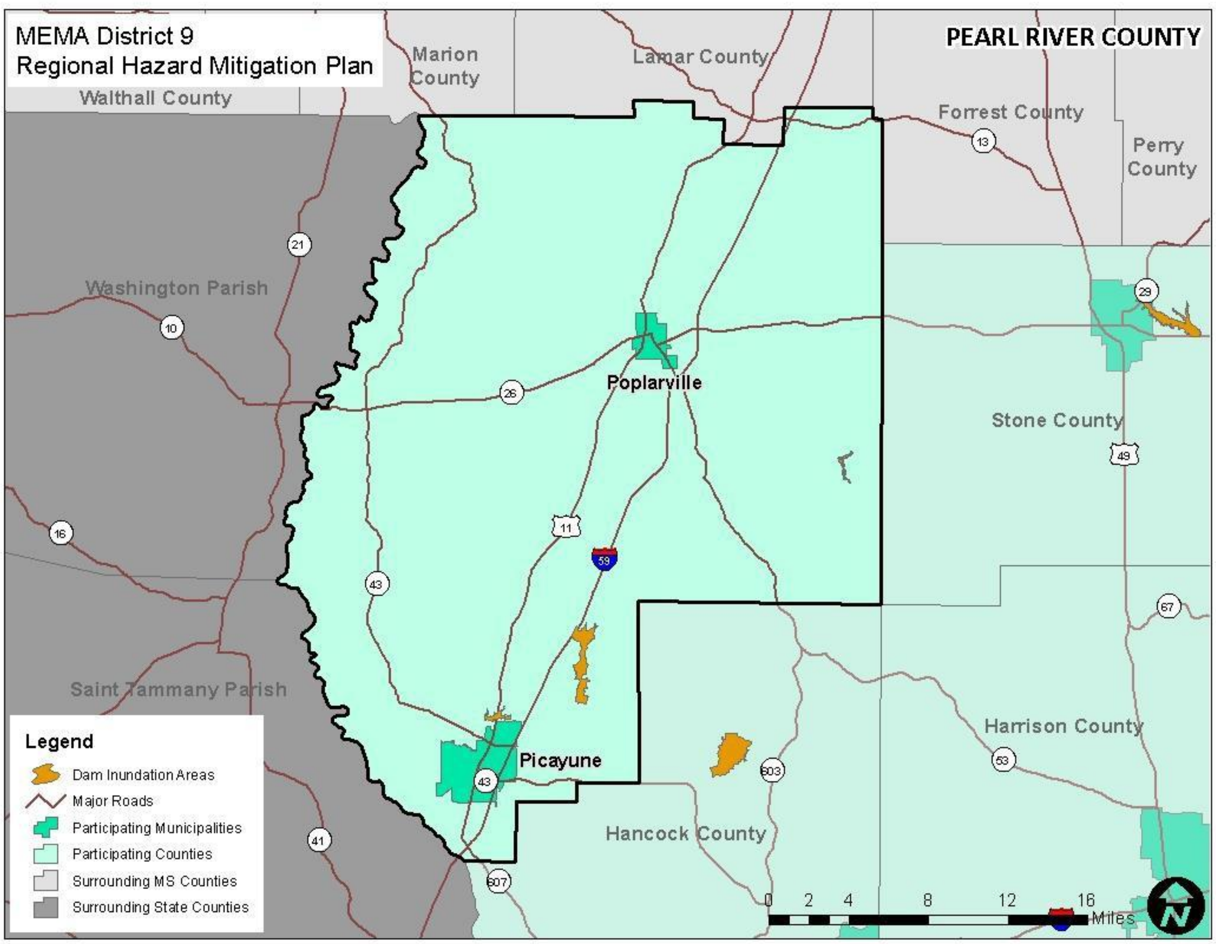
DAM/LEVEE FAILURE

In order to assess risk to a dam or levee failure, a GIS-based analysis was used to estimate exposure to one of the areas delineated by the Mississippi Department of Environmental Quality as a potential inundation area in the event of a failure. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified inundation area. As mentioned previously, this type of inundation mapping has not been completed for every dam/levee in the region, so the results of this analysis likely underestimate the overall vulnerability to a dam or levee failure. However, the analysis is still useful as a sort of baseline minimum of property that is potentially at-risk. The identified inundation areas can be found in Figure E.37.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table E.77 presents the potential at-risk property. Both the number of buildings and the approximate improved value are presented

FIGURE E.37: DAM INUNDATION AREAS IN PEARL RIVER COUNTY



Source: Mississippi Department of Environmental Quality

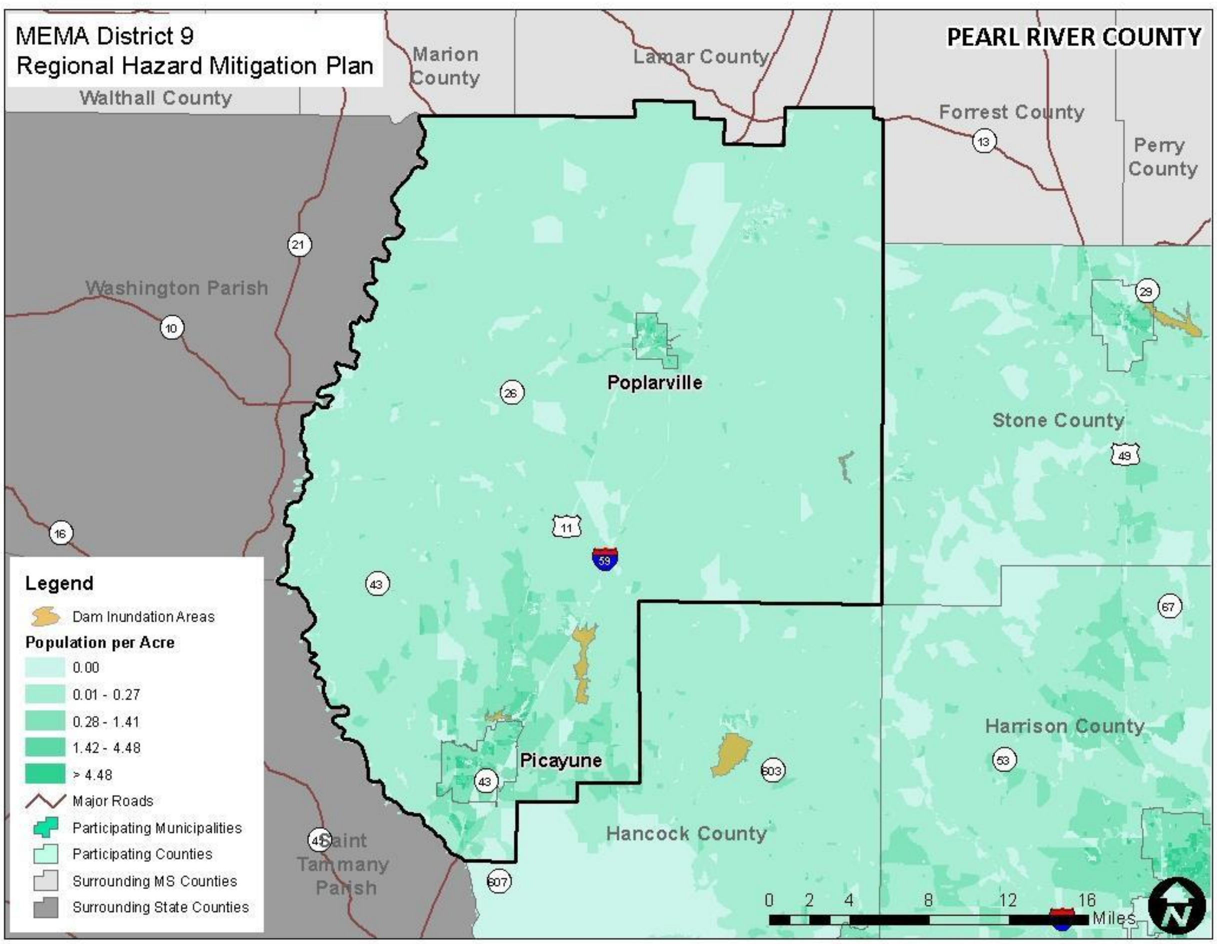
TABLE E.77: ESTIMATED EXPOSURE OF IMPROVEMENTS TO THE DAM/LEVEE FAILURE HAZARD

Location	Dam Inundation Area	
	Approx. Number of Buildings	Approx. Improved Value
Picayune	0	$0
Poplarville	0	$0
Unincorporated Area	86	$70,289,000
PEARL RIVER COUNTY TOTAL*	86	$70,289,000

* As noted above, parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.
Source: MDEQ, Hazus 3.2

Social Vulnerability
Figure E.38 is presented to gain a better understanding of at-risk population by evaluating census block level population data against dam inundation areas. There are areas of concern in the southern part of the county, although it should be noted that most of the population of the county is not at risk to a dam/levee failure.

FIGURE E.38: POPULATION DENSITY NEAR DAM INUNDATION AREAS IN PEARL RIVER COUNTY



Source: MDEQ, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there is 1 fire station located in dam inundation areas. A list of specific critical facilities and their associated risk can be found in Table E.81 at the end of this subsection.

In conclusion, a dam has the potential to impact a number of existing and future buildings, facilities, and populations in Pearl River County, though this analysis is not all-encompassing in terms of risk to a dam or levee failure because inundation mapping is not available for all dams in the region.

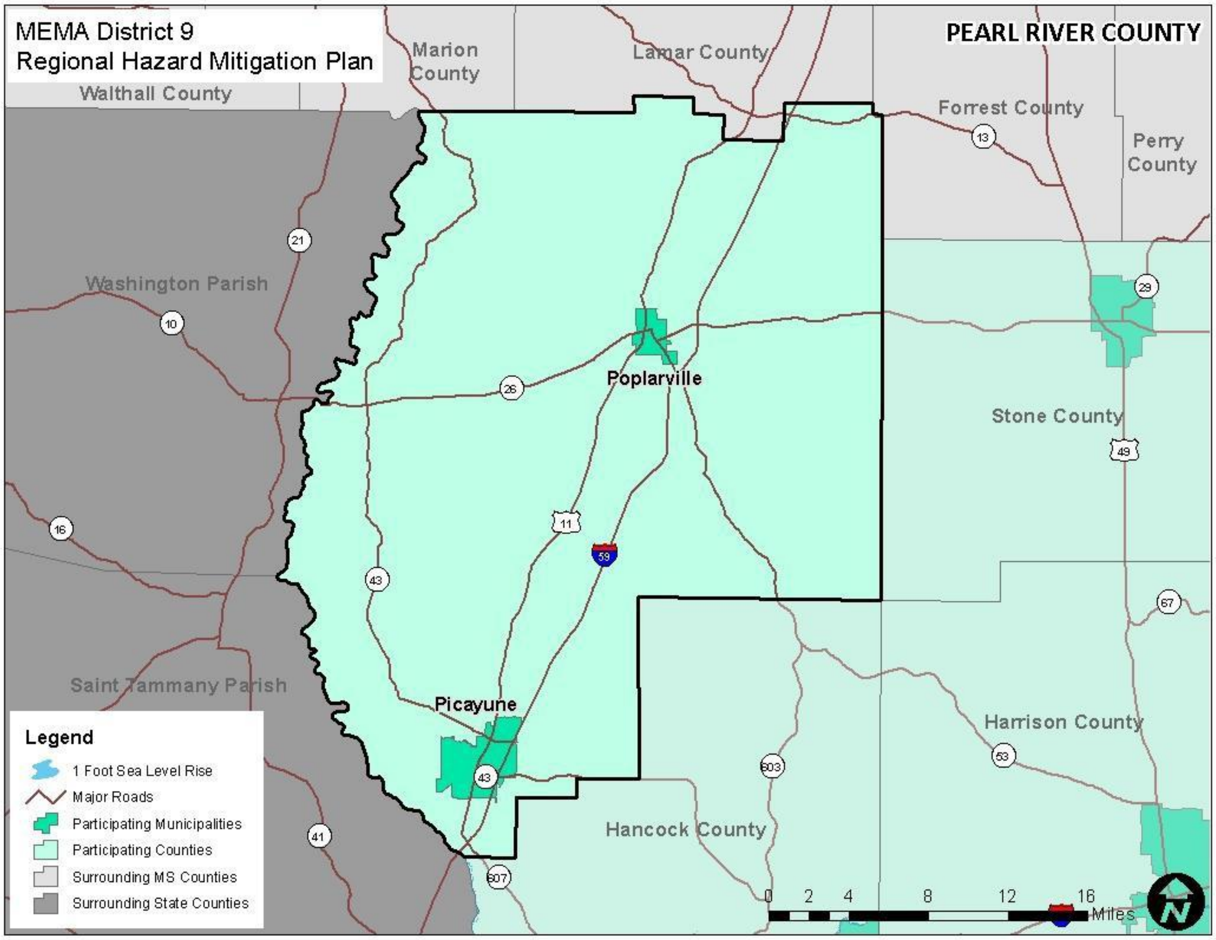
CLIMATE CHANGE/SEA LEVEL RISE

Most assessments carried out across the globe have concluded that climate change is a phenomenon that will impact our planet in the foreseeable future. Among others, the National Climate Assessment, International Panel on Climate Change, and National Oceanic and Atmospheric Administration all project that climate change will impact the United States and will have a major impact on coastal communities due to the effects of sea level rise. As such, projections concerning sea level rise are important to incorporate into planning efforts in order to identify people and property that may be impacted.

In order to assess sea level rise risk, a GIS-based analysis was used to estimate exposure to future projections of sea level rise using data produced by the National Oceanic and Atmospheric Administration in combination with improved property records for the county. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within the inundation zone that would be created in the event of 1 foot, 3 feet, and 6 feet of sea level rise. A number of different sea level rise scenarios were available via NOAA (from 1 foot to 6 feet, at 1 foot intervals), however these scenarios were selected to demonstrate a range of potential sea level rise scenarios from low to moderate to high projections. These scenarios can be found in Figure E.39, Figure E.40, and Figure E.41.

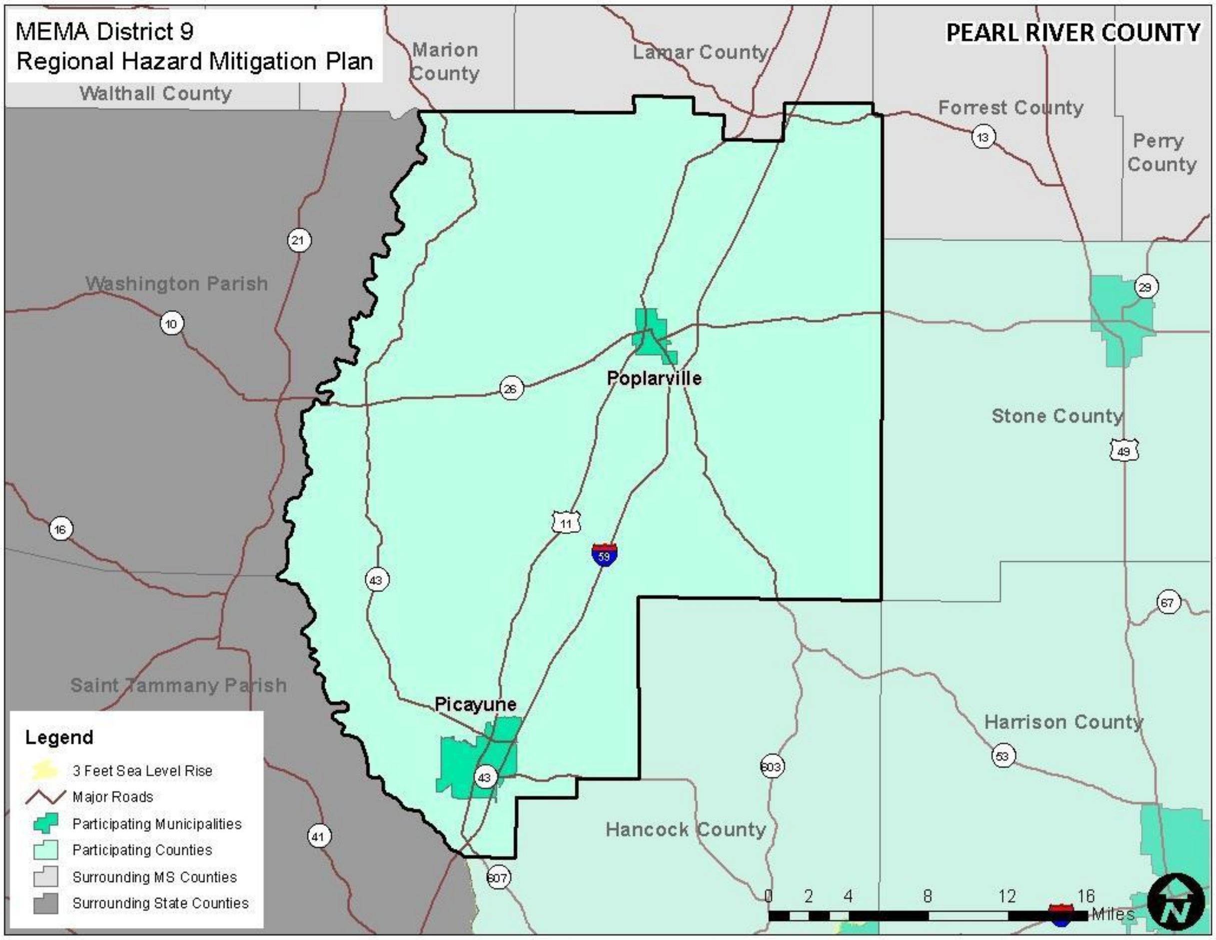
Table E.78 presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

FIGURE E.39: 1 FOOT SEA LEVEL RISE SCENARIO IN PEARL RIVER COUNTY



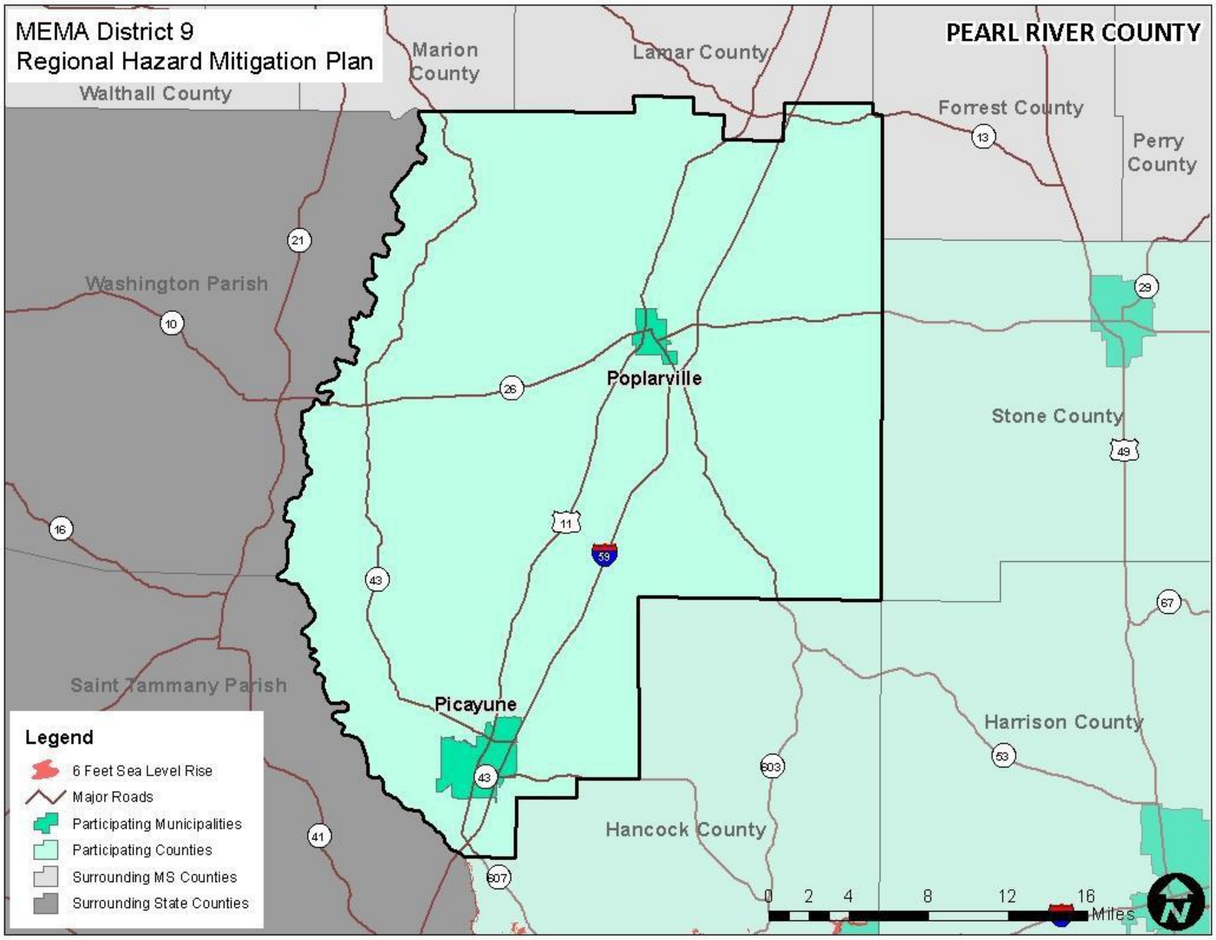
Source: NOAA

FIGURE E.40: 3 FEET SEA LEVEL RISE SCENARIO IN PEARL RIVER COUNTY



Source: NOAA

FIGURE E.41: 6 FEET SEA LEVEL RISE SCENARIO IN PEARL RIVER COUNTY



Source: NOAA

TABLE E.78: ESTIMATED EXPOSURE OF PARCELS TO THE SEA LEVEL RISE HAZARD

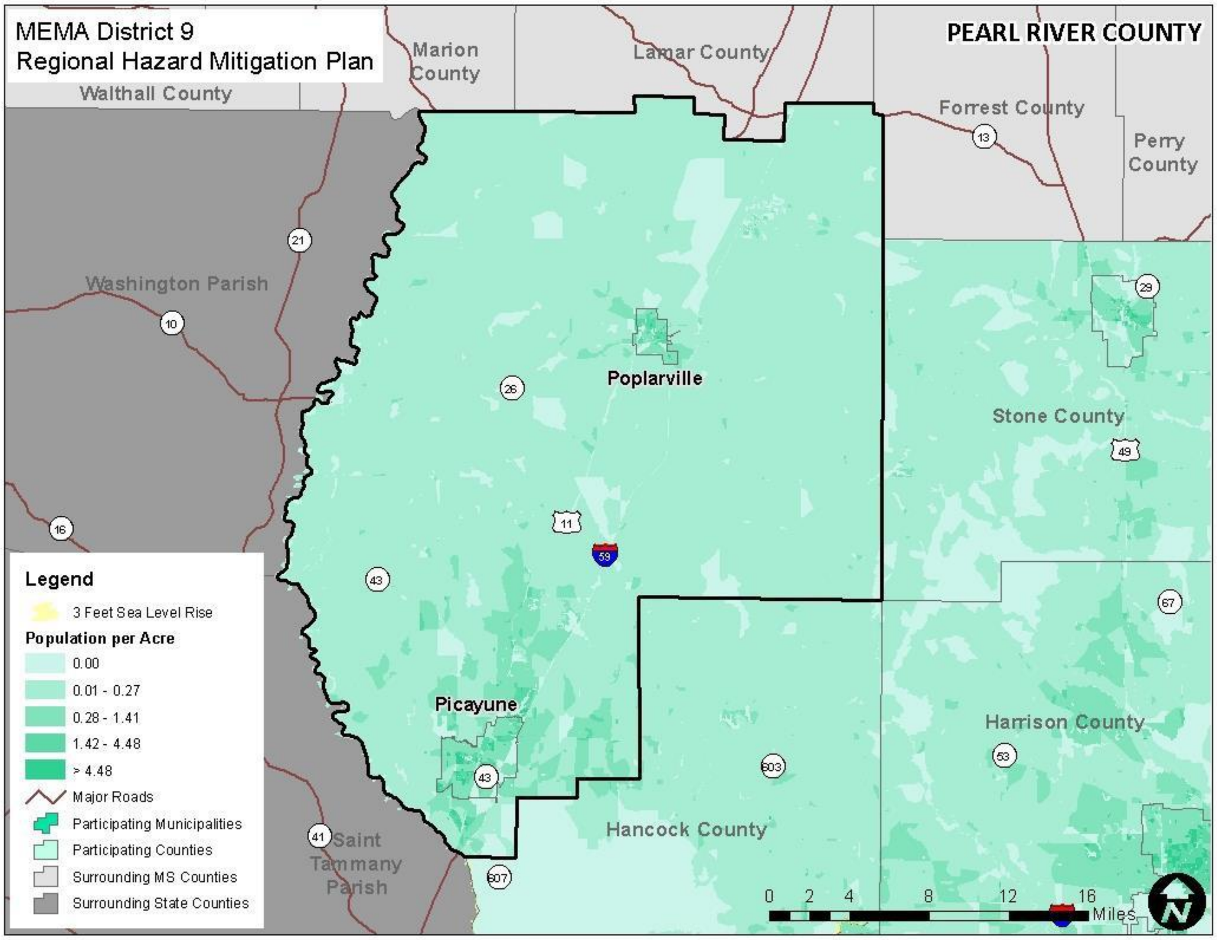
Location	1.0 foot		3.0 feet		6.0 feet	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Picayune	0	$0	0	$0	0	$0
Poplarville	0	$0	0	$0	0	$0
Unincorporated Area	0	$0	0	$0	0	$0
PEARL RIVER COUNTY TOTAL*	0	$0	0	$0	0	$0

* As noted above, parcel value data was not available for Pearl River County. As a result of this data limitation, at risk Census block building counts and values of the structures were used where necessary.
Source: NOAA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Figure E.42 is presented to gain a better understanding of at-risk population by evaluating census block level population data against the 3 feet sea level rise scenario. The three feet scenario was selected since this is a moderate level projection. Based on this analysis, there is no part of the population in the county that is vulnerable to sea level rise.

FIGURE E.42: POPULATION DENSITY WITH 3 FEET SEA LEVEL RISE IN PEARL RIVER COUNTY



Source: NOAA, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are no facilities located in the 3 feet of sea level rise scenario inundation area. As mentioned above, this scenario was selected as it is a mid-range projection for sea level rise based on a number of studies. A list of specific critical facilities and their associated risk can be found in Table E.81 at the end of this subsection.

CONCLUSIONS ON HAZARD VULNERABILITY

Table E.79 presents an overall summary of the community's vulnerability for each jurisdiction. This summary provides key problem statements and identifies the community's greatest vulnerabilities that will be addressed in the mitigation strategy.

TABLE E.79: SUMMARY OF VULNERABILITY FOR PEARL RIVER COUNTY

	Key Problem Statements
Pearl River County	Pearl River, Picayune, and Poplarville have a large amount of timber, open, and agriculture land, creating an enhanced risk to wildfires across the county. The county is also more vulnerable to drought which can damage crop yields or reduce stock and crop production in the agricultural sector, resulting in economic loss.

Table E.80 presents a summary of annualized loss for each hazard in Pearl River County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the county.

It should also be noted that many of these estimates are based on incomplete data and likely underestimate the historic dollar damage sustained in each county. Especially for hazards such as extreme cold, extreme heat, hail, lightning, and winter weather, it is very likely that more damage occurred historically than has been identified.

TABLE E.80: ANNUALIZED LOSS FOR PEARL RIVER COUNTY

Hazard	Pearl River County
Flood-related Hazards	
Dam and Levee Failure	Not Available
Erosion	Not Available
Flood	$191,132
Storm Surge	$0
Fire-related Hazards	
Drought	Not Available
Lightning	$7,388
Wildfire	Not Available
Geologic Hazards	
Earthquake†	$5,000
Wind-related Hazards	
Extreme Cold	$0
Extreme Heat/Heat Wave	Not Available
Hailstorm	$0
Hurricane and Tropical Storm	$76,274,291
Severe Thunderstorm/High Wind	$373,483
Tornado	$173,388
Winter Weather	Not Available

Hazard	Pearl River County
Other Hazards	
Climate Change/Sea Level Rise	Not Available
Hazardous Materials Incident/Train Derailment	$7,961
Infectious Disease	Not Available

†Historic dollar damage was not available for this hazard, but since estimated annualized losses from Hazus were available, those numbers were used in this table.
*In this table, the term “Not Available” is used to indicate that no records of dollar losses for the particular hazard were recorded. This could be the case either because there were no events that caused dollar damage or because documentation of that particular type of event is not well kept.

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to impacts from atmospheric hazards such as drought and hailstorm. Some buildings may be more vulnerable to some of these hazards based on locations, construction, and building type. In addition, all populations are vulnerable to hazards like infectious disease which could presumably impact any segment of the population without regard to geographic location. Table E.81 shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an “X”).

For a full listing of vulnerable critical assets throughout Pearl River County, please see the below spreadsheet link:

MEMA_District9_Hazard_TabularData.xlsx

PEARL RIVER COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Pearl River County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: Capability Assessment.

Planning and Regulatory Capability

Table E.82 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Pearl River County. An x (x) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. A dagger (†) indicates that the given item is administered for that municipality by the county. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the MEMA District 9 Regional Hazard Mitigation Plan.

TABLE E.82: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Threat and Hazard Identification and Risk Assessment (THIRA)	Comprehensive Land Use Plan	Floodplain Management Plan/Flood Mitigation Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Emergency Management Accreditation Program (EMAP Accreditation)	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment/ Reconstruction Plan/ Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System (CRS
PEARL RIVER COUNTY	x		x						x						x		x		x			x	x	x	x
Picayune	†		x						x					x	†		x	x	x			x	x	x	x
Poplarville	†		x						†						†		x	x	x			x	x	x	

A more detailed discussion on the county's planning and regulatory capabilities follows.

EMERGENCY MANAGEMENT

Hazard Mitigation Plan

Pearl River County has previously adopted a hazard mitigation plan. The cities of Picayune and Poplarville were also included in this plan.

Emergency Operations Plan
Pearl River County maintains an emergency operations plan through its Emergency Management Agency. The City of Poplarville is also covered by this plan. The City of Picayune has adopted a municipal-level emergency operations plan.

GENERAL PLANNING

Comprehensive Land Use Plan
Pearl River County has adopted a county comprehensive plan. The cities of Picayune and Poplarville have also adopted municipal comprehensive plans.

Capital Improvements Plan
Pearl River County has not adopted a capital improvements plan. However, the City of Picayune has adopted a capital improvements plan.

Zoning Ordinance
Pearl River County does not have a zoning ordinance in place, and overregulation is a serious concern for the public. However, the cities of Picayune and Poplarville have adopted zoning ordinances.

Subdivision Ordinance
Pearl River County and the cities of Picayune and Poplarville have each adopted a subdivision ordinance.

Building Codes, Permitting, and Inspections
After Hurricane Katrina, Mississippi Legislature mandated the adoption of the International Building Code and International Residential Code in five coastal counties including Pearl River County. The cities of Picayune and Poplarville have also adopted building codes.

FLOODPLAIN MANAGEMENT

Table E.83 provides NFIP policy and claim information for each participating jurisdiction in Pearl River County.

TABLE E.83: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
PEARL RIVER COUNTY†	05/17/90	06/03/08	732	$154,033,900	374	$9,905,285
Picayune	03/04/80	06/03/08	255	$56,011,200	194	$3,579,193
Poplarville	11/08/07	(NSFHA)	2	$700,000	0	$0

†Includes unincorporated areas of county only
(NSFHA) – No Special Flood Hazard Area – All Zone C
Source: NFIP Community Status information as of 1/10/2017; NFIP claims and policy information as of 10/31/2016

Community Rating System
Pearl River County (Class 8) and the City of Picayune (Class 8) participate in the CRS. Participation in the CRS program should be considered as a mitigation action by the City of Poplarville.

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Pearl River County and the cities of Picayune and Poplarville all participate in the NFIP and have adopted flood damage prevention ordinances.

Implement the substantial improvement/substantial damage provisions:
Damage Estimates are a part of the National Flood Insurance Program (NFIP). If a community participates in the NFIP, part of the responsibility of the local participating community is to perform damage estimates. These estimates are performed using a FEMA Substantial Damage Estimate software program. This program is used by the Mississippi Emergency Management Agency's (MEMA) Office of Mitigation Floodplain Management (FPM) Bureau to assist local communities in determining damage estimates as it relates to the NFIP. The FPM Bureau is tasked with assisting local communities with the training and deployment of the SDE program. Local building officials/Stormwater management and floodplain managers for each participating jurisdiction are responsible for ensuring that the substantial improvement/substantial damage provisions are implemented following a flood related event within their respective jurisdiction. The local officials will ensure that all NFIP criteria/requirements are implemented and met following a flood event, local officials will work with FEMA to ensure proper documentation/designations are made and properly recorded for structures deemed substantially damaged during an event.

Administrative and Technical Capability

Table E.84 provides a summary of the capability assessment results for Pearl River County with regard to relevant staff and personnel resources. An x (x) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill. A dagger (†) indicates a county-level staff member(s) provides the specified knowledge or skill to that municipality.

TABLE E.84: RELEVANT STAFF/PERSONNEL RESOURCES

Staff/Personnel Resource	Planners with knowledge of land development/land management	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human- caused hazards	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
PEARL RIVER COUNTY	x	x	x	x	x		x	x	x	x
Picayune	x	x	x	†	x		†	x	†	x

Poplarville	†	x		†	x		†	x	†	x

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

Fiscal Capability

Table E.85 provides a summary of the results for Pearl River County with regard to relevant fiscal resources. An x (x) indicates that the given fiscal resource has previously been used to implement hazard mitigation actions. A dagger (†) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

TABLE E.85: RELEVANT FISCAL RESOURCES

Fiscal Tool/Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: HMGP and other federal, state, and private grants/resources
PEARL RIVER COUNTY	†	x	†	†	†			†	†	x
Picayune	†	x	†	†	†			†	†	x
Poplarville		x	†		†			†	†	x

Political Capability

During the months immediately following a disaster, local public opinion in Pearl River County is more likely to shift in support of hazard mitigation efforts.

Table E.86 provides a summary of the results for Pearl River County with regard to political capability. An x (x) indicates the expected degree of political support by local elected officials in terms of adopting/funding information.

TABLE E.86: LOCAL POLITICAL SUPPORT

Political Support	Limited	Moderate	High
PEARL RIVER COUNTY			x
Picayune			x
Poplarville		x	

Conclusions on Local Capability

Table E.87 shows the results of the capability assessment using the designed scoring methodology described in Section 7: Capability Assessment. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. This information was reviewed by all jurisdictions and each jurisdiction provided feedback on the information included in the capability assessment. Local government input was vital to identifying capabilities. According to the assessment, the average local capability score for the county and its jurisdictions is 42.7, which falls into the moderate capability ranking.

TABLE E.87: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
PEARL RIVER COUNTY	47	Moderate
Picayune	46	Moderate
Poplarville	35	Moderate

PEARL RIVER COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Pearl River County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Council and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: Mitigation Strategy and Section 9: Mitigation Action Plan.

Mitigation Goals

Pearl River County developed nine mitigation goals in coordination with the other participating MEMA District 9 Region jurisdictions. The regional mitigation goals are presented in Table E.88.

TABLE E.88: MEMA DISTRICT 9 REGIONAL MITIGATION GOALS

	Goal
Goal #1	Minimize risk and vulnerability of the community to hazards. Objective 1: Improve understanding of hazard risks through monitoring and assessment projects.
Goal #2	Minimize loss of life, injury, and damages to property, the economy, and the environment. *Objective 1:* Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment. *Objective 2:* Improve hazard assessment information to make recommendations for encouraging higher standards for safer development in areas vulnerable to natural and technological hazards. *Objective 3*: Implement sustainable activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resilient to natural and technological hazards.

Goal #3	Minimize loss to critical facilities and infrastructure, utilities, and services. *Objective 1:* Prioritize mitigation projects for critical facilities, services, and infrastructure.
Goal #4	Improve, expand, and enhance public education, awareness, and preparedness. *Objective 1:* Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.
Goal #5	Build and enhance local mitigation capabilities to improve the region's ability to prepare for, respond to, and recover. *Objective 1:* Strengthen communication and coordinate participation among and within public agencies, community members, non-profit organizations, business, and industry to gain a vested interest in implementation.
Goal #6	Enter into partnerships with neighboring jurisdictions, federal and state agencies, and others to share information and develop a more hazard resistant community. *Objective 1:* Encourage leadership within the public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.
Goal #7	Enhance response procedures and emergency management capabilities. *Objective 1*: Coordinate and integrate natural and technological hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
Goal #8	Reduce economic losses, minimize social disruptions, and maintain quality of life. *Objective 1*: Reduce losses and repetitive damages for hazard events while promoting insurance coverage for catastrophic hazards.
Goal #9	Protect the environment and natural resources. *Objective 1:* Preserve, rehabilitate, re-establish, and enhance natural systems to serve natural hazard mitigation functions.

Mitigation Action Plan

The mitigation actions proposed by Pearl River County and the cities if Picayune and Poplarville are listed in the following individual Mitigation Action Plans.

Pearl River County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Develop a Stormwater Management Plan for Pearl River County.	Flood	High	County Planning and Development; Board of Supervisors; Picayune City Council	U.S. Army Corps of Engineers; Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding
P-2	Develop a capital improvement program that includes drainage.	Flood	Moderate	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local budegt	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-3	Establish a policy of extra-territorial review of subdivisions adjacent to jurisdictional boundaries to insure a comprehensive review of cumulative impacts within the watershed.	All	High	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local budget	2028	Ongoing
P-4	Establish a comprehensive drainage model.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Engineering Department; City of Poplarville Public Works; Pearl River County Tax Office	Dues to regional planning agency (SMPDD)	2028	Ongoing

P-5	Provide updated information to the U.S. Army Corps of Engineers through a grant program entitle planning assistance to states.	Flood	Moderate	Pearl River County Department of Planning and Development; Pearl River County Mapping Office; U.S. Army Corps of Engineers	USA Planning Assistance to States	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-6	Establish pre-disaster maintenance procedures for right of way along county roadways.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Road Department; Pearl River County Engineer	Local budgets	2028	Ongoing
P-7	The county will establish and adopt a policy on maintaining drainage ways. This policy will include regularly scheduled maintenance and the establishment of written tracking policy.	Flood	High	Pearl River County Road Manager	Local budgets	2028	Ongoing
P-8	Continue an ordinance and policy to determine and require the correct size culverts.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	Local budget	2028	Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Minimize damage to structure through code enforcement.	All	Moderate	Pearl River County Board of Supervisors; City of Picayune Mayor and City Council; City of Poplarville Mayor and Board of Alderman	Local budget and revenues	2028	Ongoing enforcement
P-10	Adopt and implement a regulation requiring building owners to retrofit their structures for flood damage if the structure's insured loss exceeds 50% or more of the structure's value.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Planning Department	Local budget	2028	Ongoing enforcement
P-11	Establish a formal policy to invite countywide staff to attend site plan review for projects that are immediately adjacent to the jurisdiction or will impact the jurisdiction.	All	Moderate	Pearl River County Board of Supervisors; City Council of Picayune; Poplarville Board of Alderman	Local revenues	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Reduce the number of repetitive loss properties within the county by elevating and where elevation is not an option, purchase properties at owner's request.	Flood	High	Pearl River County Board of Supervisors; Picayune Board of Alderman; Pearl River County Department of Planning and Development; Picayune Planning and Development Department	Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance Grants (FMA), Severe Repetitive Loss Grants (SRL), MEMA Planning Funds	2028	Ongoing contingent upon funding
Natural Resource Protection							
NRP-1	Continue and expand stream protection and preservation programs to secure easements to protect riparian areas.	Flood	High	Mississippi Department of Wildfire and Parks; Pearl River County Department of Planning and Development	Department of Interior; Soil and Water Conservation	2028	Ongoing contingent upon funding

NRP-2	Continue to preserve green spaces.	Flood	High	Pearl River County Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Private	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Follow through with Alligator Branch improvements.	Flood	Moderate	Pearl River County Board of Supervisors	Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding
Emergency Services							
ES-1	Through a Mississippi/Louisiana Partnership, establish a first responders shelter to house personnel and parking space for necessary equipment until the emergency has passed and personnel and equipment can be returned to Louisiana. Also, establish and man an information center to pass on critical information to returning evacuees where evacuees can temporarily remain until it is safe to return to their homes.	Hurricane	Moderate	Pearl River County Civil Defense Agency; Pearl River County Board of Supervisors; Louisiana Emergency Management Agency; Mississippi Emergency Management Agency	FEMA Grants, local emergency management funding	2028	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Provide easily accessible tax map information to the municipalities in the county, insurance agents, realtors, banking interest, and individuals.	Flood	High	Pearl River Mapping Office; Pearl River County Tax Office	Local budget	2028	Ongoing updates

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Establish monthly educational programs for local government and staff.	All	High	Pearl River County Department of Planning and Development; Picayune Planning and Development Office	Salaries	2028	Ongoing
PEA-3	Continue outreach to the community, including local officials, about the Hazard Mitigation Grant Program and requirements of elevation and purchase programs.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	HMGP and local budgets	2028	Ongoing
PEA-4	Establish a hazard mitigation library at the public library.	All	High	Picayune CRS Coordinator; Pearl River County Library System; Pearl River County Department of Planning and Development	Local budget	2026	Ongoing with updated materials

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Develop a brochure "Hazards in Pearl River County" that will detail hazards within the county.	Flood, Hurricane, Tornado, Wind	High	Pearl River County Emergency Management	Local budget	2026	Ongoing updated materials
PEA-6	Develop three programs for "Focus on Pearl River County" on WRJW.	Hurricane, Flood, Tornado, Wind	High	Pearl River County Emergency Management; Pearl River County Planning and Development; WRJW	Local budget	2028	Ongoing
PEA-7	Establish a speaker's forum.	Hurricane, Tornado, Flood, Wind Storm	High	Pearl River Emergency Management	Local budget	2028	Ongoing
PEA-8	Establish a hazard mitigation and disaster preparedness booth at the Blueberry Festival and the Picayune Street Fair.	Flood, Hurricane, Tornado, Wind Storm	High	Pearl River County Emergency Management; Picayune CRS Coordinator	Local budget	2028	Ongoing annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-9	Encourage the Chambers of Commerce, PRCDA, and Civil Defense to develop a program on business continuity planning for businesses.	Hurricane, Flood, Tornado	Low	Picayune and Poplarville Chamber of Commerce	Local budget	2028	Ongoing
PEA-10	Advise school officials and teachers of availability of education materials for children.	Hurricane, Flood, Tornado, High Wind, Thunderstorm	Moderate	Pearl River Emergency Management; Picayune CRS Coordinator	Local revenues	2028	Ongoing

City of Picayune Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Develop a Stormwater Management Plan for Pearl River County.	Flood	High	County Planning and Development; Board of Supervisors; Picayune City Council	U.S. Army Corps of Engineers; Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding
P-2	Develop a capital improvement program that includes drainage.	Flood	Moderate	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local budget	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-3	Establish a policy of extra-territorial review of subdivisions adjacent to jurisdictional boundaries to insure a comprehensive review of cumulative impacts within the watershed.	All	High	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local budget	2028	Ongoing
P-4	Establish a comprehensive drainage model.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Engineering Department; City of Poplarville Public Works; Pearl River County Tax Office	Dues to regional planning agency (SMPDD)	2028	Ongoing contingent upon funding
P-5	Provide updated information to the U.S. Army Corps of Engineers through a grant program entitle planning assistance to states.	Flood	Moderate	Pearl River County Department of Planning and Development; Pearl River County Mapping	USA Planning Assistance to States	2028	Ongoing contingent upon funding

				Office; U.S. Army Corps of Engineers			

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-6	Establish pre-disaster maintenance procedures for right of way along county roadways.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Road Department; Pearl River County Engineer	Local budgets	2028	Ongoing
P-7	The county will establish and adopt a policy on maintaining drainage ways. This policy will include regularly scheduled maintenance and the establishment of written tracking policy.	Flood	High	Pearl River County Road Manager	Local budgets	2028	Ongoing
P-8	Continue an ordinance and policy to determine and require the correct size culverts.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	Local budget	2028	Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Minimize damage to structure through code enforcement.	All	Moderate	Pearl River County Board of Supervisors; City of Picayune Mayor and City Council; City of Poplarville Mayor and Board of Alderman	Local funds and revenues	2028	Ongoing enforcement
P-10	Adopt and implement a regulation requiring building owners to retrofit their structures for flood damage if the structure's insured loss exceeds 50% or more of the structure's value.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Planning Department	Local budget	2028	Ongoing enforcement
P-11	Establish a formal policy to invite countywide staff to attend site plan review for projects that are immediately adjacent to the jurisdiction or will impact the jurisdiction.	All	Moderate	Pearl River County Board of Supervisors; City Council of Picayune; Poplarville Board of Alderman	Local budget	2026	Ongoing

P-12	File an amendment to the Community Rating System application requesting additional CRS credit to further lower the city's NFIP CRS application.	Flood	High	Picayune Planning and Building Code	FEMA/MEMA HMGP Planning Grant	2026	Ongoing efforts to lower rating

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-13	Request funding to prepare a repetitive loss plan for the city, identifying and cataloging all repetitive loss properties, ownership, and whether or not owner is interested in mitigation activities.	Flood	High	Picayune Planning and Building Code	FEMA/MEMA HMGP Planning Grant	2028	Ongoing contingent upon funding
P-14	Adopt the International Building Codes.	Wind, Flood, Earthquake, Tornado	High	Picayune Planning and Building	Local General Funds	2028	Completed/Ongoing enforcement
Property Protection							
PP-1	Reduce the number of repetitive loss properties within the county by elevating and where elevation is not an option, purchase properties at owner’s request.	Flood	High	Pearl River County Board of Supervisors; Picayune Board of Alderman; Pearl River County Department of Planning and Development; Picayune Planning and Development Department	Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance Grants (FMA), Severe Repetitive Loss Grants (SRL), MEMA Planning Funds	2028	Partially completed/Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
NRP-1	Continue and expand stream protection and preservation programs to secure easements to protect riparian areas.	Flood	High	Mississippi Department of Wildfire and Parks; Pearl River County Department of Planning and Development	Department of Interior; Soil and Water Conservation	2028	Ongoing contingent upon funding
NRP-2	Continue to preserve green spaces.	Flood	High	Pearl River County Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Private	2028	Ongoing contingent upon funding
Structural Projects							
SP-1	Follow through with Alligator Branch improvements.	Flood	Moderate	Pearl River County Board of Supervisors	Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Through a Mississippi/Louisiana Partnership, establish a first responders shelter to house personnel and parking space for necessary equipment until the emergency has passed and personnel and equipment can be returned to Louisiana. Also, establish and man an information center to pass on critical information to returning evacuees where evacuees can temporarily remain until it is safe to return to their homes.	Hurricane	Moderate	Pearl River County Civil Defense Agency; Pearl River County Board of Supervisors; Louisiana Emergency Management Agency; Mississippi Emergency Management Agency	FEMA Grants, local emergency management funding	2028	Ongoing
Public Education and Awareness							
PEA-1	Provide easily accessible tax map information to the municipalities in the county, insurance agents, realtors, banking interest, and individuals.	Flood	High	Pearl River Mapping Office; Pearl River County Tax Office	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Establish monthly educational programs for local government and staff.	All	High	Pearl River County Department of Planning and Development; Picayune Planning and Development Office	Salaries	2028	Ongoing
PEA-3	Continue outreach to the community, including local officials, about the Hazard Mitigation Grant Program and requirements of elevation and purchase programs.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	HMGP	2028	Ongoing
PEA-4	Establish a hazard mitigation library at the public library.	All	High	Picayune CRS Coordinator; Pearl River County Library System; Pearl River County Department of Planning and Development	Local budget	2026	Ongoing updated materials regularly

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Develop a brochure “Hazards in Pearl River County” that will detail hazards within the county.	Flood, Hurricane, Tornado, Wind	High	Pearl River County Emergency Management	Local budget	2026	Ongoing regular updates
PEA-6	Develop three programs for “Focus on Pearl River County” on WRJW.	Hurricane, Flood, Tornado, Wind	High	Pearl River County Emergency Management; Pearl River County Planning and Development; WRJW	Local budget	2028	Ongoing
PEA-7	Establish a speaker’s forum.	Hurricane, Tornado, Flood, Wind Storm	High	Pearl River Emergency Management	Local budget	2028	Ongoing
PEA-8	Establish a hazard mitigation and disaster preparedness booth at the Blueberry Festival and the Picayune Street Fair.	Flood, Hurricane, Tornado, Wind Storm	High	Pearl River County Emergency Management; Picayune CRS Coordinator	Local budget	2028	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-9	Encourage the Chambers of Commerce, PRCDA, and Civil Defense to develop a program on business continuity planning for businesses.	Hurricane, Flood, Tornado	Low	Picayune and Poplarville Chamber of Commerce	Local budget	2028	Ongoing
PEA-10	Advise school officials and teachers of availability of education materials for children.	Hurricane, Flood, Tornado, High Wind, Thunderstorm	Moderate	Pearl River Emergency Management; Picayune CRS Coordinator	Local revenues	2028	Ongoing

City of Poplarville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Develop a Stormwater Management Plan for Pearl River County.	Flood	High	County Planning and Development; Board of Supervisors; Picayune City Council	U.S. Army Corps of Engineers; Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding
P-2	Develop a capital improvement program that includes drainage.	Flood	Moderate	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local budget	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-3	Establish a policy of extra-territorial review of subdivisions adjacent to jurisdictional boundaries to insure a comprehensive review of cumulative impacts within the watershed.	All	High	Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Local budget	2028	Ongoing
P-4	Establish a comprehensive drainage model.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Engineering Department; City of Poplarville Public Works; Pearl River County Tax Office	Dues to regional planning agency (SMPDD)	2028	Ongoing contingent upon funding
P-5	Provide updated information to the U.S. Army Corps of Engineers through a grant program entitle planning assistance to states.	Flood	Moderate	Pearl River County Department of Planning and Development; Pearl River County Mapping	USA Planning Assistance to States	2028	Ongoing

				Office; U.S. Army Corps of Engineers			

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-6	Establish pre-disaster maintenance procedures for right of way along county roadways.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Road Department; Pearl River County Engineer	Local budgets	2028	Ongoing
P-7	The county will establish and adopt a policy on maintaining drainage ways. This policy will include regularly scheduled maintenance and the establishment of written tracking policy.	Flood	High	Pearl River County Road Manager	Local budgets	2028	Ongoing
P-8	Continue an ordinance and policy to determine and require the correct size culverts.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	Local budget	2028	Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-9	Minimize damage to structure through code enforcement.	All	Moderate	Pearl River County Board of Supervisors; City of Picayune Mayor and City Council; City of Poplarville Mayor and Board of Alderman	Local funds and revenues	2028	Ongoing enforcement
P-10	Adopt and implement a regulation requiring building owners to retrofit their structures for flood damage if the structure's insured loss exceeds 50% or more of the structure's value.	Flood	Moderate	Pearl River County Department of Planning and Development; City of Picayune Planning Department	Local budget	2028	Ongoing enforcement
P-11	Establish a formal policy to invite countywide staff to attend site plan review for projects that are immediately adjacent to the jurisdiction or will impact the jurisdiction.	All	Moderate	Pearl River County Board of Supervisors; City Council of Picayune; Poplarville Board of Alderman	Local revenues	2026	Ongoing

P-12	Develop and adopt a flood ordinance for the City of Poplarville.	Flood	High	Poplarville Board of Alderman	Local budgets	2028	Completed/Ongoing enforcement

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Property Protection							
PP-1	Reduce the number of repetitive loss properties within the county by elevating and where elevation is not an option, purchase properties at owner's request.	Flood	High	Pearl River County Board of Supervisors; Picayune Board of Alderman; Pearl River County Department of Planning and Development; Picayune Planning and Development Department	Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance Grants (FMA), Severe Repetitive Loss Grants (SRL), MEMA Planning Funds	2028	Ongoing contingent upon funding
Natural Resource Protection							
NRP-1	Continue and expand stream protection and preservation programs to secure easements to protect riparian areas.	Flood	High	Mississippi Department of Wildfire and Parks; Pearl River County Department of Planning and Development	Department of Interior; Soil and Water Conservation	2028	Ongoing contingent upon funding

NRP-2	Continue to preserve green spaces.	Flood	High	Pearl River County Board of Supervisors; Poplarville Board of Alderman; Picayune City Council	Private	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Structural Projects							
SP-1	Follow through with Alligator Branch improvements.	Flood	Moderate	Pearl River County Board of Supervisors	Hazard Mitigation Grant Program	2028	Ongoing contingent upon funding
Emergency Services							
ES-1	Through a Mississippi/Louisiana Partnership, establish a first responders shelter to house personnel and parking space for necessary equipment until the emergency has passed and personnel and equipment can be returned to Louisiana. Also, establish and man an information center to pass on critical information to returning evacuees where evacuees can temporarily remain until it is safe to return to their homes.	Hurricane	Moderate	Pearl River County Civil Defense Agency; Pearl River County Board of Supervisors; Louisiana Emergency Management Agency; Mississippi Emergency Management Agency	HMGP, BRIC, local emergency management funding	2028	Ongoing
Public Education and Awareness							
PEA-1	Provide easily accessible tax map information to the municipalities in the county, insurance agents, realtors, banking interest, and individuals.	Flood	High	Pearl River Mapping Office; Pearl River County Tax Office	Local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-2	Establish monthly educational programs for local government and staff.	All	High	Pearl River County Department of Planning and Development; Picayune Planning and Development Office	Salaries	2028	Ongoing
PEA-3	Continue outreach to the community, including local officials, about the Hazard Mitigation Grant Program and requirements of elevation and purchase programs.	Flood	High	Pearl River County Board of Supervisors; Pearl River County Department of Planning and Development	HMGP	2028	Ongoing
PEA-4	Establish a hazard mitigation library at the public library.	All	High	Picayune CRS Coordinator; Pearl River County Library System; Pearl River County Department of Planning and Development	Local budget	2026	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-5	Develop a brochure “Hazards in Pearl River County” that will detail hazards within the county.	Flood, Hurricane, Tornado, Wind	High	Pearl River County Emergency Management	Local budget	2026	Ongoing updated materials
PEA-6	Develop three programs for “Focus on Pearl River County” on WRJW.	Hurricane, Flood, Tornado, Wind	High	Pearl River County Emergency Management; Pearl River County Planning and Development; WRJW	Local budget	2028	Ongoing
PEA-7	Establish a speaker’s forum.	Hurricane, Tornado, Flood, Wind Storm	High	Pearl River Emergency Management	Local budget	2028	Ongoing
PEA-8	Establish a hazard mitigation and disaster preparedness booth at the Blueberry Festival and the Picayune Street Fair.	Flood, Hurricane, Tornado, Wind Storm	High	Pearl River County Emergency Management; Picayune CRS Coordinator	Local budget	2028	Ongoing Annually

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-9	Encourage the Chambers of Commerce, PRCDA, and Civil Defense to develop a program on business continuity planning for businesses.	Hurricane, Flood, Tornado	Low	Picayune and Poplarville Chamber of Commerce	Local budget	2028	Ongoing
PEA-10	Advise school officials and teachers of availability of education materials for children.	Hurricane, Flood, Tornado, High Wind, Thunderstorm	Moderate	Pearl River Emergency Management; Picayune CRS Coordinator	Local revenues	2028	Ongoing

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ANNEX F: STONE COUNTY

This annex includes jurisdiction-specific information for Stone County and its participating municipalities. It consists of the following five subsections:

F.1 Stone County Community Profile
F.2 Stone County Risk Assessment
F.3 Stone County Vulnerability Assessment
F.4 Stone County Capability Assessment
F.5 Stone County Mitigation Strategy

SECTION 25 STONE COUNTY COMMUNITY PROFILE

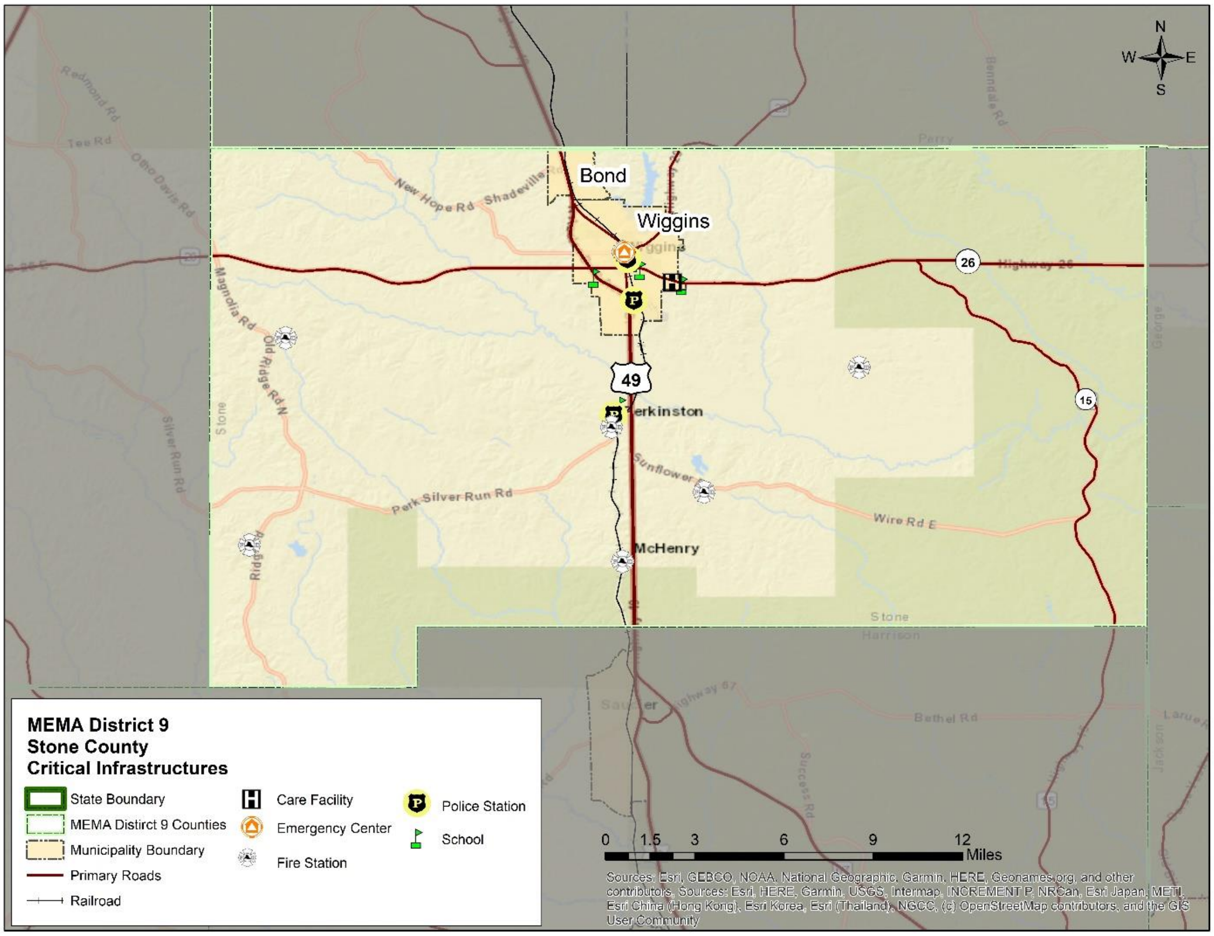
Geography and the Environment

Stone County is located in southern Mississippi. It comprises one city, Wiggins, as well as many small unincorporated communities. An orientation map is provided as Figure F.1.

Stone County is situated in the East Gulf Coastal Plain. It is made up of the gently rolling Pine Belt, also known as the “Piney Woods,” and the coastal area called the Coastal Meadows or Terrace. The region has generally low topographic elevations and extensive tracts of marshy land. There are many rivers, creeks, bayous, and other natural drainage networks in the region which empty into the Gulf of Mexico. The total area of the county is 484 square miles, 5 square miles of which is water area.

Stone County enjoys four distinct seasons but the climate in the region is generally hot and humid compared to the rest of the United States given its latitude and location along the Gulf Coast. Precipitation is generally highest in winter months when the temperatures are moderately lower, but the likelihood of precipitation remains relatively constant throughout the year. Snowfall is rare but does occur. Summers in the region can become fairly hot with average highs in the nineties and lows in the seventies. The region is also often susceptible to turbulent weather when warm, wet air from the Gulf of Mexico is pushed up into the region to mix with cooler air coming down from across the continent which can result in severe weather conditions. This is particularly true in the spring when seasons are changing and diverse weather patterns interact. The region is also subject to hurricanes and tropical storms from June to October.

FIGURE F.1: STONE COUNTY ORIENTATION MAP



Population and Demographics

Population counts from the U.S. Census Bureau for 1990, 2000,2010, and 2020 for the county and participating jurisdiction are presented in Table F.1.

TABLE F.1: POPULATION COUNTS FOR STONE COUNTY

Jurisdiction	2000 Census Population	2010 Census Population	2020 Census Population	% Change 2010-2020
Stone County	13,622	17,786	18,333	3.1%
Wiggins	3,849	4,390	4,282*	-2.5%

Source: United States Census Bureau, 1990, 2000, 2010, 2020 Census, 2021 ACS*

The racial characteristics of the county are presented in Table F.2.

TABLE F.2: DEMOGRAPHICS OF STONE COUNTY

Jurisdiction	White, Percent (2010)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Stone County	78.6%	19.1%	0.5%	0.3%	0.0%	1.1%	1.3%
Wiggins	64.4%	33.4%	0.4%	0.4%	0.0%	1.1%	0.9%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau, 2020 Census/2017-2021 ACS

Housing

Housing information for the county and one municipality is presented in Table F.3.

TABLE F.3: HOUSING CHARACTERISTICS OF STONE COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Housing Units (2020)	Median Home Value (2017-2021)
Stone County	5,343	7,161		$
Wiggins	1,546	1,658		$

Source: United States Census Bureau, 2000,2010, 2020 Census, 2017-2021 American Community Survey 5-Year Estimates

Infrastructure

TRANSPORTATION

In Stone County, U.S. Highway 49 and Mississippi Highway 15 run north to south allowing transportation in the county. Mississippi Highway 26 runs east-west through Stone County. U.S.

The Dean Griffin Memorial Airport is a general aviation airport located in Stone County. The Gulfport- Biloxi International Airport, located in Harrison County, also serves the county. This airport is served by three major airlines with direct flights to Atlanta, Charlotte, Dallas/Ft. Worth, and Houston as well as connections to hundreds of locations in the U.S. and worldwide.

In terms of other transportation services, one Class-I Major railway also serves the county.

UTILITIES

Electrical power in Stone County is mainly provided by electric power associations. Mississippi Power Company also provides power to some parts of the county.

CenterPoint Energy Resources is the natural gas supplier that serves Stone County.

Water and sewer service is provided by a number of different sources, but unincorporated areas often rely on septic systems and wells in Stone County.

COMMUNITY FACILITIES

There are a number of buildings and community facilities located throughout Stone County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 1 communications facility, 1 emergency operations center (EOC), 1 fire station, 1 medical facility, 2 police stations, 3 power/gas facilities, 7 public facilities, 5 schools, 4 shelters, and 2 transportation facilities located within the county.

There is one hospital located in Stone County. It is Stone County Hospital in the City of Wiggins.

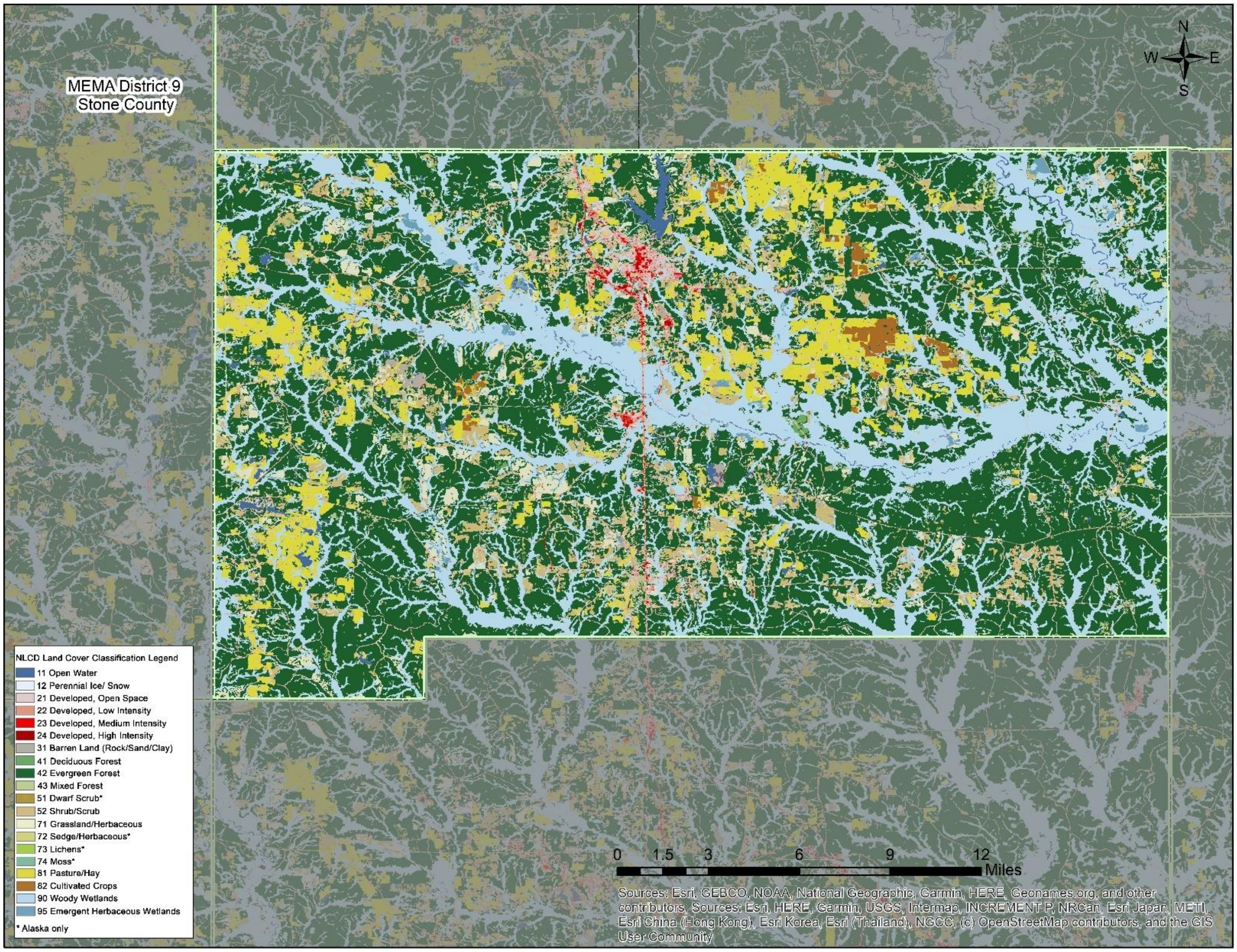
Stone County contains numerous local, state, and national parks and recreation areas, including the Mississippi Gulf Coast National Heritage Area and DeSoto National Forest. Golf courses and other recreational opportunities are also available in the county.

Land Use

Many areas of Stone County are undeveloped or sparsely developed. There is one small incorporated municipality located in the county and a few unincorporated rural centers. There is a mix of protected lands, such as the DeSoto National Forest. Private lands are used for exurban housing, agriculture, and forestry. Consistent with its rural character, densities are very low and uses are not mixed, making motor vehicles the only viable mode for virtually all travel.

Local land use and associated regulations are further discussed in Section 7: Capability Assessment.

Figure F.2: Land Classification



Employment and Industry

According to the 2019 American Community Survey (ACS), Stone County had an average annual employment of 8,229 workers and an average unemployment rate of 1.9 percent (compared to 4.2 percent for the state). In 2019, the average annual median household income in Stone County was $45,483 compared to $45,081 in the state of Mississippi.

SECTION 26 STONE COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: Hazard Identification as they pertain to Stone County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: Hazard Profiles.

National Risk Index Scores:
The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather. Because not all hazards apply to the County, only those with a defined risk to the County are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability and Community Resilience, to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions but cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision-makers as they develop risk reduction strategies.

Social Vulnerability:
Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Per the FEMA National Risk Index, Stone County has a Social Vulnerability Rating of **"Very High"** and a Social Vulnerability Score of **"82.5"** (FEMA, 2023).

The "Social Vulnerability Score" and "Rating" represent the relative level of a community's social vulnerability compared to all other communities at the same level. A community's Social Vulnerability Score is also proportional to a community's risk. A higher Social Vulnerability Score results in a higher Risk Index Score (FEMA, 2023).

Social vulnerability is also one of five components included in the formulation of the "National Risk Index Score" in addition to community resilience, estimated annual loss (EAL) based on exposure, annualized frequency, and historic Loss Ratio (HLR) factors (FEMA, 2023).

Table F.4: Social Vulnerability FEMA NRI Score

STONE COUNTY, MS FEMA NRI SOCIAL VULNERABILITY SCORE	
Social Vulnerability Score	**Social Vulnerability Rating**
82.5	Very High
Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).	
Source: hazards.fema.gov/nri/social-vulnerability	

Community Resilience:
Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Table F.5: Community Resilience FEMA NRI Score

STONE COUNTY, MS FEMA NRI COMMUNITY RESILIENCE SCORE	
Community Resilience Score	**Community Resilience Rating**
27.7	Relatively Low
Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).	
Source: hazards.fema.gov/nri/community-resilience	

Expected Annual Loss:

Table F.6: Expected Annual Loss FEMA NRI Score (All Natural Hazards)

EXPECTED ANNUAL LOSS FOR STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS SCORE	
Expected Annual Loss Score	Expected Annual Loss Rating
79.9	Relatively Low
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio).	
Source: hazards.fema.gov/nri/expected-annual-loss	

FEMA National Risk Index Score:

Table F.7: Overall FEMA NRI Score

FEMA OVERALL NRI SCORE FOR STONE COUNTY,MS FEMA OVERALL NRI SCORE	
FEMA Overall NRI Score	FEMA Overall NRI Rating
82.53	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience. (Expected Annual Loss X Social Vulnerability / Community Resilience = Risk Index).	
Source: hazards.fema.gov/nri/determining-risk	

--- County Overall Risk Scores:

The following tables represent the new overall risk scores for ---- County based on the described methodology above. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores. FEMA NRI Scores were used as appropriate and applicable to inform the analysis.

Table F:8 2023 Hazard Risk Scores Stone County

Dam and Levee Failure	1	4	6	13	23	15
Erosion	2	0	8	16	24	28
Flood	3	8	12	31	51	77
Storm Surge	0	0	4	-	4	0
Drought	2	8	11	17	36	40
Lightning	3	7	11	19	37	59
Wildfire	2	8	6	21	35	39
Earthquake	0	0	4	12	16	0
Extreme Cold	3	4	5	19	28	46
Extreme Heat/Heat Wave	3	7	10	23	40	63
Hailstorm	2	4	6	13	23	27
Hurricane Tropical Storm	3	12	17	36	65	95
Severe Thunderstorm/High Wind	3	11	16	29	56	84
Tornado	2	8	15	32	55	58
Winter Weather	3	3	7	26	36	57
Climate Change/Sea Level Rise	2	3	6	15	24	28

HAZMAT/Train Derailment	1	4	6	17	27	17
Infectious Disease	2	8	12	27	47	51

For a full list of hazard rankings and methodologies, please click the below link:

StoneCounty_RankingSpreadsheet.xlsx

Table F.9: Hazard Risk Scores Legend

Probability Factor		Sum of Weighted Extent Factors		Sum of Weighted Vulnerability Factors		Sum of Weighted Impact Factors		Consequence Score		Total Risk Score	
1	Low (L)	0–6	Low (L)	0–6	Low (L)	0–12	Low (L)	0–25	Low (L)	0–24	Low (L)
2	Medium (M)	7–12	Medium (M)	7–12	Medium (M)	13–26	Medium (M)	26–50	Medium (M)	25–59	Medium (M)
3	High (H)	13–18	High (H)	13–18	High (H)	27–39	High (H)	51–75	High (H)	60–100	High (H)

** The **Legend** – specifically the assignment of low, medium, and high—provides an additional means to qualitatively assess the probability factor, sum of weighted factors, and the total risk scores for each hazard.*

*The **Consequence Score** represents the sum of the Extent, Vulnerability, and Impact Factors.*

*The **Total Risk Score** is a measure of Probability and Consequence.*

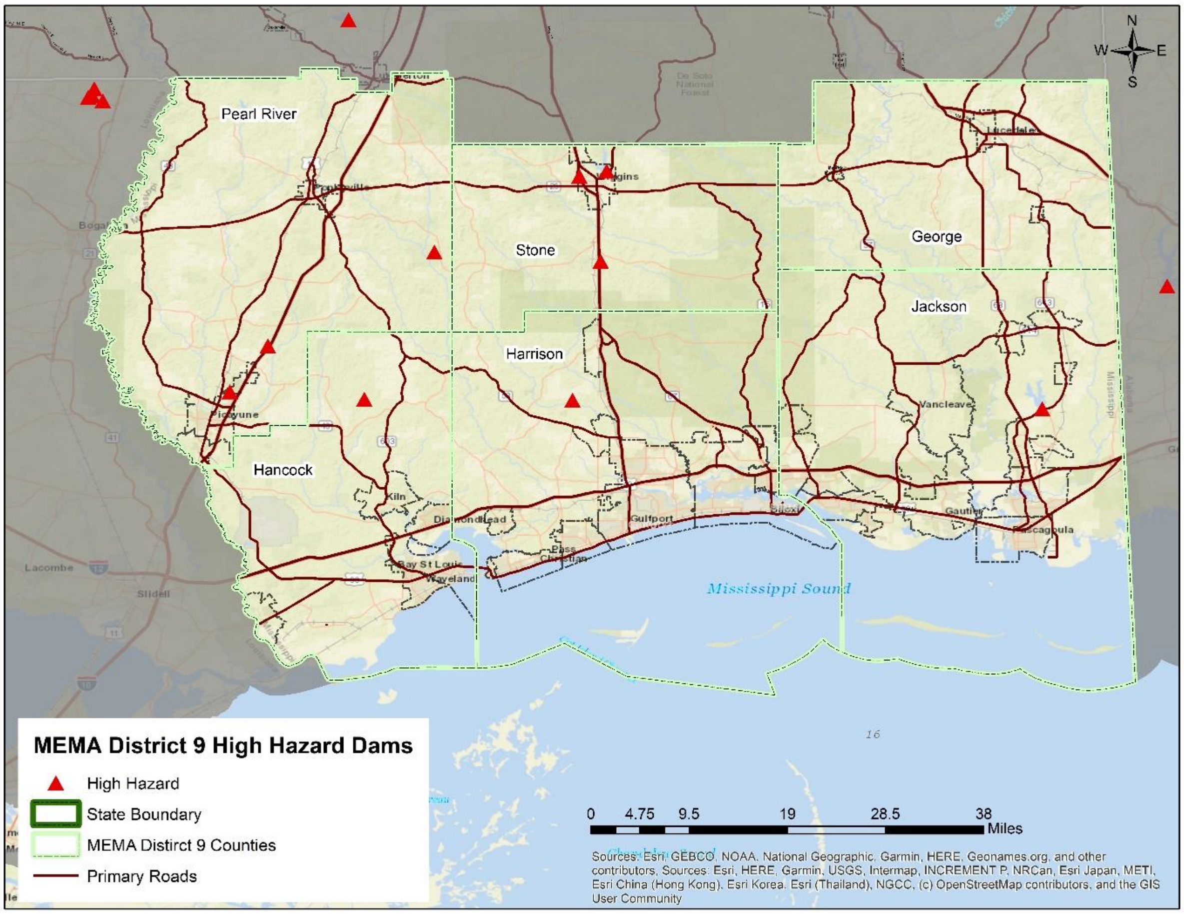
FLOOD-RELATED HAZARDS

Dam and Levee Failure

LOCATION AND SPATIAL EXTENT

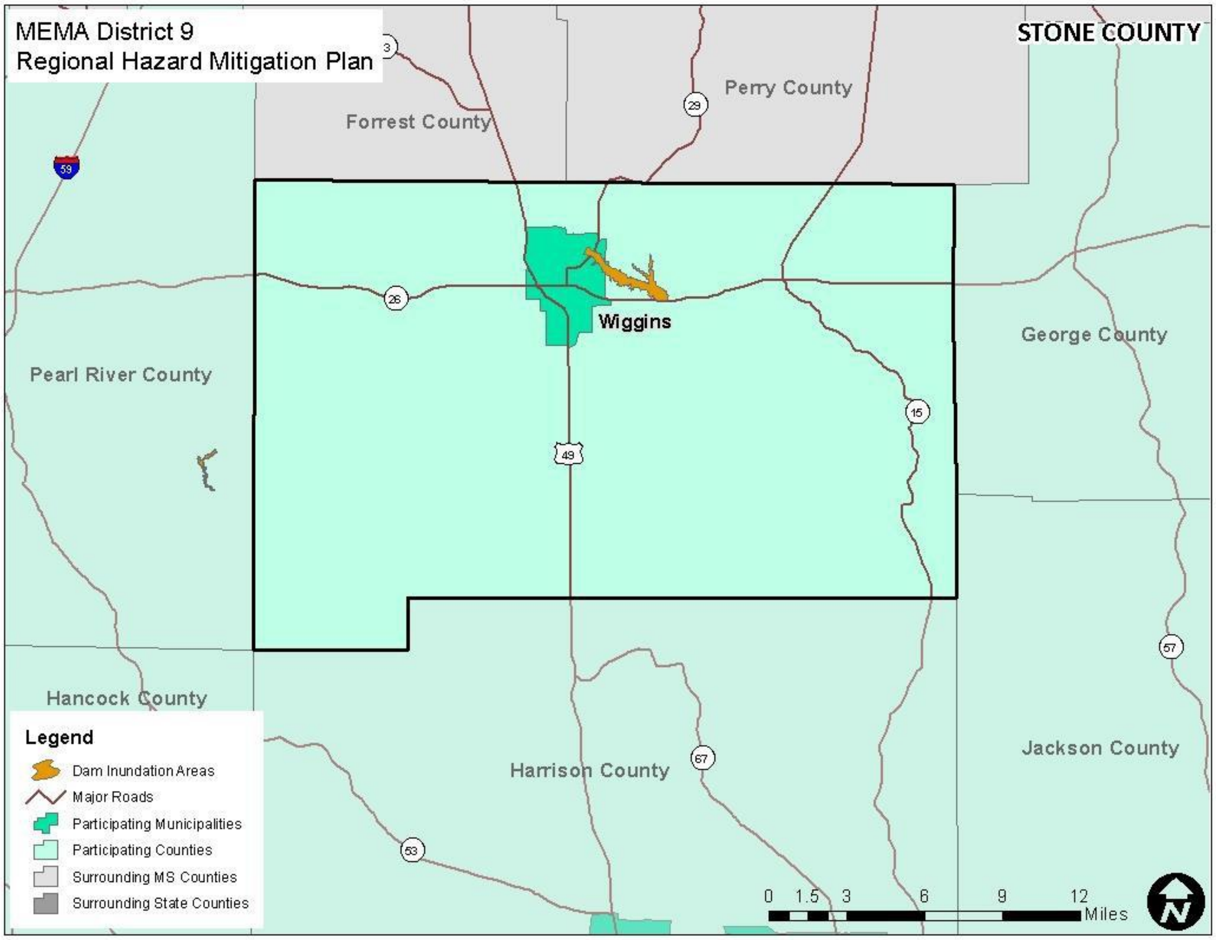
According to the Mississippi Department of Environmental Quality, there is one high hazard dam in Stone County. Figure F.3 and Figure F.4 show the location of this high hazard dam as well as mapped dam inundation areas, and Table F.10 lists it by name.

FIGURE F.3: STONE COUNTY HIGH HAZARD DAM LOCATIONS



Source: Mississippi Department of Environmental Quality

FIGURE F.4: STONE COUNTY DAM INUNDATION AREAS



Source: Mississippi Department of Environmental Quality

TABLE F.10: STONE COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential
Stone County	
FLINT CREEK RESERVOIR DAM	High

Source: Mississippi Department of Environmental Quality

HISTORICAL OCCURRENCES

According to the Mississippi State Hazard Mitigation Plan, there have been no dam failures reported in Stone County (Table F.11). However, several breach scenarios in the region could be catastrophic.

TABLE F.11: STONE COUNTY DAM FAILURES (1982-2022)

Date	County	Structure Name	Cause of Failure
None reported	Stone	--	--

Source: Mississippi State Hazard Mitigation Plan

PROBABILITY OF FUTURE OCCURRENCES

Given the current dam inventory and historic data, a dam breach is possible (between 1 and 10 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

The FEMA NRI does not assess high-hazard dams and levees.

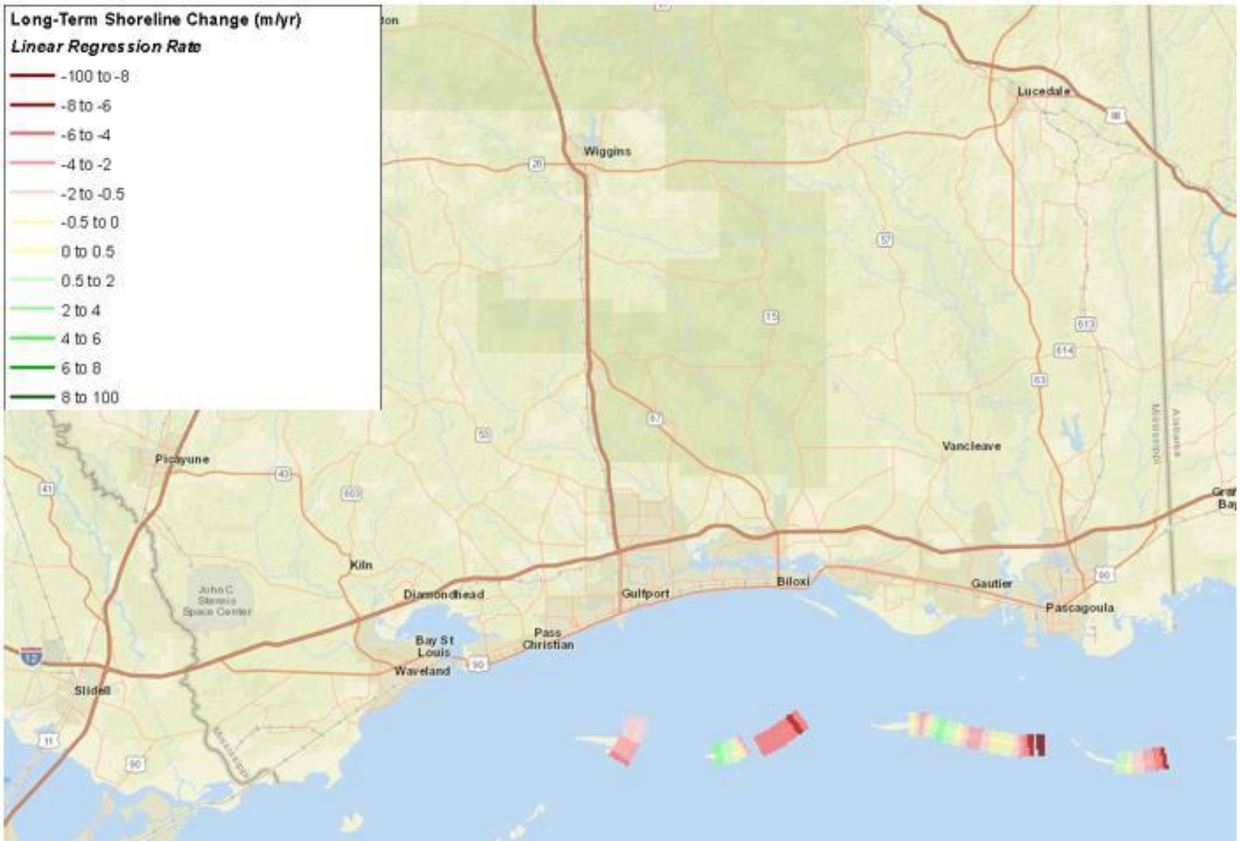
Erosion

LOCATION AND SPATIAL EXTENT

For the most part, major erosion in the MEMA District 9 Region is typically caused by coastal tides, ocean currents, and storm events. Although the region also experiences riverine erosion in many of its inland areas, including Stone County, these are of somewhat less concern than coastal erosion areas which historically have had larger impacts. Unlike inland areas, where the soil has greater organic matter content, coastal soils are mainly composed of fine grained particles such as sand. This makes coastal soils much more susceptible to erosion. Although some areas of the MEMA District 9 Region coast are protected and natural erosion processes are allowed to take place for the most part, many areas near where development has occurred are especially susceptible.

At this time, there is limited data available on localized areas of erosion. Most of the information collected by the United States Geological Survey (USGS) is focused on the barrier islands that are just off the coast of the mainland. The long-term shoreline change for the barrier islands as calculated by the USGS can be found in Figure F.5 It should be noted that many areas of the coast are protected through the use of structural techniques. Also, a great deal of renourishment activities are carried out along the mainland coastal communities.

FIGURE F.5: LONG-TERM SHORELINE CHANGE (M/YR) IN THE MEMA DISTRICT 9 REGION



Source: United States Geological Survey

HISTORICAL OCCURRENCES

Several sources were vetted to identify areas of erosion in Stone County. This includes searching local newspapers, interviewing local officials, and reviewing previous hazard mitigation plans. Because dramatic, short-term erosion tends to take place after major storm events such as hurricanes, flooding, or storm surge, the erosion events often correspond directly with those events. Conversely, with long- term erosion, it is difficult to identify a specific historic occurrence because these events are by nature occurring at all times over a long period at a very gradual rate. Therefore, long-term historic erosion events cannot be confined to a specific timeframe or occurrence.

PROBABILITY OF FUTURE OCCURRENCES

Erosion remains a natural, dynamic, and continuous process for Stone County, and it will continue to occur. The annual probability level assigned for erosion is likely (between 10 and 100 percent annually).

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk

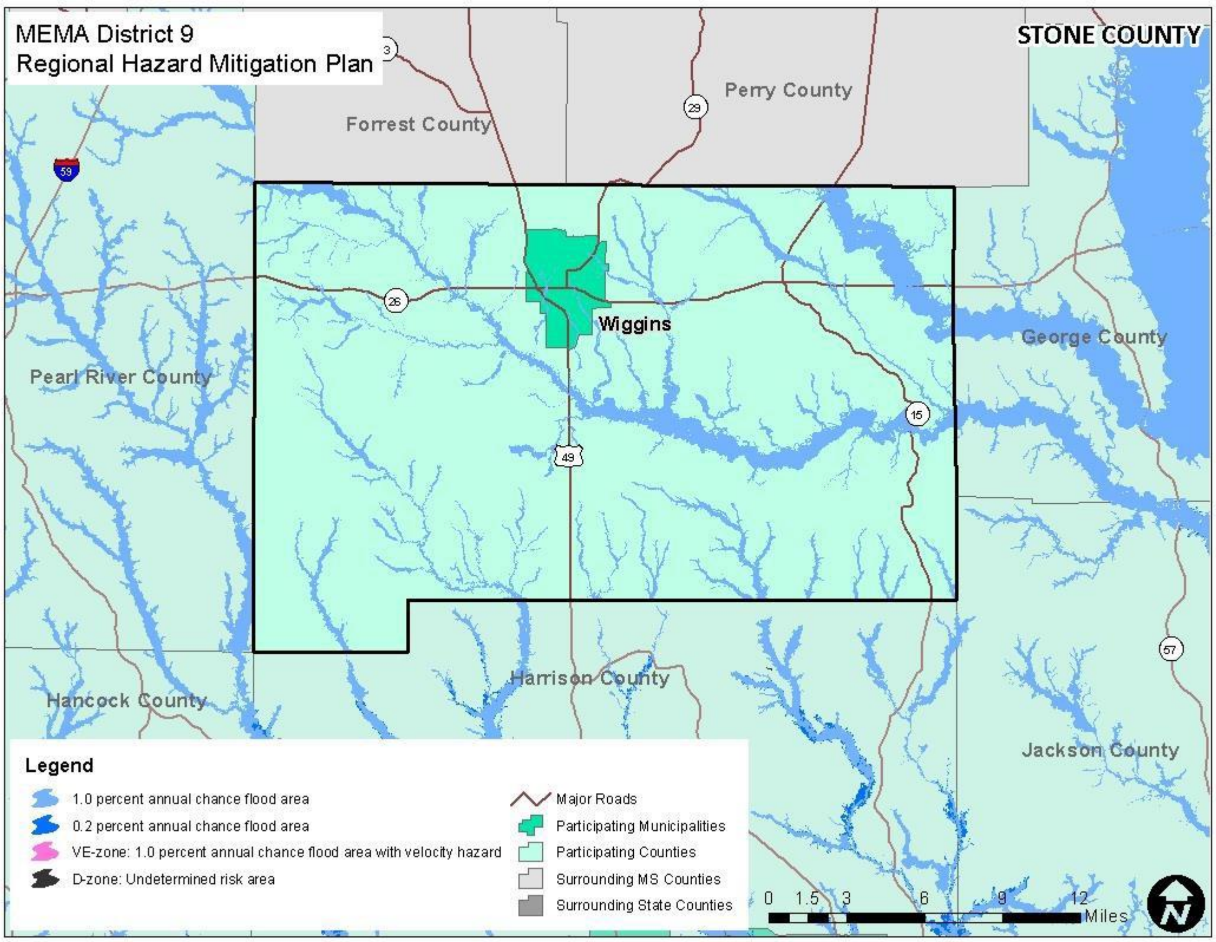
The FEMA NRI does not assess erosion events.

Flood

LOCATION AND SPATIAL EXTENT

There are areas in Stone County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM). This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevations), Zone VE (1-percent annual chance floodplain with additional hazards due to storm-induced velocity wave action), Zone X500 (0.2-percent annual chance floodplain), and Zone D (undetermined risk area). Figure F.6 illustrates the location and extent of currently mapped special flood hazard areas for the county based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

FIGURE F.6: SPECIAL FLOOD HAZARD AREAS IN STONE COUNTY



Source: Federal Emergency Management Agency

Figure F.7: National Flood Hazard Layer (No Facilities)

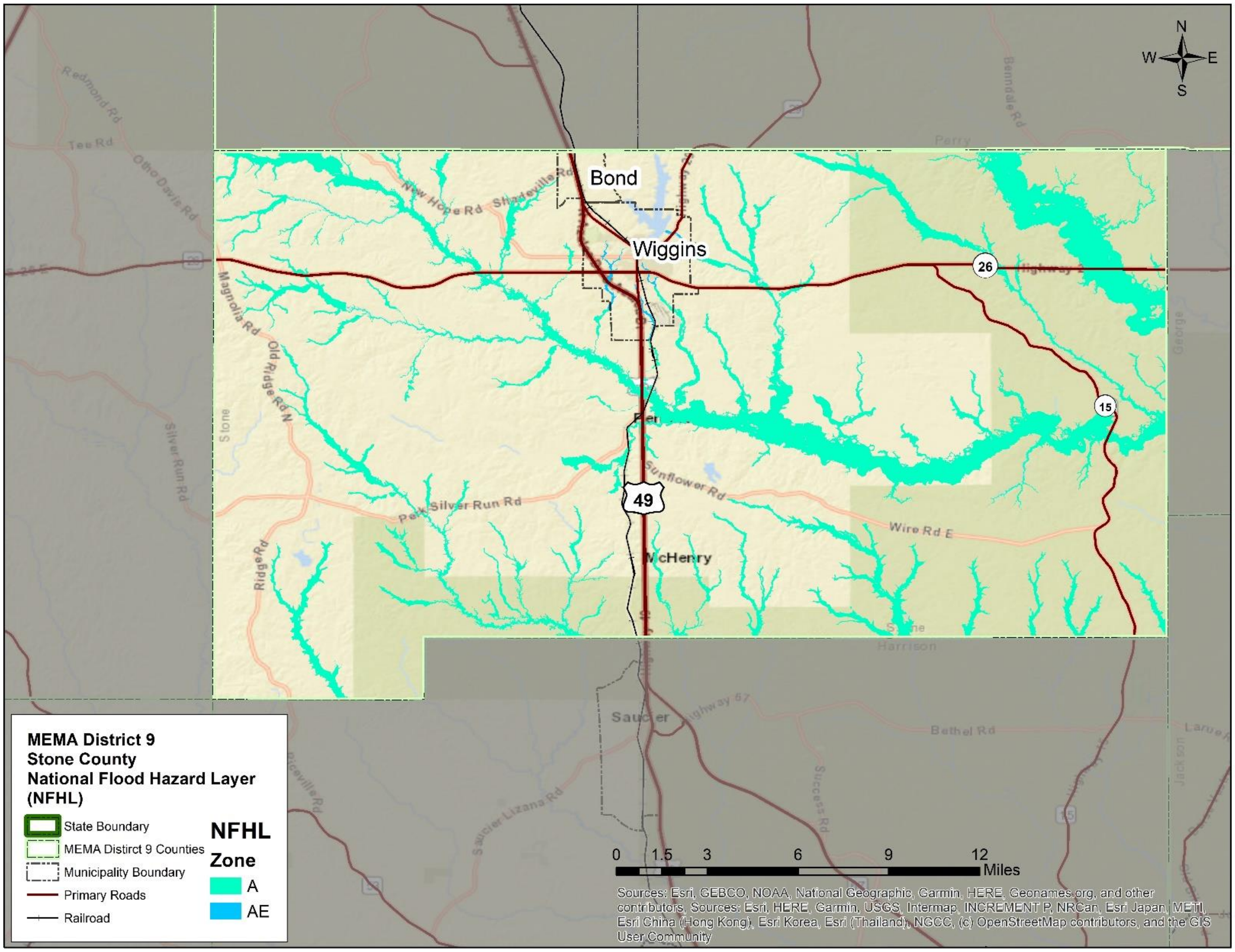


Figure F.8: National Flood Hazard Layer (No Facilities)

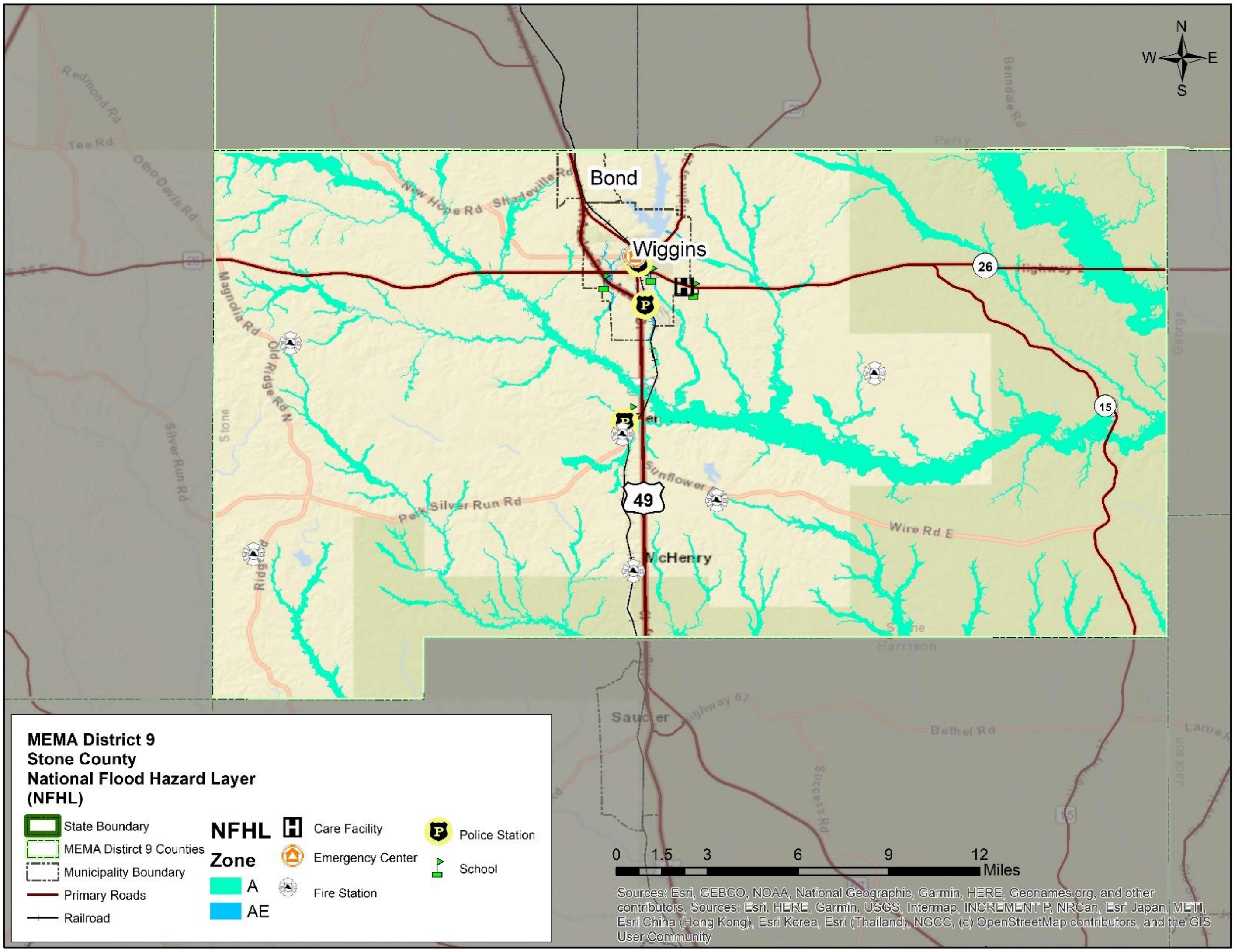


Figure F.9: HAZUS 100-Year Analysis (No Facilities)

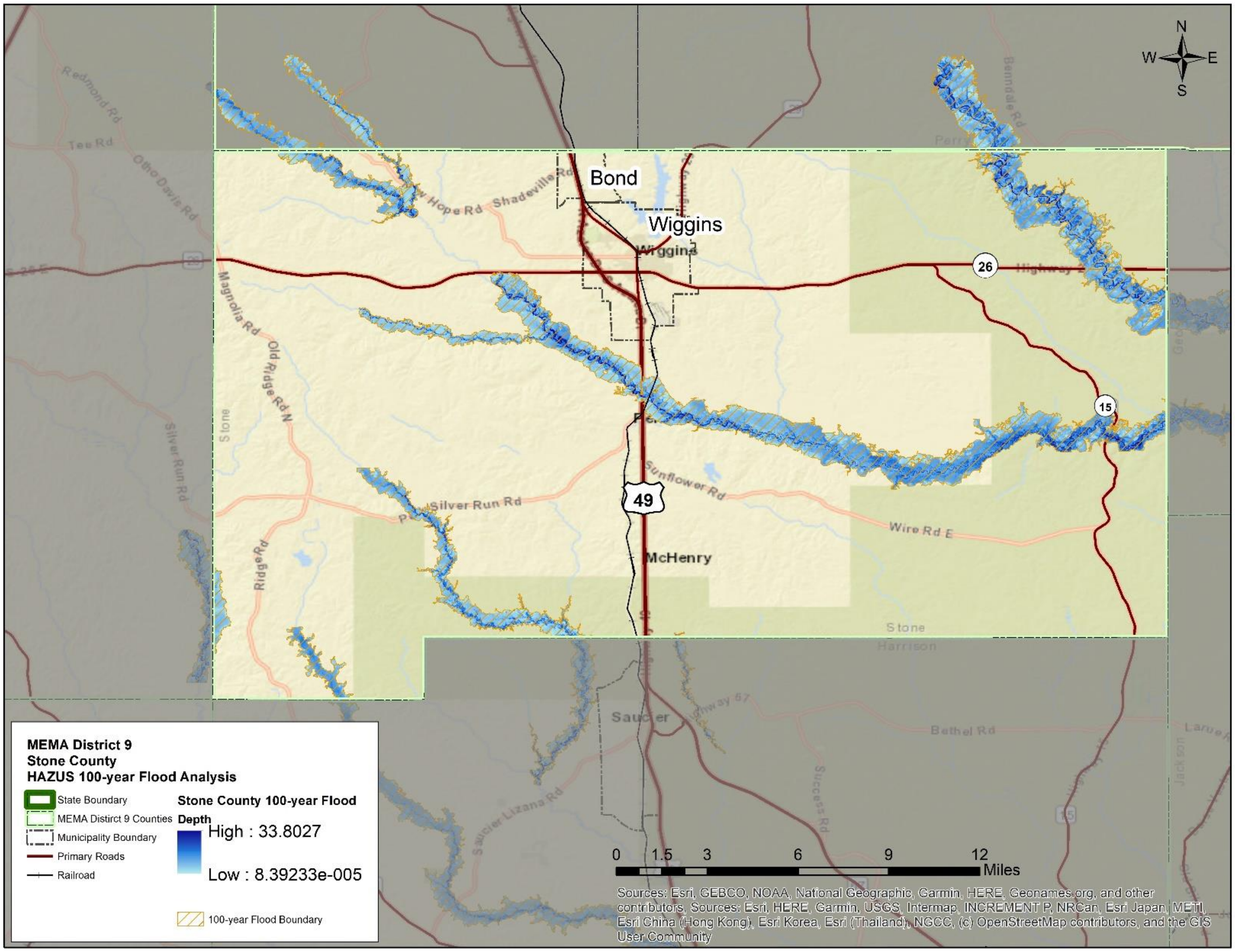
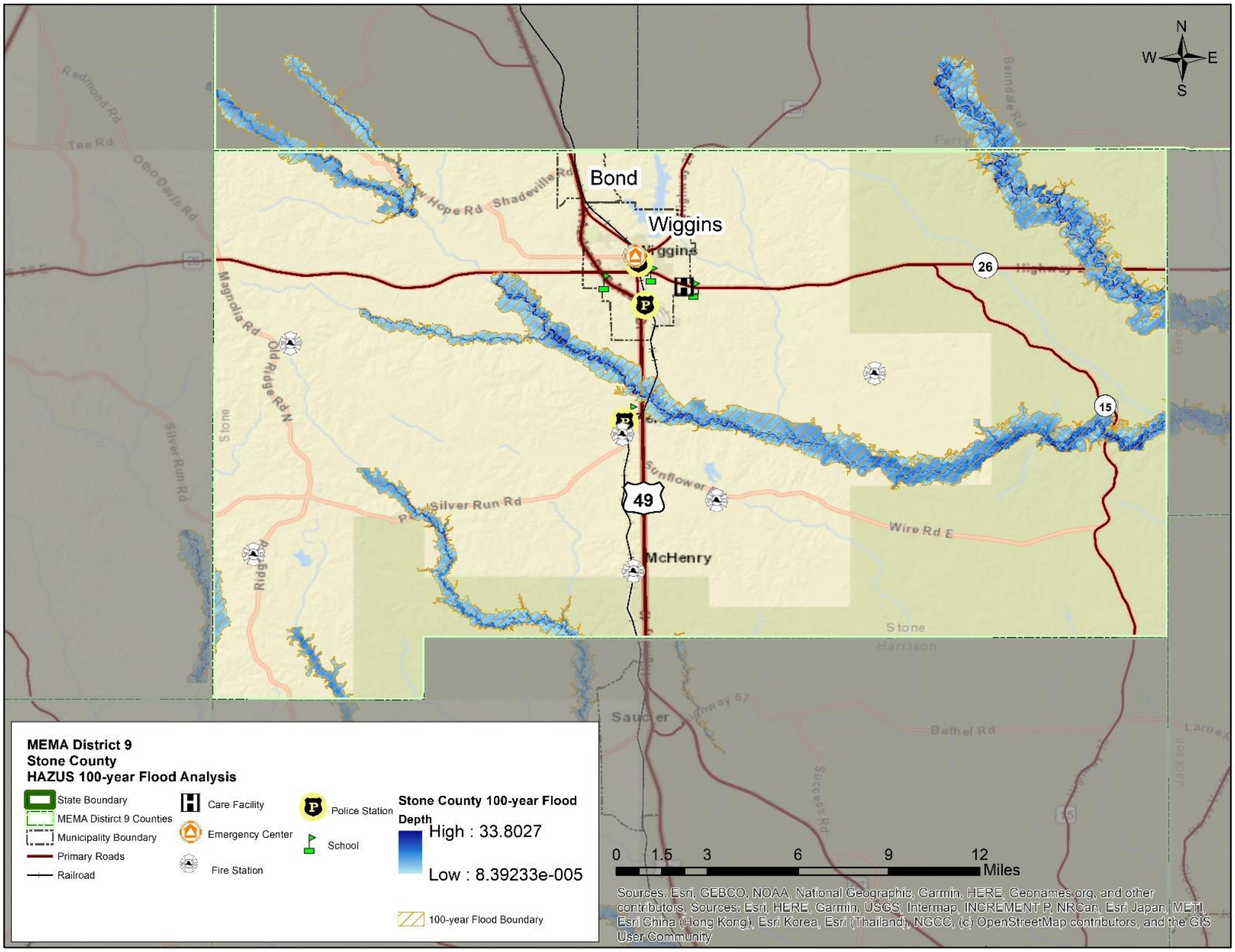


Figure F.10: HAZUS 100-Year Analysis (Facilities)



HISTORICAL OCCURRENCES

Floods were at least partially responsible for one disaster declaration in Stone County in 2009. Information from the National Center for Environmental Information was used to ascertain additional historical flood events. The National Center for Environmental Information reported a total of 33events in Stone County since 1998. These events accounted for over $246,000 in property damage in the county. Based on historic recorded events from NCEI, Stone County experiences events ranging from 3-5'' regularly causing minor flooding throughout the county. The extreme events recorded for the county range from 8-11" of rainfall from a single event. Based on damage estimates flood depths range from a few inches to feet of water within floodways, for specific flood depths additional analyses is required through hydrologic and hydraulic studies A summary of these events is presented in Table F.12. Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in Table F.13.

TABLE F.12: SUMMARY OF FLOOD OCCURRENCES IN STONE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Wiggins	11	0/0	$13,987	$583
Unincorporated Area	22	0/0	$232,331	$9,680

STONE COUNTY TOTAL	33	0/0	$246,318	$10,263

Source: National Center for Environmental Information

TABLE F.13: HISTORICAL FLOOD EVENTS IN STONE COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Wiggins				
WIGGINS	6/16/2000	Flash Flood	0/0	$13,987
WIGGINS	9/26/2002	Flash Flood	0/0	$0
WIGGINS	10/27/2002	Flash Flood	0/0	$0
WIGGINS	10/22/2007	Flash Flood	0/0	$0
WIGGINS	3/27/2009	Flash Flood	0/0	$0
WIGGINS	2/4/2010	Flash Flood	0/0	$0
WIGGINS	3/5/2011	Flash Flood	0/0	$0
WIGGINS	3/21/2012	Flash Flood	0/0	$0
WIGGINS	3/22/2012	Flash Flood	0/0	$0
WIGGINS	3/24/2021	Flash Flood	0/0	$0
WIGGINS	8/25/2022	Flash Flood	0/0	$0
Unincorporated Area				
WEST PORTION	1/26/1998	Flash Flood	0/0	$1,478
NORTHWEST PORTION	4/28/1998	Flash Flood	0/0	$14,776
COUNTYWIDE	9/28/1998	Flash Flood	0/0	$0
COUNTYWIDE	3/3/2001	Flash Flood	0/0	$13,600
EAST PORTION	10/28/2002	Flash Flood	0/0	$0
COUNTYWIDE	12/31/2002	Flash Flood	0/0	$0
NORTH CENTRAL PORTION	4/7/2003	Flash Flood	0/0	$0
COUNTYWIDE	6/30/2003	Flash Flood	0/0	$0
PERKINSTON	5/12/2004	Flash Flood	0/0	$0
COUNTYWIDE	8/29/2005	Flash Flood	0/0	$0
WHITES CROSSING	12/21/2006	Flash Flood	0/0	$47,788
BEATRICE	4/5/2008	Flash Flood	0/0	$0
BEATRICE	9/1/2008	Flash Flood	0/0	$2,237
MC HENRY	8/29/2012	Flood	0/0	$52,452

Location	Date	Type	Deaths/Injuries	Property Damage*
RAMSEY SPGS	4/14/2015	Flash Flood	0/0	$0
BOND	7/24/2017	Flash Flood	0/0	$100,000
DEAN GRIFFIN MEM ARP	4/14/2018	Flash Flood	0/0	$0
DEAN GRIFFIN MEM ARP	5/11/2019	Flash Flood	0/0	$0
PERKINSTON	3/30/2021	Flash Flood	0/0	$0
PERRY	4/10/2021	Flash Flood	0/0	$0
WHITES CROSSING	6/19/2021	Flash Flood	0/0	$0
PERKINSTON	6/22/2021	Flash Flood	0/0	$0

Source: National Center for Environmental Information

HISTORICAL SUMMARY OF INSURED FLOOD LOSSES

According to FEMA flood insurance policy records as of October 2016, there have been 11 flood losses reported in Stone County through the National Flood Insurance Program (NFIP) since 1978, totaling over $115,000 in claims payments. A summary of these figures for the county is provided in Table F.14. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Stone County were either uninsured, denied claims payment, or not reported.

TABLE F.14: SUMMARY OF INSURED FLOOD LOSSES IN STONE COUNTY

Location	Number of Policies	Flood Losses	Claims Payments
Wiggins	5	0	$0
Unincorporated Area	31	11	$115,205
STONE COUNTY TOTAL	36	11	$115,205

Source: National Flood Insurance Program

REPETITIVE LOSS PROPERTIES

According to the Mississippi Emergency Management Agency, there are two non-mitigated repetitive loss properties located in Stone County, which accounted for four losses and almost $24,000 in claims payments under the NFIP. The average claim amount for these properties is $5,968. Both properties are single family. Without mitigation, these properties will likely continue to experience flood losses. Table F.15 presents detailed information on repetitive loss properties and NFIP claims and policies for Stone County.

During the 2022 HMP update process updated NFIP/Repetitive Loss data was requested; however, no new data was made available. The 2016 data is considered the best available data for the plan update. With a lack of data provided via FEMA the National Resource Defense Council (NRDC) was utilized to provide unofficial NFIP/RL data. Based on data available via the (NRDC), Stone County has experienced a total of 33 NFIP claims totaling $504,132 in payments. There are no SRL properties with no claim payments.
[Losing Ground: Severe Repetitive Flooding in the United States (nrdc.org)]

TABLE F.15: REPETITIVE LOSS PROPERTIES IN STONE COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment

Wiggins	0	--	0	$0	$0	$0	$0
Unincorporated Area	2	2 single family	4	$8,641	$15,233	$23,874	$5,968
STONE COUNTY TOTAL	2		4	$8,641	$15,233	$23,874	$5,968

Source: Federal Emergency Management Agency, National Flood Insurance Program

PROBABILITY OF FUTURE OCCURRENCES

Flood events will remain a threat in Stone County, and the probability of future occurrences will remain highly likely (100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figure above, which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain). Further, as described in other hazard profiles, it is highly likely that Stone County will continue to experience inland flooding associated with large tropical storms and hurricanes.

It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county. For example, the eastern half of the county has more floodplain and thus a higher risk of flood than the rest of the county. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

It should also be noted that anticipated sea level rise will increase the probability and intensity of future tidal flooding events in years to come. Rising sea level over time will shorten the return period (increasing the frequency) of significant flood events. This hazard is discussed elsewhere in this section.

FEMA NRI Expected Annual Loss Estimates

Table F.16: Stone County Expected Annual Loss Table

STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR FLOODING EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1.2 events/year	0.00	$29,261	$10,619	$293	$40,174	15.7	Very Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table F.17: Stone County Hazard Specific Risk Index Table

STONE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – FLOODING	
Risk Index Score	Risk Index Rating
15.7/100	Very Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.*	

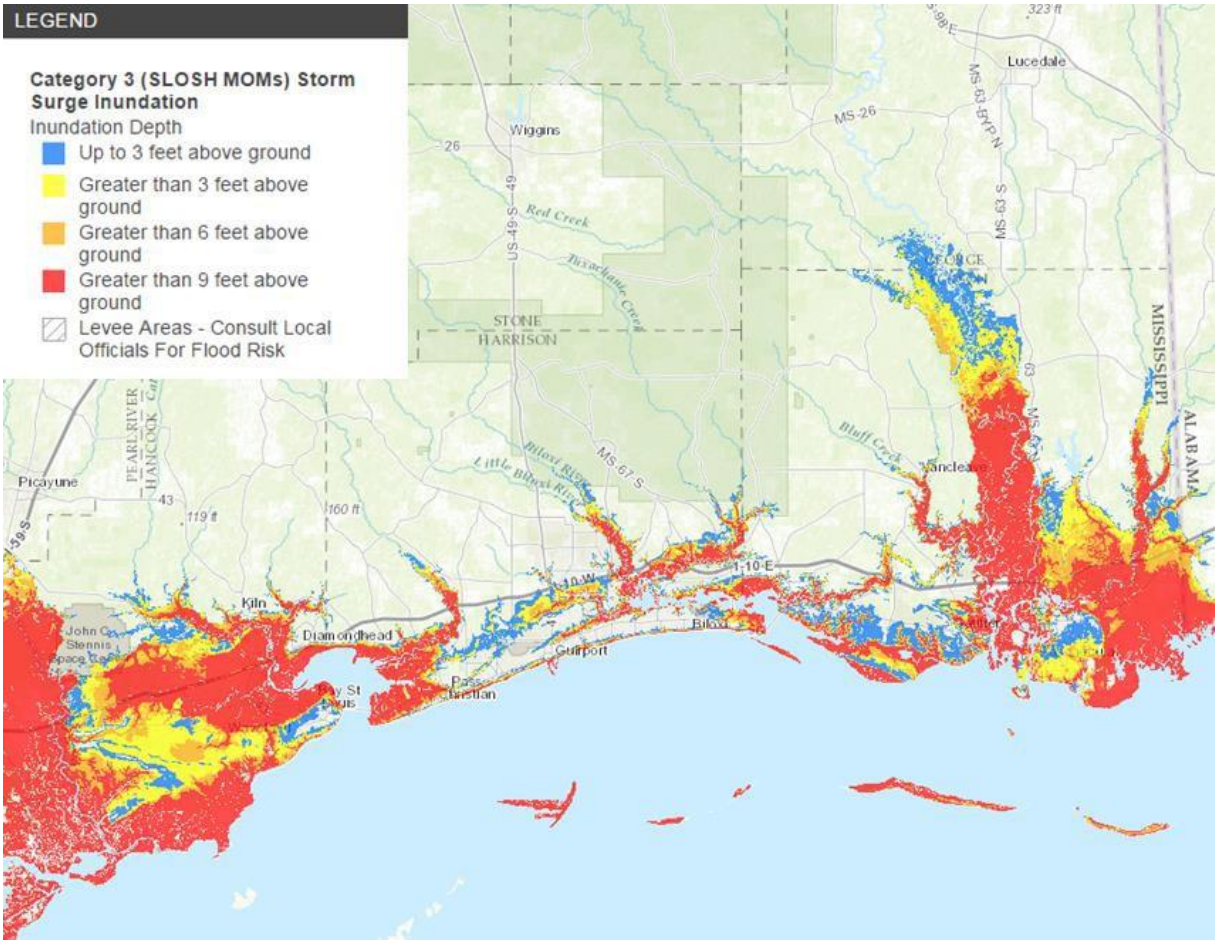
*FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*
Source: FEMA National Risk Index (2023)

Storm Surge

LOCATION AND SPATIAL EXTENT

There are no areas in Stone County that are subject to potential storm surge inundation as modeled and mapped by the National Oceanic and Atmospheric Administration (NOAA). Figure F.11 illustrates hurricane storm surge inundation zones based on a Category 3 storm. The illustration is derived from geo-referenced SLOSH (Sea, Lake, and Overland Surge from Hurricanes) data produced by the USACE in coordination with NOAA. SLOSH is a modeling tool used to estimate storm surge for coastal areas resulting from historical, hypothetical, or predicted hurricanes taking into account maximum expected levels for pressure, size, forward speed, track, and winds. Therefore, the SLOSH data is best used for defining the potential maximum surge associated with various storm intensities for any particular location. As shown in the figure, no areas in Stone County are at risk to storm surge inundation. However, inland areas may also experience substantial flooding during a storm event.

FIGURE F.11: STORM SURGE RISK AREAS IN THE MEMA DISTRICT 9 REGION



Source: NOAA

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, no storm surge events have been reported for Stone County since 1996. A summary of these events is presented in Table F.18. Detailed information on the recorded storm surge events can be found in Table F.19.

TABLE F.18: SUMMARY OF STORM SURGE EVENTS IN STONE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2016)	Annualized Property Losses
Wiggins	0	0/0	$0	$0
Unincorporated Area	0	0/0	$0	$0
STONE COUNTY TOTAL	0	0/0	$0	$0

Source: National Center for Environmental Information

TABLE F.19: HISTORICAL STORM SURGE EVENTS IN STONE COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Wiggins				
None reported	--	--	--	--
Unincorporated Area				
None reported	--	--	--	--

Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

It is unlikely (less than 1 percent annual probability) that Stone County will experience storm surge associated with large tropical storms, hurricanes, and squalls combined with high tides. As noted in the preceding section (under Flood), anticipated sea level rise will increase the probability and intensity of future storm surge events in years to come. This rise in sea level will not only increase the probability and intensity of tidal flooding events, but will also contribute to the loss of coastal wetlands and erosion of sand beaches that act as protective buffers against storm surge events.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI is not applicable to Coastal Flooding/Storm Surge for Stone County

FIRE-RELATED HAZARDS

Drought

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that Stone County would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment but may exacerbate wildfire conditions.

HISTORICAL OCCURRENCES

According to the U.S. Drought Monitor, Stone County had drought levels of Severe or worse in 8 of the last 23 years (January 2000-December 2022). Table F.20 shows the most severe drought classification for each year, according to U.S. Drought Monitor classifications. It should be noted that the U.S. Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

TABLE F.20: HISTORICAL DROUGHT OCCURRENCES IN STONE COUNTY

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

	Stone County
2000	EXCEPTIONAL
2001	MODERATE
2002	SEVERE

	Stone County
2003	ABNORMAL
2004	ABNORMAL
2005	ABNORMAL
2006	EXTREME
2007	MODERATE
2008	ABNORMAL
2009	MODERATE
2010	SEVERE
2011	EXCEPTIONAL
2012	SEVERE
2013	ABNORMAL
2014	SEVERE
2015	SEVERE
2016	ABNORMAL
2017	NONE
2018	NONE
2019	NONE
2020	NONE
2021	NONE
2022	NONE

Source: United States Drought Monitor

No anecdotal information was available from the National Center for Environmental Information on droughts in Stone County.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that Stone County has a probability level of likely (between 10 and 100 percent annual probability) for future drought events. However, the extent (or magnitude) of drought and the amount of geographic area covered by drought, varies with each year. Historic information indicates that there is a much lower probability for extreme, long-lasting drought conditions.

FEMA NRI Expected Annual Loss Estimates

Table F.21: Stone County Expected Annual Loss Table

STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR DROUGHT EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
14.8 events/year	n/a	n/a	n/a	$111,747	$111,747	70.0	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table F.22: Stone County Hazard Specific Risk Index Table

STONE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – DROUGHT	
Risk Index Score	**Risk Index Rating**
68.7/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Lightning

LOCATION AND SPATIAL EXTENT

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Stone County is uniformly exposed to lightning.

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, there have been six recorded lightning events in Stone County since 2002. These events resulted in almost $91,000) in damages. Furthermore, lightning has caused nine injuries in the county. A summary of these events is presented in Table F.23. Detailed information on historical lightning events can be found in Table F.24.

It is certain that more than five events have impacted the county. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE F.23: SUMMARY OF LIGHTNING OCCURRENCES IN STONE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Wiggins	6	0/9	$90,767	$4,538
Unincorporated Area	0	0/0	$0	$0
STONE COUNTY TOTAL	6	0/9	$90,767	$4,538

Source: National Center for Environmental Information

TABLE F.24: HISTORICAL LIGHTNING OCCURRENCES IN STONE COUNTY

Location	Date	Deaths/ Injuries	Property Damage*	Details
Wiggins				
WIGGINS	8/25/2002	0/0	$13,388	Lightning struck three trees and started a fire in a building near the strike. The fire was put out but the building suffered some minor damage from the fire.
WIGGINS	3/12/2003	0/0	$26,180	Lightning struck the communications center in Wiggins. The 911 center was without service for several hours.
WIGGINS	6/9/2007	0/0	$23,232	A home was struck by lightning in Wiggins. The strike caused a fire in the hot water heater. The fire was contained to a small area. The home still suffered considerable smoke and water damage.
WIGGINS	7/3/2008	0/0	$27,967	Lightning struck a few buildings in Wiggins causing a fire that damaged the buildings.
WIGGINS	8/4/2010	0/2	$0	Four individuals were struck by lightning at Flint Creek Water Park. Two of them were transported to a hospital.
WIGGINS	7/13/2021	0/7	$0	Seven people were injured by a lightning strike while boating and swimming at Flint Creek Waterpark in Wiggins, MS.
Unincorporated Area				

PROBABILITY OF FUTURE OCCURRENCES

Although there was not a high number of historical lightning events reported in Stone County via NCEI data, it is a regular occurrence accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN), Stone County is located in an area of the country that experienced an average of 4 to 12 and up lightning flashes per square kilometer per year between 2005 and 2022. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table F.25: Stone County Expected Annual Loss Table

STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR LIGHTNING EVENTS

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
131.6 events/year	0.01	$116,963	$8,219	n/a	$125,182	61.5	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table F.26: Stone County Hazard Specific Risk Index Table

STONE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – LIGHTNING	
Risk Index Score	**Risk Index Rating**
62.9/100	Relatively Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Wildfire

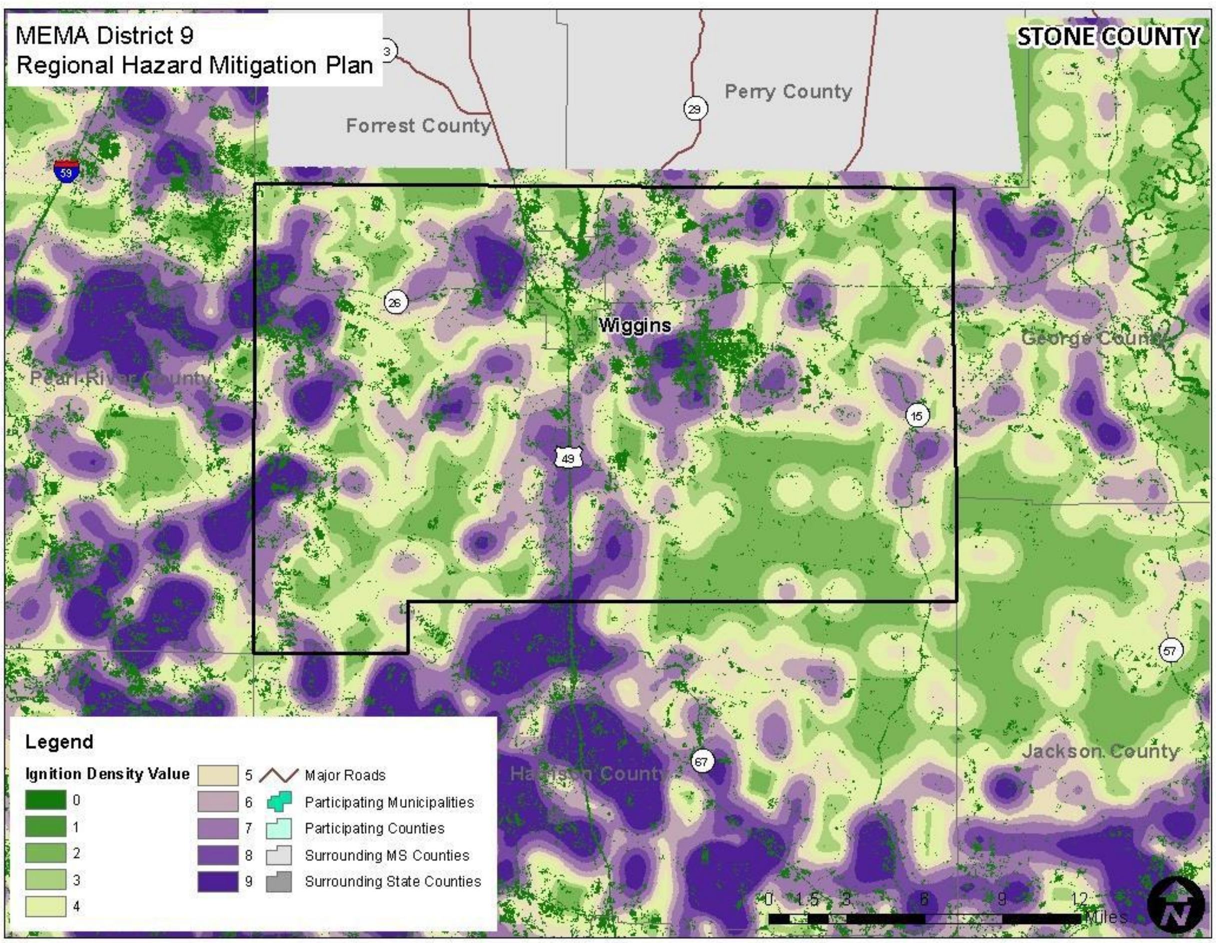
LOCATION AND SPATIAL EXTENT

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban- wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Wildfire Ignition Density data shown in the figure below give an indication of historic location.

HISTORICAL OCCURRENCES

Figure F.12 shows the Wildfire Ignition Density in Stone County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.

FIGURE F.12: WILDFIRE IGNITION DENSITY IN STONE COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the Mississippi Forestry Commission from 2007 to 2022, Stone County experiences an average of 41 wildfires annually which burn a combined 364 acres, on average per year. The data indicates that most of these fires are small, averaging nine acres per fire. Table F.27 provides a summary of wildfire occurrences in Stone County and Table F.28 lists the number of reported wildfire occurrences in the county between the years 2007 and 2022.

TABLE F.27: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2007 -2016)*

	Stone County
Average Number of Fires per year	31.06
Average Number of Acres Burned per year	283
Average Number of Acres Burned per fire	9.9

Source: Mississippi Forestry Commission

TABLE F.28: HISTORICAL WILDFIRE OCCURRENCES IN STONE COUNTY

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Stone County																
Number of Fires	52	42	52	30	58	18	39	36	58	24	16	6	9	14	21	22
Number of Acres Burned	492	377	542	168	401	67	368	296	236	690	123	96	63	188	134	287

Source: Mississippi Forestry Commission

PROBABILITY OF FUTURE OCCURRENCES

Wildfire events will be an ongoing occurrence in Stone County. Figure F.8 shows that there is some probability a wildfire will occur throughout the county. However, the likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Stone County for future wildfire events is highly likely (100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table F.29: Stone County Expected Annual Loss Table

STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WILDFIRE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating

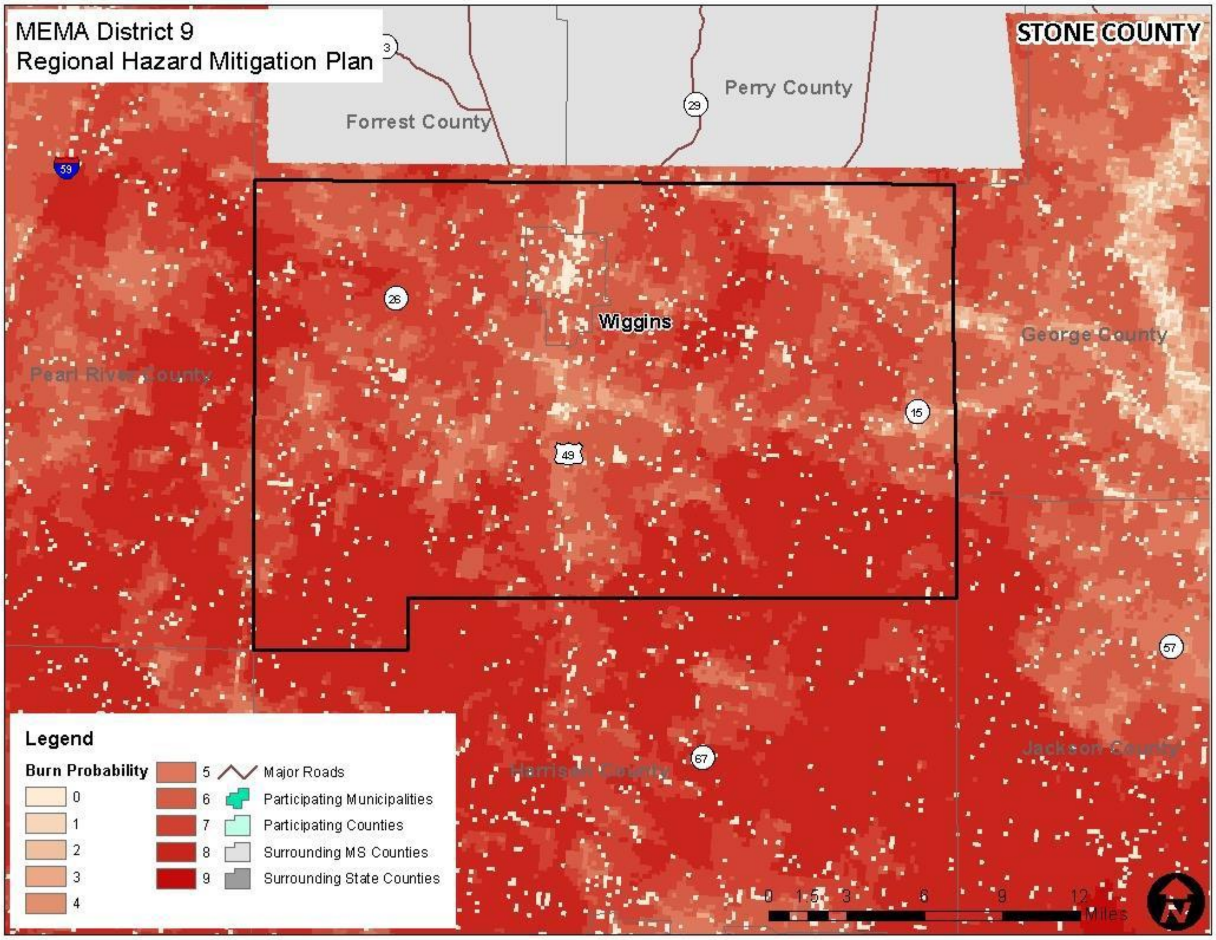
0.426% chance/year	0.01	$104,318	$731,369	$104	$835,791	85.6	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table F.30: Stone County Hazard Specific Risk Index Table

STONE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WILDFIRE	
Risk Index Score	**Risk Index Rating**
85.9/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

FIGURE F.13: BURN PROBABILITY IN STONE COUNTY



Source: Southern Wildfire Risk Assessment

Figure F.14: Wildfire Hazard Potential

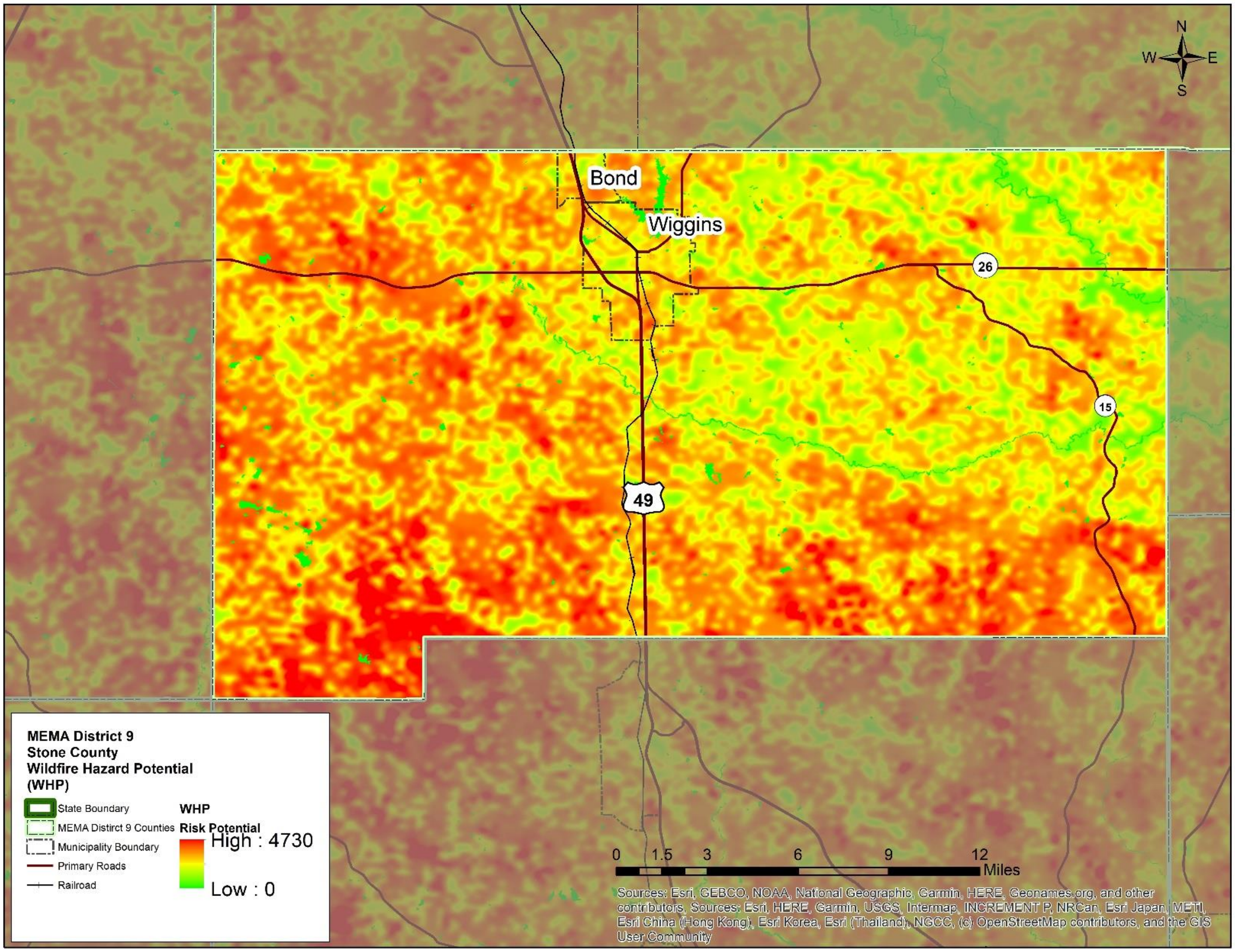
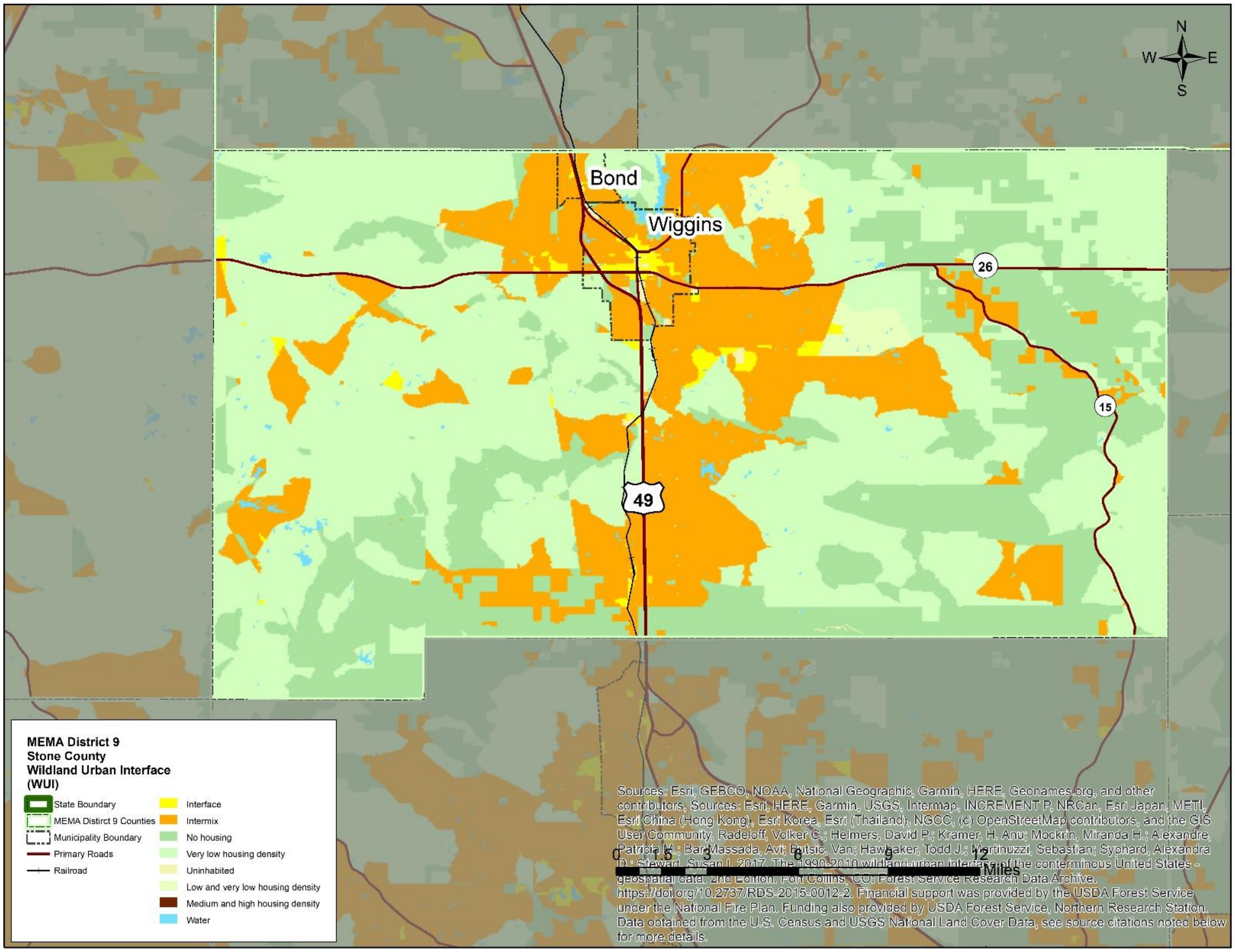


Figure F.15: Wildland Urban Interface



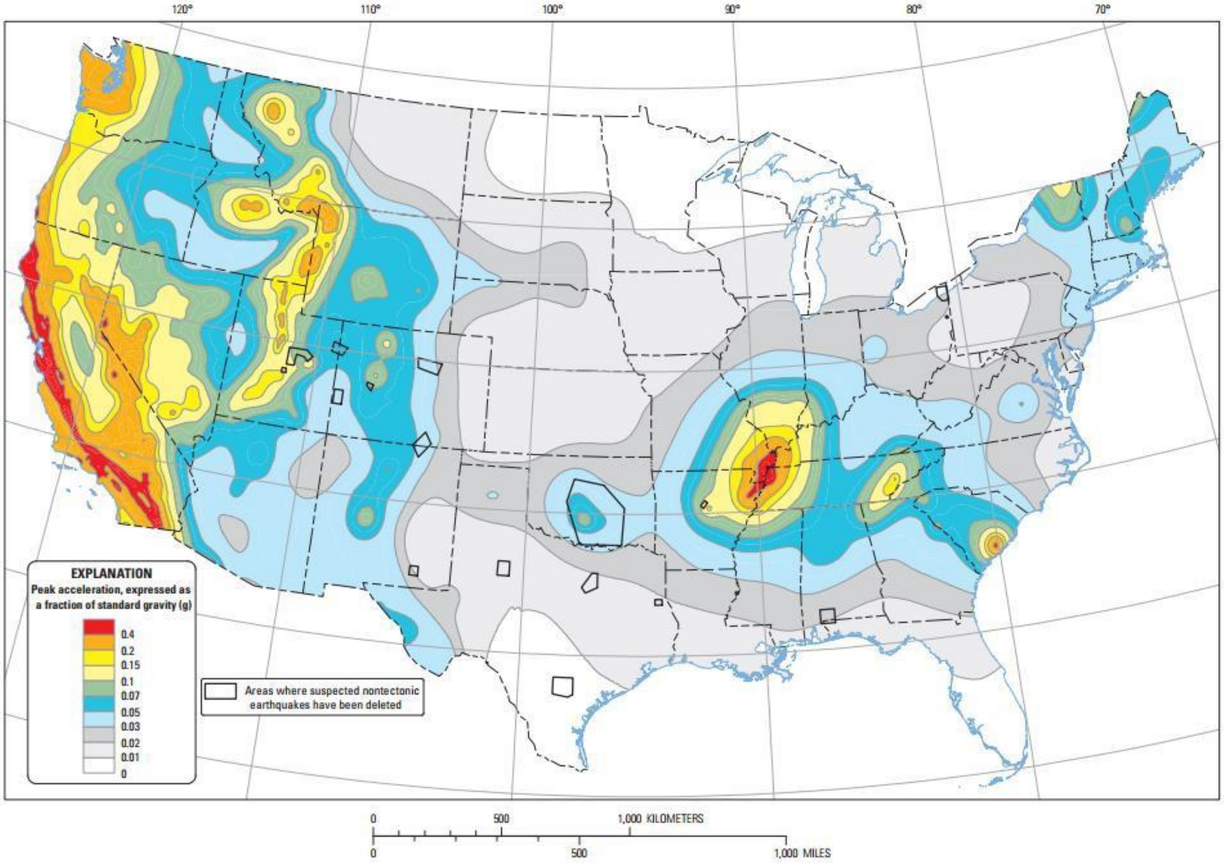
GEOLOGIC HAZARDS

Earthquake

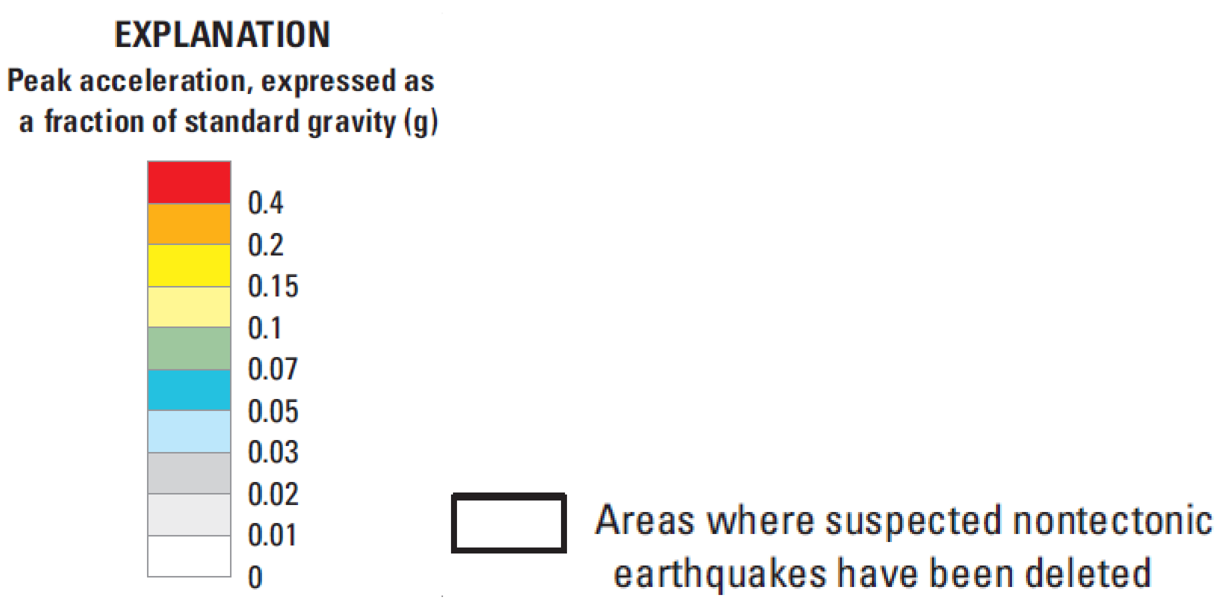
LOCATION AND SPATIAL EXTENT

Figure F.16 shows the intensity level associated with Stone County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Stone County lies within an approximate zone of level “1” to “3” ground acceleration. This indicates that the county exists within an area of low seismic risk.

FIGURE F.16: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



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



Source: United States Geological Survey, 2014

The primary source of potential damage to Stone County from an earthquake is the New Madrid Seismic Zone (NMSZ). Historically, a series of earthquakes in 1811 and 1812 demonstrated that this fault zone can produce high magnitude seismic events, sometimes on the scale of a 7.5-8.0 on the Richter scale. The biggest challenge with earthquakes that occur in this area of seismic activity is predicting the recurrence of earthquakes emanating from this zone. Although the magnitude of earthquakes from the NMSZ can be large, they occur very irregularly and fairly infrequently. This makes it extremely difficult to project when they will occur.

It should also be noted that the State of Mississippi Hazard Mitigation Plan identifies certain areas of concern for liquefaction and lists the counties and corresponding zones within those counties that have the highest liquefaction potential. Stone County does not have any identified liquefaction potential risk.

HISTORICAL OCCURRENCES

No earthquakes are known to have affected Stone County since 1638. Table F.31 provides a summary of earthquake events reported by the National Centers for Environmental Information (formerly National Geophysical Data Center) between 1638 and 1985, and Figure F.17 presents a map showing earthquakes whose epicenters have occurred near the county between 1985 and 2022(no earthquakes occurred within the county boundaries during this period). A detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known) can be found in Table F.32.

TABLE F.31: SUMMARY OF SEISMIC ACTIVITY IN STONE COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Wiggins	0	--	--
Unincorporated Area	0	--	--
STONE COUNTY TOTAL	0	--	--

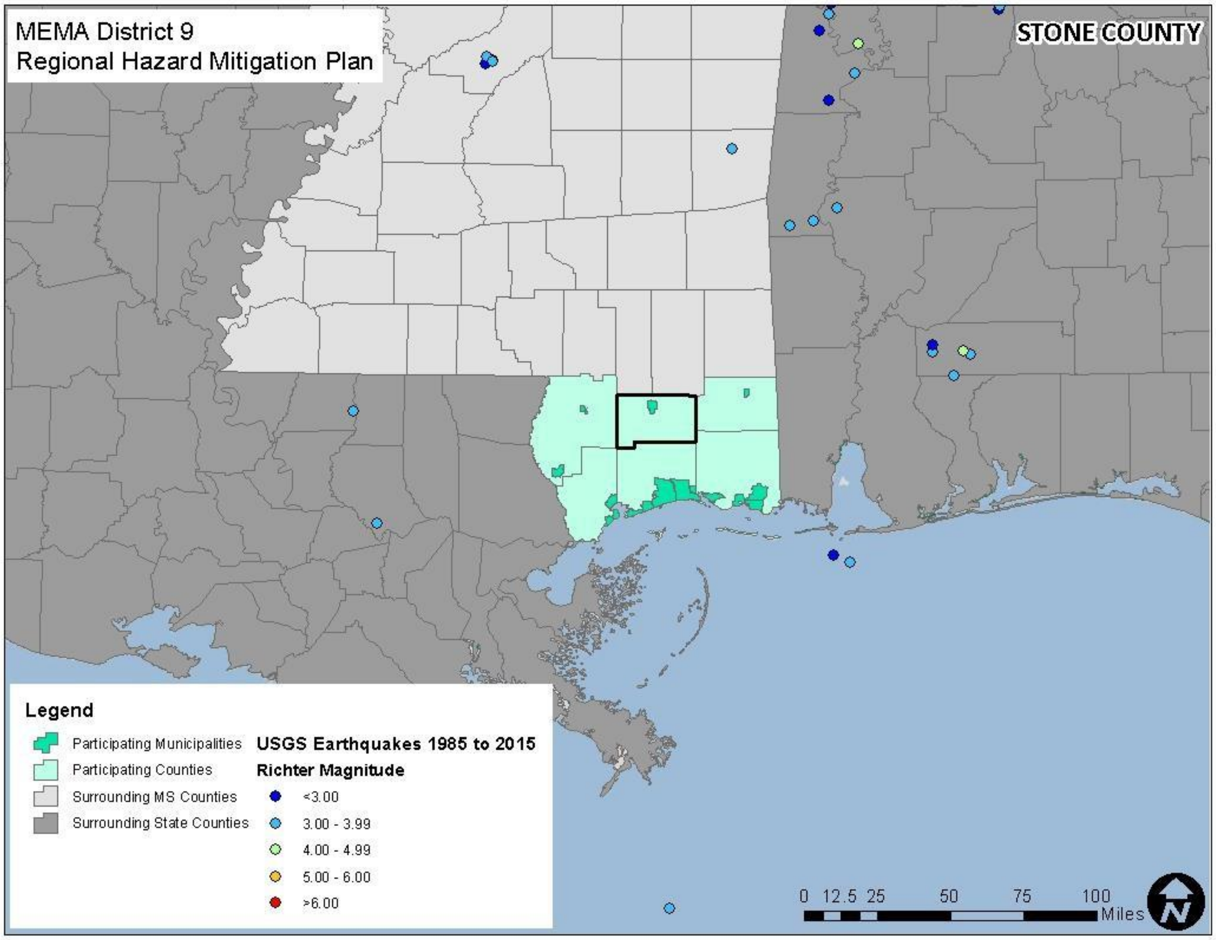
Source: National Geophysical Data Center

TABLE F.32: SIGNIFICANT SEISMIC EVENTS IN STONE COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Wiggins				
None reported	--	--	--	--
Unincorporated Area				
None reported	--	--	--	--

Source: National Geophysical Data Center

FIGURE F.17: HISTORIC EARTHQUAKES WITH EPICENTERS NEAR STONE COUNTY (1985-2022)



Source: United States Geological Survey

PROBABILITY OF FUTURE OCCURRENCES

The probability of significant, damaging earthquake events affecting Stone County is unlikely. However, it is possible that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated to be between 1 and 10 percent (possible).

FEMA NRI Expected Annual Loss Estimates

Table F.33: Stone County Expected Annual Loss Table

STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR EARTHQUAKE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.038% chance/year	0.00	$13,033	$37,758	n/a	$50,790	35.3	Very Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*
Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table F.34: Stone County Hazard Specific Risk Index Table

STONE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – EARTHQUAKE	
Risk Index Score	**Risk Index Rating**
36.9/100	Very Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

WIND-RELATED HAZARDS

Extreme Cold

Extreme cold typically impacts a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme cold conditions.

HISTORICAL OCCURRENCES

Data from the National Center for Environmental Information was used to determine historical extreme cold events in Stone County. No events specific to the county were reported, however, two events were reported elsewhere in the region. Similar events and impacts can be expected in Stone County.

February 2, 1996 – Cold/Wind Chill – An arctic airmass overspread much of south Mississippi bringing the longest extended period of cold weather since 1989. In Amite County, 4SW Gillsburg, a 67 year old man died from hypothermia on the 4th after the fire in a wood burning heater went out. Considerable property damage resulted from broken pipes due to the extended period of subfreezing temperatures. In Jackson County, Moss Point and Gautier had broken pipes in 100 and 147 houses, respectively.

December 18, 1996 – Cold/Wind Chill – An arctic airmass overspread south Mississippi resulting in three consecutive nights with subfreezing minimum temperatures. Temperatures lowered into the mid-teens over the southwest section of the state and near 20 degrees along the Gulf Coast.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of Stone County has a probability level of possible (between 1 and 10 percent annual probability) for future extreme cold events to impact the county.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not anticipate any losses due to extreme cold.

Extreme Heat

Heat waves typically impact a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme heat conditions.

HISTORICAL OCCURRENCES

The National Center for Environmental Information was used to determine historical heat wave occurrences in the county.

July 2000 – July was a hot and dry month in Southeast Mississippi. In Beaumont the temperature was 100 degrees or higher eleven days during the month with the hottest being 105 degrees. In Richton the temperature was 100 degrees or higher three days during the month with the hottest being 102 degrees. In Waynesboro the temperature was 100 degrees or higher four days during the month with the hottest being 103 degrees. In Wiggins the temperature was 100 degrees or higher nine days during the month with 105 degrees being the hottest. In addition to being hot is was also a dry month across the area. Most stations ended up with below normal rainfall totals for the month. In Jackson County, a 68 year old man died from heat exhaustion while sitting in his pickup truck in a parking lot with the windows rolled up, and 10 days later, a 58 year old male was found dead from heat exhaustion while sitting in his truck in the driveway of his home with the windows rolled up.

August 2007 – Heat advisories were issued for a combination of high temperatures and high humidities. Heat index vales were between 110 and 115 degrees. Several public buildings and churches allowed people to come in and cool off during the heat of the day.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of Stone County has a probability level of highly likely (100 percent annual probability) for future heat wave events.

FEMA NRI Expected Annual Loss Estimates

Table F.35: Stone County Expected Annual Loss Table

STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR EXTREME HEAT EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.7 events/year	0.01	$59,596	$8	$64	$59,667	48.4	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table F.36: Stone County Hazard Specific Risk Index Table

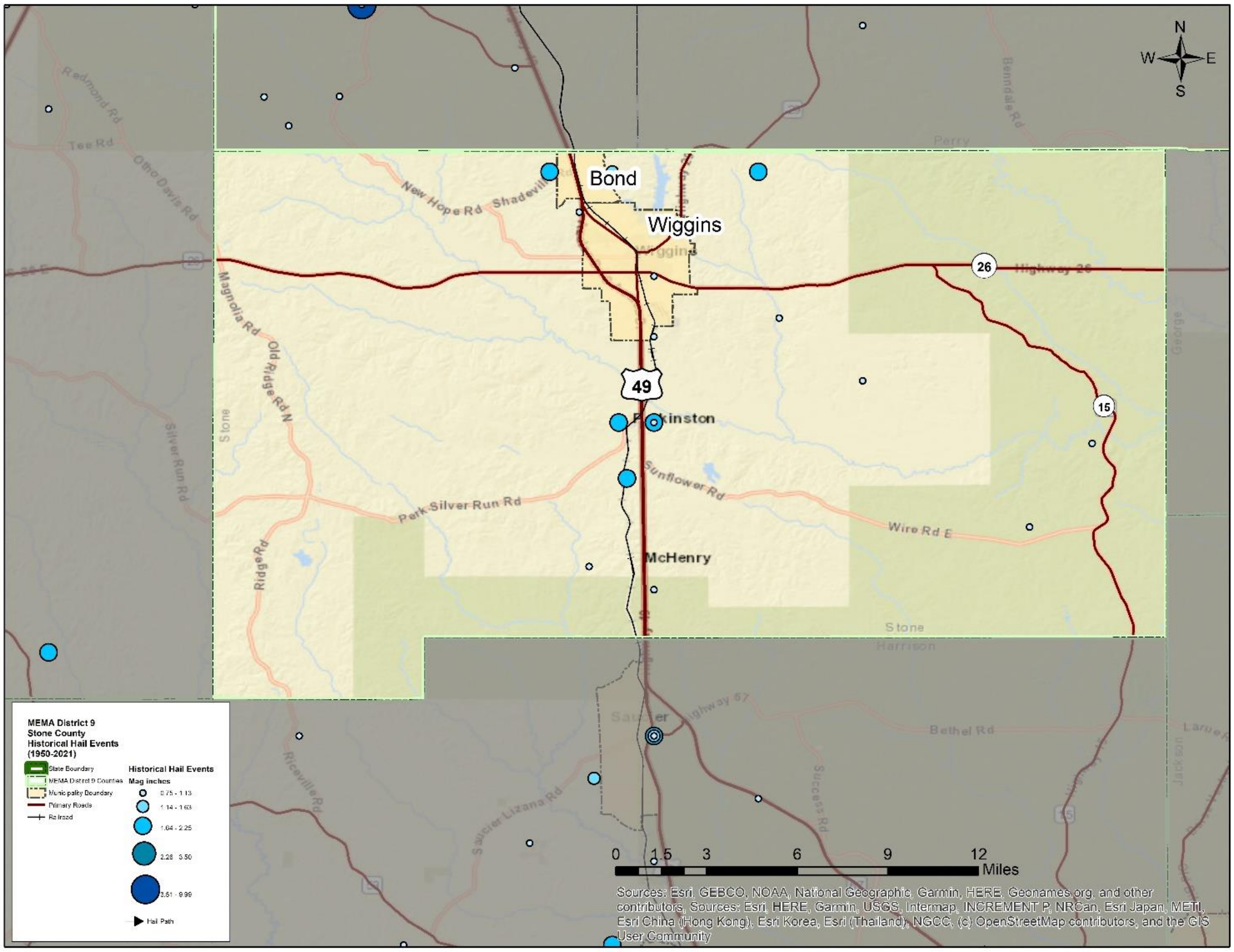
STONE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – EXTREME HEAT	
Risk Index Score	Risk Index Rating
47.7/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Hailstorm

LOCATION AND SPATIAL EXTENT

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that Stone County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms. With that in mind, Figure F.18 shows the location of hail events that have impacted the county between 1955 and 2022.

FIGURE F.18: HAILSTORM TRACKS IN STONE COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, 25 recorded hailstorm events have affected Stone County since 1960. In all, hail occurrences did not result in any property damages. Hail ranged in diameter from 0.75 inches to 2.0 inches. Table F.37 provides a summary of the hail events in Stone County. Detailed information about each event that occurred in the county is provided in Table F.38.

It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Center for Environmental Information. Therefore, it is likely that damages are greater than the reported value.

TABLE F.37: SUMMARY OF HAIL OCCURRENCES IN STONE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Wiggins	8	0/0	$0	$0
Unincorporated Area	16	0/0	$0	$0
STONE COUNTY TOTAL	24	0/0	$0	$0

Source: National Center for Environmental Information

TABLE F.38: HISTORICAL HAIL OCCURRENCES IN STONE COUNTY

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
Wiggins				
WIGGINS	5/23/1997	0.75 in.	0/0	$0
WIGGINS	1/23/2000	0.75 in.	0/0	$0
WIGGINS	8/1/2003	0.75 in.	0/0	$0
WIGGINS	4/29/2004	0.75 in.	0/0	$0
WIGGINS	4/26/2005	0.75 in.	0/0	$0
WIGGINS	5/12/2009	1.00 in.	0/0	$0
WIGGINS	7/2/2009	0.75 in.	0/0	$0
WIGGINS	6/22/2015	0.75 in.	0/0	$0
Unincorporated Area				
STONE CO.	5/5/1960	1.75 in.	0/0	$0
STONE CO.	3/11/1968	2.00 in.	0/0	$0
STONE CO.	4/18/1988	1.75 in.	0/0	$0
STONE CO.	6/4/1991	1.25 in.	0/0	$0
STONE CO.	6/5/1991	0.75 in.	0/0	$0
STONE CO.	5/31/1995	0.75 in.	0/0	$0
PERKINSTON	11/1/1997	0.88 in.	0/0	$0
PERKINSTON	3/6/1998	0.75 in.	0/0	$0
BEATRICE	4/13/2000	0.75 in.	0/0	$0

Location	Date	Magnitude	Deaths/Injuries	Property Damage*
PERKINSTON	10/13/2001	1.75 in.	0/0	$0
WHITES CROSSING	3/31/2002	0.75 in.	0/0	$0
RAMSEY SPGS	7/8/2004	0.88 in.	0/0	$0
PERKINSTON	8/15/2006	1.00 in.	0/0	$0
MC HENRY	5/11/2007	0.88 in.	0/0	$0
MC HENRY	9/1/2008	0.75 in.	0/0	$0
PERKINSTON	2/18/2012	1.75 in.	0/0	$0
PERKINSTON	2/27/2017	1.75 in.	0/0	$0

Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard, it is assumed that Stone County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

FEMA NRI Expected Annual Loss Estimates

Table F.39: Stone County Expected Annual Loss Table

STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HAIL EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
2.4 events/year	0.00	$17,721	$66,039	$7	$83,767	49.4	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table F.40 Stone County Hazard Specific Risk Index Table

STONE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HAIL	
Risk Index Score	**Risk Index Rating**
50.4/100	Relatively Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Hurricane and Tropical Storm

LOCATION AND SPATIAL EXTENT

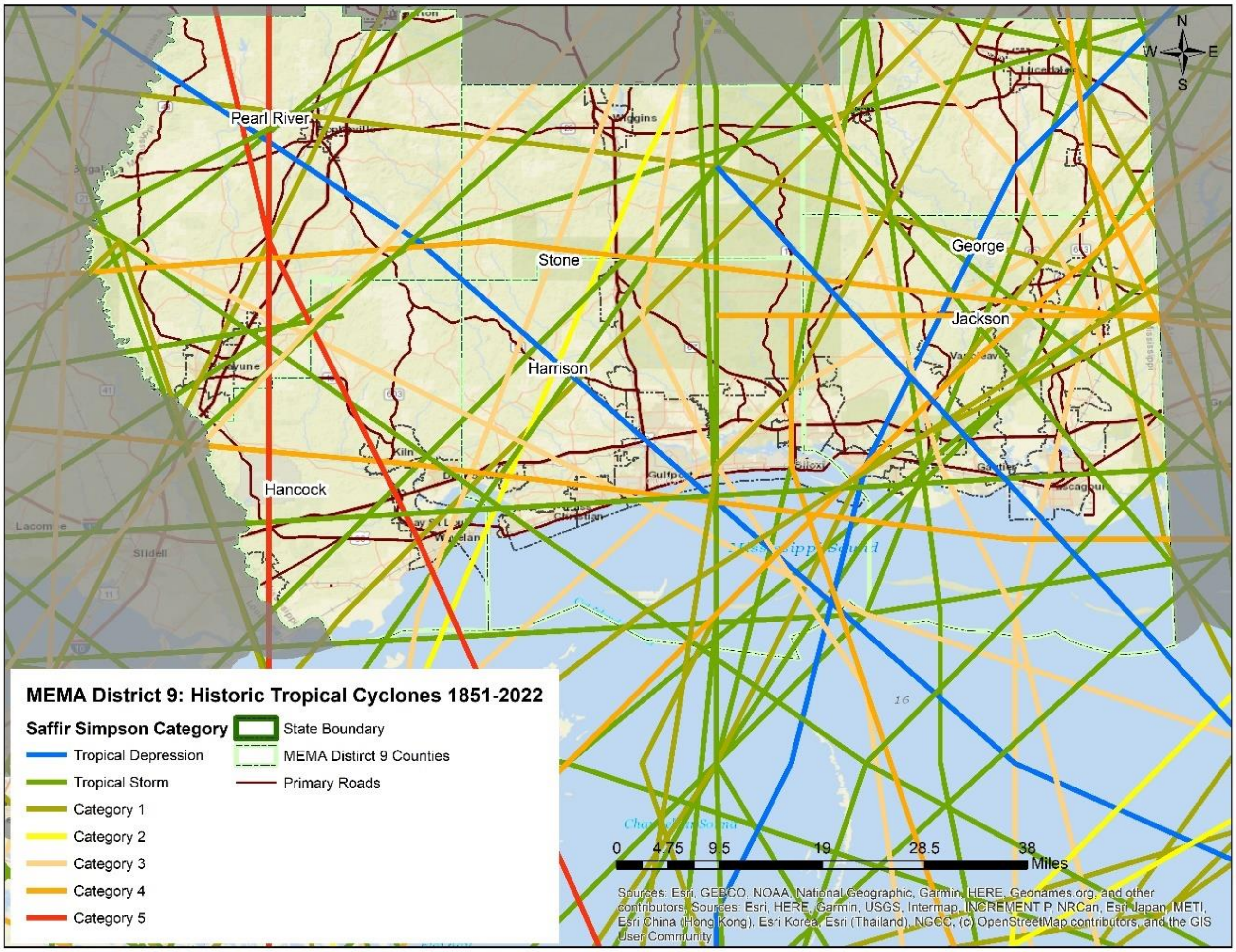
Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States, and while coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland. Stone County is located in a region of the country that is susceptible to all of the hazards wrought by hurricanes and tropical storms. All areas throughout Stone County are susceptible to the accompanying hazard effects of extreme wind, flooding, and tornadoes.

HISTORICAL OCCURRENCES

According to the National Hurricane Center's historical storm track records, 122hurricane or tropical storm/depression tracks have passed within 100 miles of the MEMA District 9 Region since 1855. This includes: 4 Category 3 hurricanes, 16 Category 2 hurricanes, 29 Category 1 hurricanes, 30 tropical storms, and 43 tropical depressions. Additionally, four other major storms had large-scale impacts on the region and are not included in these totals. These storms are listed below and range in Category from 1 to 4.

Of the recorded storm events, 61 hurricane or tropical storm/depression events traversed directly through the region as shown in Figure F.19. Notable storms include Hurricane Camille (1969), Hurricane Frederic (1979), and Hurricane Katrina (2005). Table F.41 provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 100 miles of the MEMA District 9 Region) and category of the storm based on the Saffir-Simpson Scale.

FIGURE F.19: HISTORICAL HURRICANE STORM TRACKS WITHIN 100 MILES OF THE MEMA DISTRICT 9 REGION



Source: National Oceanic and Atmospheric Administration, National Hurricane Center

TABLE F.41: HISTORICAL STORM TRACKS WITHIN 100 MILES OF THE MEMA 9 DISTRICT REGION (1842–2022)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/25/1852	UNNAMED	93	Category 2
8/3/1855	NOT NAMED	--	Tropical Depression
9/16/1855	UNNAMED	96	Category 2

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
6/24/1857	NOT NAMED	--	Tropical Depression
9/15/1859	UNNAMED	79	Category 1
8/11/1860	UNNAMED	96	Category 2
9/15/1860	UNNAMED	89	Category 2
8/17/1861	NOT NAMED	--	Tropical Depression
11/1/1861	NOT NAMED	--	Tropical Depression
9/15/1862	NOT NAMED	--	Tropical Depression
9/16/1862	NOT NAMED	--	Tropical Depression
10/1/1863	UNNAMED	43	Tropical Storm
6/3/1866	NOT NAMED	--	Tropical Depression
9/16/1867	NOT NAMED	--	Tropical Depression
10/5/1867	UNNAMED	89	Category 2
10/3/1868	NOT NAMED	--	Tropical Depression
9/5/1869	UNNAMED	79	Category 1
7/30/1870	NOT NAMED	--	Tropical Depression
7/11/1872	UNNAMED	59	Tropical Storm
9/18/1875	UNNAMED	18	Tropical Depression
9/18/1877	UNNAMED	79	Category 1
9/1/1879	UNNAMED	89	Category 2
10/7/1879	UNNAMED	59	Tropical Storm
8/31/1880	UNNAMED	70	Category 1
8/2/1881	NOT NAMED	--	Tropical Depression
8/3/1881	UNNAMED	59	Tropical Storm
8/30/1885	UNNAMED	59	Tropical Storm
9/26/1885	UNNAMED	70	Category 1
6/15/1886	UNNAMED	50	Tropical Storm
6/14/1887	UNNAMED	33	Tropical Depression
10/19/1887	UNNAMED	82	Category 1
6/27/1888	NOT NAMED	--	Tropical Depression
9/23/1889	UNNAMED	79	Category 1
8/27/1890	UNNAMED	43	Tropical Storm
9/21/1891	NOT NAMED	--	Tropical Depression
9/12/1892	UNNAMED	59	Tropical Storm
9/7/1893	UNNAMED	79	Category 1
10/2/1893	UNNAMED	97	Category 3
8/7/1894	UNNAMED	59	Tropical Storm
8/15/1895	UNNAMED	59	Tropical Storm
9/13/1900	UNNAMED	43	Tropical Storm
8/14/1901	UNNAMED	82	Category 1
10/9/1905	UNNAMED	43	Tropical Storm
9/27/1906	UNNAMED	93	Category 2
9/21/1907	UNNAMED	43	Tropical Storm
8/11/1911	UNNAMED	79	Category 1
6/13/1912	UNNAMED	59	Tropical Storm
7/17/1912	UNNAMED	5	Tropical Depression
9/13/1912	UNNAMED	82	Category 1

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/18/1914	UNNAMED	33	Tropical Depression
9/29/1915	UNNAMED	96	Category 2
7/5/1916	UNNAMED	95	Category 2
10/17/1922	UNNAMED	18	Tropical Depression
6/26/1923	UNNAMED	43	Tropical Storm
10/17/1923	UNNAMED	59	Tropical Storm
9/20/1926	UNNAMED	93	Category 2
9/1/1932	UNNAMED	82	Category 1
10/15/1932	UNNAMED	59	Tropical Storm
7/27/1936	UNNAMED	43	Tropical Depression
8/22/1936	UNNAMED	5	Tropical Depression
6/16/1939	UNNAMED	59	Tropical Storm
9/26/1939	UNNAMED	50	Tropical Depression
9/24/1940	UNNAMED	18	Tropical Depression
9/10/1944	UNNAMED	64	Category 1
9/5/1945	UNNAMED	18	Tropical Depression
9/19/1947	UNNAMED	92	Category 2
9/4/1948	UNNAMED	79	Category 1
9/4/1949	UNNAMED	43	Tropical Storm
8/31/1950	BAKER	82	Category 1
8/1/1955	BRENDA	70	Category 1
8/27/1955	UNNAMED	50	Tropical Storm
9/24/1956	FLOSSY	82	Category 1
9/18/1957	ESTHER	64	Category 1
10/8/1959	IRENE	43	Tropical Storm
9/15/1960	ETHEL	85	Category 2
9/26/1960	FLORENCE	1	Tropical Depression
10/4/1964	HILDA	70	Category 1
9/10/1965	BETSY	117	Category 4
9/29/1965	DEBBIE	33	Tropical Depression
8/18/1969	CAMILE	100	Category 3
8/8/1971	UNNAMED	5	Tropical Depression
9/4/1971	FERN	5	Tropical Depression
9/16/1971	EDITH	70	Category 1
7/29/1975	UNNAMED	18	Tropical Depression
10/17/1975	UNNAMED	5	Tropical Depression
9/24/1976	UNNAMED	5	Tropical Depression
7/19/1977	UNNAMED	18	Tropical Depression
9/6/1977	BABE	18	Tropical Depression
10/25/1977	UNNAMED	18	Tropical Depression
8/10/1978	UNNAMED	5	Tropical Depression
7/11/1979	BOB	74	Category 1
9/12/1979	FREDERIC	97	Category 3
7/20/1980	UNNAMED	5	Tropical Depression
10/27/1984	UNNAMED	18	Tropical Depression
9/2/1985	ELENA	95	Category 2

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
10/31/1985	JUAN	64	Category 1
8/12/1987	UNNAMED	5	Tropical Depression
8/8/1988	BERYL	5	Tropical Depression
8/9/1988	BERYL	50	Tropical Storm
9/10/1988	FLORENCE	79	Category 1
8/3/1995	ERIN	82	Category 1
7/19/1997	DANNY	79	Category 1
9/27/1998	GEORGES	92	Category 2
9/20/1998	HERMINE	33	Tropical Depression
6/11/2001	ALLISON	43	Tropical Storm
8/5/2002	BERTHA	33	Tropical Depression
9/14/2002	HANNA	59	Tropical Storm
9/26/2002	ISIDORE	64	Category 1
6/30/2003	BILL	59	Tropical Storm
7/1/2003	BILL	18	Tropical Depression
9/16/2004	IVAN	96	Category 2
6/11/2005	ARLENE	59	Tropical Storm
7/6/2005	CINDY	74	Category 1
7/10/2005	DENNIS*	100	Category 3
8/29/2005	KATRINA	98	Category 3
9/22/2007	TEN	5	Tropical Depression
8/24/2008	FAY	18	Tropical Depression
9/1/2008	GUSTAV*	87	Category 2
11/10/2009	IDA	70	Category 1
7/25/2010	BONNIE	5	Tropical Depression
8/12/2010	FIVE	5	Tropical Depression
9/5/2011	LEE	43	Tropical Storm
8/28/2012	ISAAC*	70	Category 1
10/07/2017	Nate	85	Category 1
9/04/2018	Gordon	70	Tropical Storm
10/28/2020	Zeta	110	Category 2

*It should be noted that the track of several major hurricanes that impacted the region fell outside of the 100-mile buffer. These storms were included in the table due to their significant impact (Betsy, 1965; Dennis, 2005; Gustav, 2008; and Isaac, 2012), but it should be noted that wind speed and storm category are estimated based on anecdotal information.

Source: National Hurricane Center

Federal records indicate that 12 disaster declarations were made in 1969 (Hurricane Camille), 1979 (Hurricane Frederic), 1985 (Hurricane Elena), 1998 (Hurricane Georges), 2002 (Tropical Storm Isidore), 2004 (Hurricane Ivan), 2005 (Hurricane Dennis and Hurricane Katrina), 2008 (Hurricane Gustav), 2012 (Hurricane Isaac) 2017 (Hurricane Nate) and 2021 (Hurricane Ida). Hurricane and tropical storm events can cause substantial damage in the area due to high winds and flooding.

Flooding and high winds from hurricanes and tropical storms can cause damage throughout the county. Anecdotes are available from NCEI for the major storms that have impacted the county as found below:

Hurricane Georges – September 25-29, 1998

Hurricane Georges, a strong Category 2 hurricane moved slowly northwest across the Gulf of Mexico toward southeast Louisiana and coastal Mississippi on the September 25 and September 26. As the hurricane approached the mouth of the Mississippi River on September 27, it slowly turned toward the north making landfall along the Mississippi Coast just to the east of Biloxi, MS at 0400 CST on September 28. The hurricane moved only slowly north during the morning hours, at times becoming nearly stationary. The hurricane finally was downgraded to a tropical storm at 1500CST on September 28 when it was located north of Biloxi. The tropical storm then moved very slowly eastward into southern Alabama on September 29.

Most of the inland counties in Southeast Mississippi had damage from heavy rains and from trees and power lines being blown down by the persistent winds. One of the hardest hit areas by the high winds was in Stone County Mississippi near where the center of the hurricane moved. Eighty five homes were damaged in Stone County by the wind. Fifty four homes had minor damage, twenty six had major damage and five were destroyed. Most of the damage was along and east of U. S. Highway 49.

Throughout the area, agriculture took a beating with the cotton, soybean and pecan crop almost totally destroyed.

Hurricane Katrina – August 24-30, 2005
Hurricane Katrina was one of the strongest and most destructive hurricanes on record to impact the coast of the United States. It will likely be recorded as one the worst natural disaster in the history of the United States to date resulting in catastrophic damage and numerous casualties in southeast Louisiana and along the Mississippi coast. Damage and casualties resulting from Hurricane Katrina extended as far east as Alabama and the panhandle of Florida. Katrina developed from a tropical depression southeast of the Bahamas on August 24th. After moving through the Bahamas as a tropical storm, Katrina strengthened to a category 1 hurricane prior to landfall in south Florida around the Miami area on the 25th of August. Katrina crossed south Florida and entered the Gulf of Mexico and began to strengthen. Hurricane Katrina strengthened to a category 5 storm on August 28th about 250 miles south southeast of the mouth of the Mississippi River with winds reaching their peak intensity of 175 mph and a central pressure of 902 mb. Post event analysis by the National Hurricane Center indicates that Katrina weakened slightly before making landfall as a strong category 3 storm in initial landfall in lower Plaquemines Parish. Maximum sustained winds were estimated at 110 knots or 127 mph and a central pressure of 920 mb around 610 AM CDT on August 29th in southeast Louisiana just south of Buras in Plaquemines Parish. The storm continued on a north northeast track with the center passing about 40 miles southeast of New Orleans with a second landfall occurring near the Louisiana and Mississippi border around 945 AM CDT as a category 3 storm with maximum sustained winds estimated around 105 knots or 121 mph. Katrina continued to weaken as it moved north northeast across Mississippi during the day, but remained at hurricane strength 100 miles inland near Laurel, Mississippi. Katrina weakened to a tropical depression near Clarksville, Tennessee on August 30th.

Due to the failure of power and equipment prior to the peak of the storm, data for wind, storm surge, pressure, and rainfall are incomplete. The lowest pressure on the Mississippi coast was estimated to be 928 mb where the hurricane made landfall near the Louisiana Mississippi border. A pressure of 976 mb was recorded at 0951 CDT by a university weather station deployed in Pascagoula, well east of the landfall location. At approximately the same time, the pressure at the NWS office in Slidell, just to the west of landfall location, recorded a pressure of 934.1 mb at 0938 AM CDT.

The highest wind gusts recorded in Mississippi and the adjacent coastal waters were 117 knots (134 mph) at the Pearl River County EOC office in Poplarville and 102 knots (118 mph) at 1000AM CDT by a university wind tower deployed at the Stennis Space Center in Hancock County. Maximum sustained winds in Mississippi were estimated around 105 knots (121 mph) near the storm's second landfall along the Mississippi and Louisiana border. Unofficial wind observations before the gage failed included a wind gust of 106 kt, (122 mph) at 0615 CDT by an amateur radio operator in Long Beach and a wind gust of 108 kt (124 mph) at the EOC in Pascagoula.

High winds from Katrina caused significant tree and power line damage to the counties that border the Mississippi and Alabama state line. Wind gusts of 80-100 mph were estimated across Stone County and 70-90 mph across George

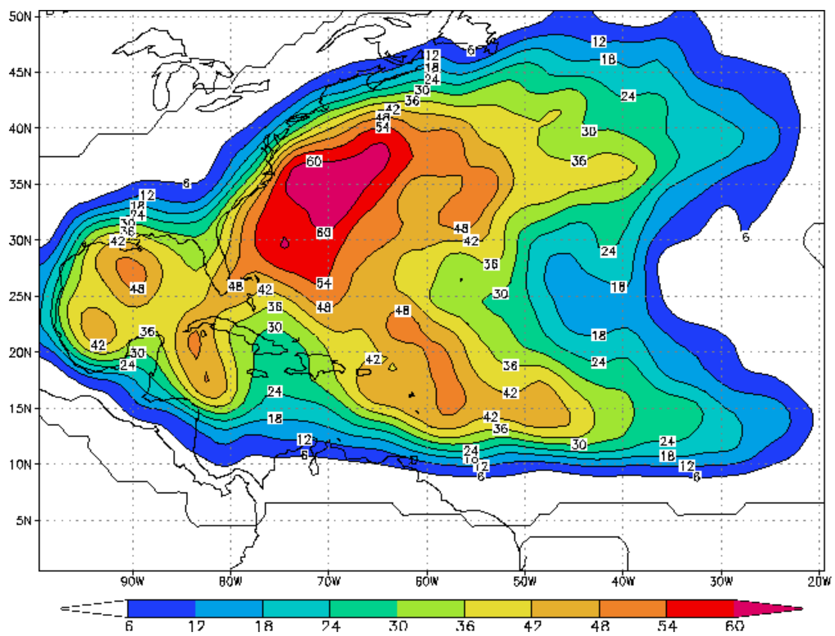
County. Many of the fallen trees fell on structures and caused damage. Stone County received the most damage.

Storm total rainfall amounts generally ranged from 10 to 16 inches across coastal and south Mississippi with much lower amounts observed over southwest Mississippi. The highest observed storm total rainfall was 11 inches at Stennis Space Center and near Picayune.

PROBABILITY OF FUTURE OCCURRENCES

According to NOAA statistical data, the region is located in an area with an annual probability of a named storm between 30 and 42 percent as presented in Figure F.20. This illustration was created by the National Oceanic and Atmospheric Administration's Hurricane Research Division using data from 1944 to 1999 and counting hits when a storm or hurricane was within approximately 100 miles (165 km) of each location. As a reference point, the tip of Florida's outline can be found near the 25N, 80W intersection, and the MEMA District 9 Region is near the 30N, 90W intersection. This empirical probability is fairly consistent with other scientific studies and observed historical data made available through a variety of federal, state, and local sources.

FIGURE F.20: EMPIRICAL PROBABILITY OF A NAMED HURRICANE OR TROPICAL STORM



Source: National Oceanic and Atmospheric Administration

The probability of storm occurrences will vary significantly based on the return interval for different categories of magnitude. The probability of less intense storms (lower return periods) is higher than more intense storms (higher return periods). Table F.42 profiles the potential peak gust wind speeds that can be expected in the MEMA District 9 Region during a hurricane event for various return periods according to FEMA's HAZUS-MH®.

TABLE F.42: POTENTIAL PEAK GUST WIND SPEEDS PER RETURN PERIOD

50-Year	100-Year	500-Year	1,000-Year
119.4 mph	133.9 mph	160.3 mph	170.0

Source: Federal Emergency Management Agency (Hazus-MH 3.2)

Overall, the probability level of future hurricane and tropical storm occurrence for Stone County is highly likely (100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table F.43 Stone County Expected Annual Loss Table

STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HURRICANE EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.2 events/year	0.04	$418,526	$15,181,764	$136,686	$15,73 6,976	89.3	Relatively Moderate
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table F.44: Stone County Hazard Specific Risk Index Table

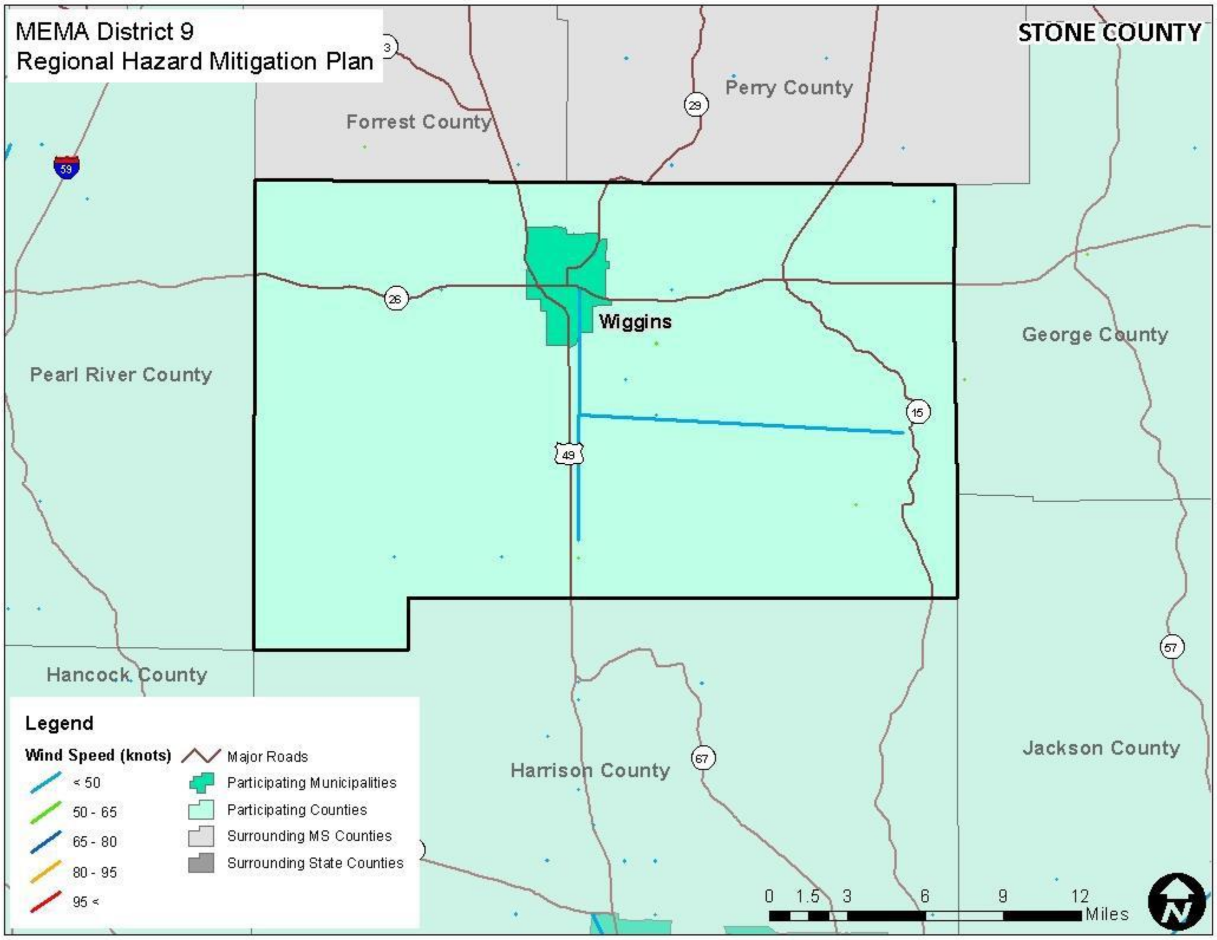
STONE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HURRICANE	
Risk Index Score	Risk Index Rating
91.2/100	Relatively Moderate
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Severe Thunderstorm/High Wind

LOCATION AND SPATIAL EXTENT

A thunderstorm event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. It is assumed that Stone County has uniform exposure to an event and the spatial extent of an impact could be large. With that in mind, Figure F.21 shows the location of wind events that have impacted the county between 1955 and 2015.

FIGURE F.21: SEVERE THUNDERSTORM TRACKS IN STONE COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Severe storms were at least partially responsible for two disaster declarations in Stone County in 1971 and 2009. According to NCEI, there have been 80 reported thunderstorm and high wind events since 1971 in Stone County. These events caused nearly $983,000) in damages. There were also reports of one fatality and five injuries. Table F.45 summarizes this information. Detailed thunderstorm and high wind event reports including date, magnitude, and associated damages for each event are presented in Table F.46.

TABLE F.45: SUMMARY OF THUNDERSTORM/HIGH WIND OCCURRENCES IN STONE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2016)	Annualized Property Losses
Wiggins	42	1/5	$649,788	$12,741
Unincorporated Area	33	0/0	$333,141	$6,532
STONE COUNTY TOTAL	72	1/5	$982,929	$19,273

Source: National Center for Environmental Information

TABLE F.46: HISTORICAL THUNDERSTORM/HIGH WIND OCCURRENCES IN STONE COUNTY

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
Wiggins					
Wiggins	3/7/1995	Thunderstorm Wind	0 kts.	1/0	$79,020
Wiggins	4/21/1995	Thunderstorm Wind	0 kts.	0/0	$1,580
Wiggins	5/9/1995	Thunderstorm Wind	0 kts.	0/0	$3,161
Wiggins	5/9/1995	Thunderstorm Wind	0 kts.	0/0	$790
WIGGINS	6/22/1996	Thunderstorm Wind	45 kts.	0/5	$153,507
WIGGINS	1/24/1997	Thunderstorm Wind	50 kts.	0/0	$3,001
WIGGINS	2/21/1997	Thunderstorm Wind	50 kts.	0/0	$3,001
WIGGINS	4/5/1997	Thunderstorm Wind	50 kts.	0/0	$1,501
WIGGINS	4/27/1997	Thunderstorm Wind	50 kts.	0/0	$1,501
WIGGINS	6/18/1997	Thunderstorm Wind	50 kts.	0/0	$1,501
WIGGINS	10/25/1997	Thunderstorm Wind	50 kts.	0/0	$7,503
WIGGINS	1/22/1998	Thunderstorm Wind	50 kts.	0/0	$4,433
WIGGINS	2/10/1998	Thunderstorm Wind	50 kts.	0/0	$4,433
WIGGINS	1/2/1999	Thunderstorm Wind	55 kts.	0/0	$7,228
WIGGINS	7/25/1999	Thunderstorm Wind	55 kts.	0/0	$28,914
WIGGINS	1/23/2000	Thunderstorm Wind	50 kts. E	0/0	$6,993
WIGGINS	9/5/2000	Thunderstorm Wind	55 kts. E	0/0	$0
WIGGINS	1/19/2001	Thunderstorm Wind	55 kts. E	0/0	$2,720
WIGGINS	6/16/2017	Thunderstorm Wind	61 kts.	0/0	$50,000
WIGGINS	11/01/2018	Thunderstorm Wind	52 kts.	0/0	$10,000
WIGGINS	1/11/2020	Thunderstorm Wind	52 kts.	0/0	$0

Location		Type	Magnitude	Deaths/Injuries	Property Damage*
WIGGINS		Thunderstorm Wind	50 kts. E	0/0	$4,080
WIGGINS		Thunderstorm Wind	55 kts. E	0/0	$13,388
.WIGGINS		Thunderstorm Wind	50 kts. E	0/0	$13,388

WIGGINS		Thunderstorm Wind	50 kts. E	0/0	$10,711
WIGGINS		Thunderstorm Wind	50 kts. EG	0/0	$6,545
WIGGINS		Thunderstorm Wind	50 kts. EG	0/0	$6,375
WIGGINS		Thunderstorm Wind	50 kts. EG	0/0	$9,866
WIGGINS		Thunderstorm Wind	50 kts. EG	0/0	$9,558
WIGGINS		Thunderstorm Wind	50 kts. EG	0/0	$9,558
WIGGINS		Thunderstorm Wind	50 kts. EG	0/0	$11,616
WIGGINS		Thunderstorm Wind	50 kts. EG	0/0	$13,939
WIGGINS		Thunderstorm Wind	50 kts. EG	0/0	$8,949
WIGGINS		Thunderstorm Wind	50 kts. EG	0/0	$11,187
WIGGINS		Thunderstorm Wind	50 kts. EG	0/0	$28,067
WIGGINS		Thunderstorm Wind	52 kts. EG	0/0	$16,840
WIGGINS		Thunderstorm Wind	52 kts. EG	0/0	$11,045
WIGGINS		Thunderstorm Wind	78 kts. EG	0/0	$53,537
WIGGINS		Thunderstorm Wind	52 kts. EG	0/0	$10,707
WIGGINS		Thunderstorm Wind	61 kts. EG	0/0	$21,415
WIGGINS		Thunderstorm Wind	61 kts. EG	0/0	$3,147
WIGGINS		Thunderstorm Wind	52 kts. EG	0/0	$5,081
STONE CO.		Thunderstorm Wind	0 kts.	0/0	$0
STONE CO.		Thunderstorm Wind	0 kts.	0/0	$0
STONE CO.		Thunderstorm Wind	0 kts.	0/0	$0
STONE CO.		Thunderstorm Wind	0 kts.	0/0	$0
STONE CO.		Thunderstorm Wind	0 kts.	0/0	$0
Perkinston		Thunderstorm Wind	0 kts.	0/0	$813
STONE CO.		Thunderstorm Wind	0 kts.	0/0	$3,951
Canton		Thunderstorm Wind	0 kts.	0/0	$790
Silver Run Lake		Thunderstorm Wind	0 kts.	0/0	$790
BEATRICE		Thunderstorm Wind	55 kts.	0/0	$3,838
MC HENRY		Thunderstorm Wind	50 kts.	0/0	$2,303
COUNTYWIDE		Thunderstorm Wind	60 kts.	0/0	$44,329
CENTRAL PORTION		Thunderstorm Wind	50 kts.	0/0	$10,343
COUNTYWIDE		Thunderstorm Wind	50 kts.	0/0	$14,457
MC HENRY		Thunderstorm Wind	65 kts. E	0/0	$13,987
MC HENRY		Thunderstorm Wind	65 kts. E	0/0	$6,694
WHITES CROSSING		Thunderstorm Wind	50 kts. E	0/0	$6,694
PERKINSTON		Thunderstorm Wind	50 kts. EG	0/0	$10,200
RAMSEY SPGS		Thunderstorm Wind	50 kts. EG	0/0	$11,947
RAMSEY SPGS		Thunderstorm Wind	50 kts. EG	0/0	$11,947
CENTRAL PORTION		Thunderstorm Wind	50 kts. EG	0/0	$23,894
PERKINSTON		Thunderstorm Wind	50 kts. EG	0/0	$47,788
MC HENRY		Thunderstorm Wind	50 kts. EG	0/0	$13,424
MC HENRY		Thunderstorm Wind	50 kts. EG	0/0	$13,424

Location	Date	Type	Magnitude	Deaths/Injuries	Property Damage*
WHITES CROSSING	3/3/2008	Thunderstorm Wind	50 kts. EG	0/0	$11,187
PERKINSTON	4/4/2008	Thunderstorm Wind	50 kts. EG	0/0	$33,560
PERKINSTON	3/26/2009	Thunderstorm Wind	50 kts. EG	0/0	$13,472
INDA	4/4/2011	Thunderstorm Wind	50 kts. EG	0/0	$0
TEN MILE	6/10/2011	Thunderstorm Wind	52 kts. EG	0/0	$2,142
WHITES CROSSING	2/18/2012	Thunderstorm Wind	61 kts. EG	0/0	$5,245
MC HENRY	8/29/2012	Thunderstorm Wind	52 kts. EG	0/0	$5,245
PERKINSTON	4/11/2013	Thunderstorm Wind	52 kts. EG	0/0	$5,169
WHITES CROSSING	5/20/2015	Thunderstorm Wind	52 kts. EG	0/0	$508
PERKINSTON	4/03/2017	Thunderstorm Wind	52 kts. EG	0/0	$5,000
MC HENRY	5/12/2017	Thunderstorm Wind	52 kts. EG	0/0	$5,000
PERRY	4/23/2020	Thunderstorm Wind	52 kts. EG	0/0	$0
DEAN GRIFFIN MEM ARP	4/24/2021	Thunderstorm Wind	52 kts. EG	0/0	$0
DEAN GRIFFIN MEM ARP	3/30/2022	Thunderstorm Wind	52 kts. EG	0/0	$0

†E = estimated; EG = estimated gust; ES = estimated sustained; MG = measured gust; MS = measured sustained
Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

Given the high number of previous events, it is certain that thunderstorm events, including straight-line wind events, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for the entire county.

FEMA NRI Expected Annual Loss Estimates

Table F.47: Stone County Expected Annual Loss Table

STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR HIGH WIND EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
1.9 events/year	0.01	$134,196	$67,742	$47	$201,985	37.4	Relatively Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table F.48: Stone County Hazard Specific Risk Index Table

STONE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – HIGH WIND	
Risk Index Score	Risk Index Rating
37.7/100	Relatively Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

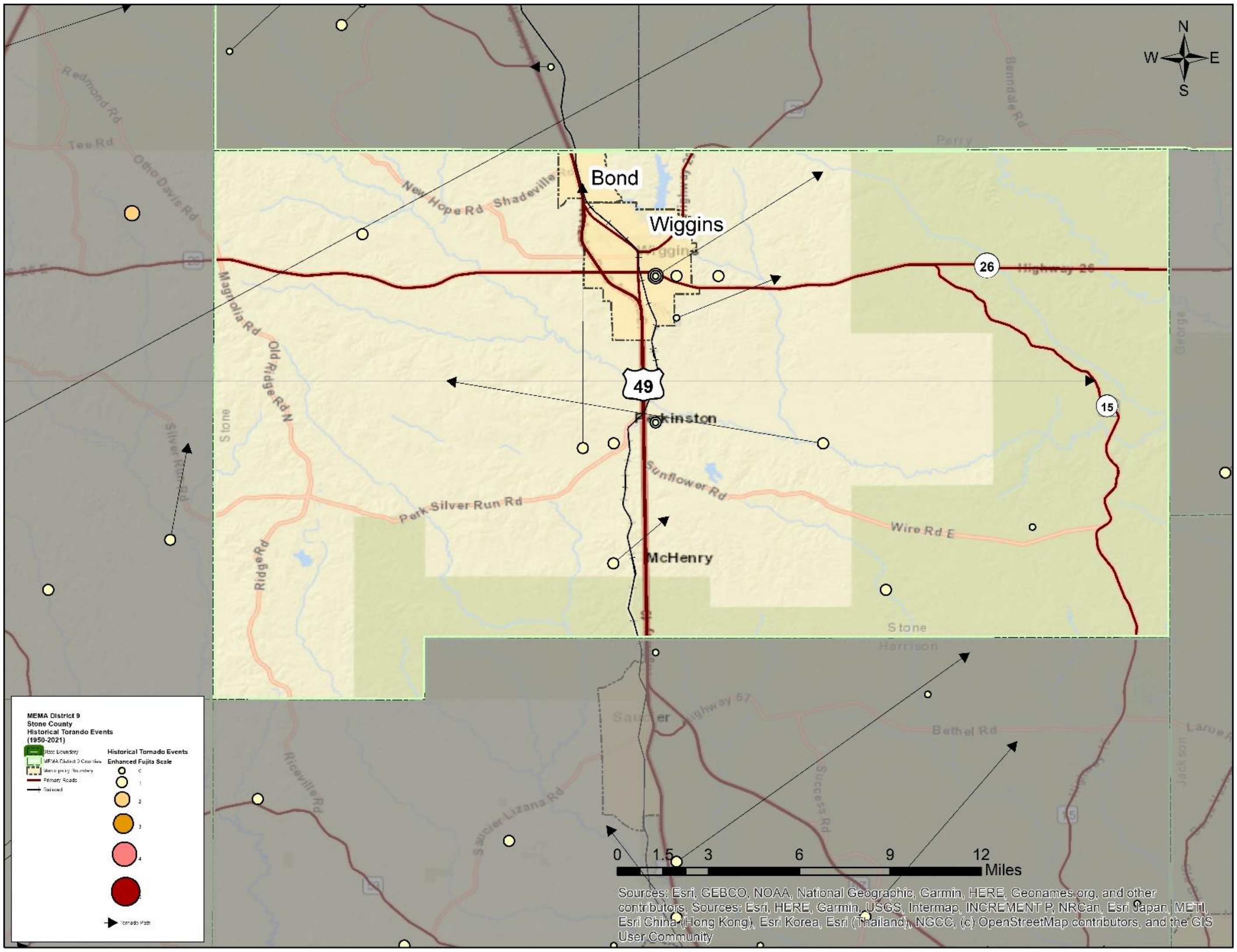
Tornado

LOCATION AND SPATIAL EXTENT

Tornadoes occur throughout the state of Mississippi, and thus in Stone County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Stone County is uniformly exposed to this hazard. With that in mind, Figure F.22 shows tornado track data for many of the major tornado events that have impacted the county between 1950 and 2022. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE F.22: HISTORICAL TORNADO TRACKS IN STONE COUNTY

Source: National Weather Service Storm Prediction Center



HISTORICAL OCCURRENCES

Tornadoes were at least partially responsible for two disaster declarations in Stone County in 1971 and 2009. According to the National Center for Environmental Information, there have been a total of 22 recorded tornado events in Stone County since 1953, resulting in almost $1.8 million in property damages.21 In addition, five injuries were reported. The magnitude of these tornadoes ranged from F0 to F2 and EF1 to EF2 in intensity. A summary of these events is presented in Table F.49. Detailed information on historic tornado events can be found in Table F.50.

TABLE F.49: SUMMARY OF TORNADO OCCURRENCES IN STONE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Wiggins	7	0/0	$134,091	$1,943
Unincorporated Area	15	0/5	$1,665,573	$24,139
STONE COUNTY TOTAL	22	0/5	$1,799,664	$26,082

Source: National Center for Environmental Information

TABLE F.50: HISTORICAL TORNADO IMPACTS IN STONE COUNTY

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Wiggins					
WIGGINS	4/27/1997	Funnel Cloud	0/0	$0	A funnel cloud was observed just north of Wiggins. The funnel never touched down and no damage was found in the area.
WIGGINS	4/24/2000	F0	0/0	$41,960	It was found from a National Weather Service Storm Survey that two different tornadoes of similar strength, width and distance, tracked east and southeast of Wiggins, MS. (See April 00 Storm Data) The first began in Wiggins near State Highways 29 and 26. The tornado moved northeast crossing State Highway 26 near 4th Street, then moved across Clubhouse Drive and went back into the clouds near McGregor and Big Four Roads. The tornado was a F0, about 50 yards wide and traveled mostly at tree top level a distance of approximately 2 miles. Almost all of the damage was to trees, except at 4th Street and State Highway 26, where an auto parts store had its windows blown out by debris. High winds then pushed one side of the cinder block store over. An old building near the store, that had been vacant for some time, was blown over.

WIGGINS	4/24/2000	F0	0/0	$20,980	The second tornado began near King Bee Road just west of Big Level. This tornado also moved northeast, moving across Bond Lott Cemetery and John Willis Roads before lifting back into the clouds near Big Four Road and State Highway 26, near Whites Crossing. As with the first tornado, the track was at tree top level, with damage primarily to trees, except near State Highway 26. Here a business had some tin blown off its sides and roof. Some of the tin blew into a field where a vehicle was damaged and two cows were killed. This tornado was a F0, was about 50 yards wide, and traveled 3.5 miles. No injuries were reported.
WIGGINS	10/3/2002	F0	0/0	$6,694	A weak F0 tornado produced some minor tree damage just southeast of Wiggins.

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
WIGGINS	11/24/2004	F0		$6,375	A weak tornado briefly touched down and downed trees west of the town of Wiggins.
WIGGINS	1/5/2007	F0	0/0	$58,081	A weak tornado first touched down near the fire station in Wiggins. The tornado did some minor roof damage to the station. The tornado then moved across the street and blew the roof off of the old train depot. The tornado then moved across a business where several metal buildings were damaged. The tornado then went back into the clouds just northeast of the business. Some debris from the train depot was found about a quarter of a mile away near Flint Creek Water Park. No one was injured.
DEAN GRIFFIN MEM ARP	12/25/2012	EF2	0/0	$0	The tornado moved from northeast Pearl River county into extreme northwest Stone county causing significant damage to a few homes on Magnolia Road. It crossed Highway 26...snapping numerous pine trees in the lake Tac-O-Leen campground. The tornado continued northeast destroying a manufactured home on Will Lee road and heavily damaging several frame houses. A manufactured home was also rolled into a frame house. Emergency Management also reported trees down on Progress Road before the tornado exited Stone County into Forrest County. This tornado segment in Stone County is part of a 61 mile long track tornado that went from central Pearl River County to western Greene County Mississippi.
Unincorporated Area					
STONE CO.	4/4/1953	F2	0/0	$225,518	--
STONE CO.	5/4/1953	F1	0/0	$225,518	--
STONE CO.	6/5/1959	--	0/0	$20,692	--
STONE CO.	6/12/1959	F1	0/0	$20,692	Small tornado uprooted trees 16" diameter, damaged some roofs and TV antennas in NE part of town.
STONE CO.	11/22/1961	F1	0/0	$20,138	--

STONE CO.	12/10/1967	F1	0/1	$180,279	--
STONE CO.	11/3/1968	F2	0/3	$173,027	Radar indicated a line of thunderstorms at 4:15 PM from near Bogalusa, La. to Columbia, Miss. moving rapidly toward the east. From 4:50 to 5:30 PM people reported during cloudy rainy weather storm moved from W towards E; one funnel observed aloft most of the time; some heard roar like jet airplane. PERAL RIVER COUNTY: At White Sands 8 WSW Poplarville man reported thunder began about 4 PM, and tornado "came through very swift" about 4:50 PM, and "was gone in seconds." There was "hard thunder and roaring before...then funnel formed about 5 miles

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					West of my house, it swept through 3/4 mile of my place, about 1/4 mile wide Blew down 20 acres tung trees, 40 acres pine timber, 1 house (tenant) and 1 feed shed, tin off 2 other barns, much damage to 200 pecan trees, lots of fence down." He reported one funnel "bouncing up and down from ground to 20 ft. high." He estimated $5,000 damage on his place. In the area of Derby and Savannah, there was high wind damage to trees, shelters and some buildings. No injuries from the winds were reported. Woman saw tornado cross Highway 59, she said, "There was lots of funnels, looked like fingers pointed down; also rotating counter clockwise, very dark clouds with a large tail trailing." STONE COUNTY: In the western part of the county, at Smith Community, man reported storm was traveling east along township line between 2 and 3, it did not vary over 1 mile " Damage occurred along a path 1/4 mile wide. At about 5 PM, "Trees and other debris on one side was felled NE; center of path felled east; on north side of path it felled toward SE. There is evidence there was several small funnels." Red Creek Community (in western Stone County) had houses damaged but no injuries. The worst damage was a house chimney blown down and roof caved in, corn crop flattened, tung orchard damaged; at another place roof was blown off. Damage occurred over a 450 yard wide path, one funnel observed touching ground, and some heard roar. Storm reported to have begun at 4:45 PM, ended 5:15 PM. About 15 miles away, at Big Level Community, 4 SE Wiggins, one funnel observed during rainy weather remained aloft most of time. Man reported storm 5:15-5:20

					PM at nursery, width of path 100 yds; equipment and tool sheds badly damaged, room attached to house carried 1/2 mile, weather instruments damaged, debris closed road. A couple and son, age 11, received lacerations and bruises 5:25-5:30 PM when one end of their house was destroyed; path 200 ft. wide. In area SE of Wiggins, other signs of damage to barns and outhouses were reported; trees up to 3 ft. in diameter uprooted; house trailer about 10 miles east of Big Level moved about 4 ft. off foundation. Damage in Wiggins area estimated at $15,000. Radar at Mobile indicated a single thunderstorm cell (in Stone County) but no hook was observed. Authorities said 7 homes were damaged in Stone County.

Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
STONE CO.	4/13/1969	F1	0/0	$0	Tornado touchdown reported by public 7 W Wiggins (Lat. 30.9º N, Long. 89.2º W). Highway Patrol reported 1 barn destroyed and slight damage to house, no injuries.
STONE CO.	2/12/1971	F1	0/0	$0	Tornado dipped down 1 W Wiggins (lat. 30.9º N, long. 89.1º W) where 4 house trailers were overturned and at 2 E Wiggins where it tore roof of Country Club and splintered part of frame structure.
STONE CO.	9/2/1985	F1	0/0	$559,603	--
STONE CO.	2/15/1987	F1	0/0	$53,005	A tornado touched down 4 miles south of Wiggins. One barn was destroyed while several residences reported minor roof damage. Numerous pine trees were also uprooted.
PERKINSTON	10/29/2002	F0	0/0	$10,711	A weak tornado briefly touched down near Perkinston. A few trees were blown down and a barn was damaged by the tornado.
BEATRICE	11/24/2004	F0	0/0	$6,375	A weak tornado briefly touched down near Beatrice. Several trees were damaged by the tornado.
					The tornado touched down just north of Bankston Road which is just west of the town of Perkinston. The tornado moved north and lifted in the town of Bond near the intersection of U.S. Highway 49 and Pump Branch Road. The path length was approximately 9 miles, but was not always fully in contact with the ground and became very narrow in several places. Numerous trees were blown over or snapped with several trees snapped off at the top. Two residences suffered damage from the tornado. A double-wide mobile home on Sumrall Road west of Perkinston lost 40 percent of its roof. The mobile home was also shifted off its concrete masonry unit piers, consistent with EF-1 intensity damage with winds between 86 MPH and 110

TEN MILE	9/4/2011	EF1	0/1	$107,075	MPH. One adult male was injured in the mobile home, suffering cuts and abrasions to his arms. A single-wide mobile home, on College Avenue West, was severely damaged when a large tree fell on it.
PERRY	9/30/2012	EF1	0/0	$62,942	The tornado touched down one quarter mile north of West McHenry Road and west of US Highway 49 where trees were snapped off at mid-trunk and uprooted. The tornado continued northeast to Pine Avenue where it briefly increased in strength to EF-1 intensity and nearly 100 yards wide taking the roof off of one residence and damaging the roof structures of 4 other homes. The tornado then continued northeast across Highway 49 before lifting on Wire Road East near the Highway 49

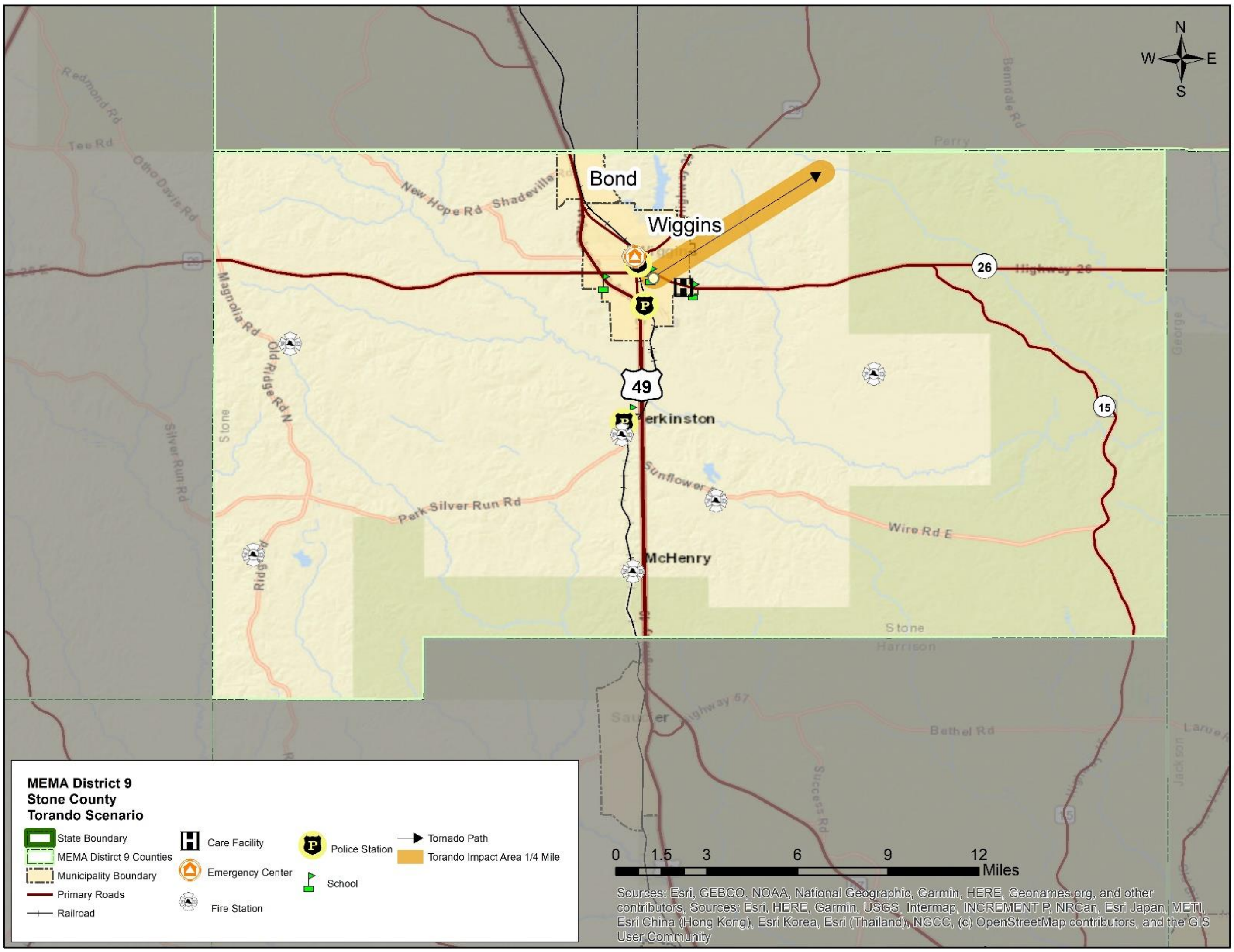
Location	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					intersection where a wooden backyard privacy fence was blown down and a few trees were topped out.

Source: National Center for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

According to historical information, tornado events pose a significant threat to Stone County. The probability of future tornado occurrences affecting Stone County is highly likely (100 percent annual probability). The following graphic demonstrates a potential scenario.

Figure F.23: Tornado Scenario



A tornado scenario was developed utilizing an existing EF1 tornado tract within Stone County a .25-mile buffer was added to the existing tract to illustrate potential impacts and distance from existing critical assets from a single tornadic event. The identified scenario places the tornadic event in the Wiggins jurisdiction with direct impacts to Stone Middle School.

FEMA NRI Expected Annual Loss Estimates

Table F.51: Stone County Expected Annual Loss Table

STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR TORNADO EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.4 events/year	0.05	$547,447	$344,195	$653	$892,295	48.0	Relatively Low
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2023)							

FEMA Hazard-Specific Risk Index Table

Table F.52: Stone County Hazard Specific Risk Index Table

STONE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – TORNADO	
Risk Index Score	Risk Index Rating
49.2/100	Relatively Low
FEMA Hazard-Type ***Risk Index Scores*** *are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type* ***Risk Index Ratings*** *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

Winter Weather

LOCATION AND SPATIAL EXTENT

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. Stone County is not accustomed to severe winter weather conditions and rarely receives severe winter weather, even during the winter months. Events tend to be mild in nature; however, even relatively small accumulations of snow, ice, or other wintery precipitation can lead to losses and damage due to the fact that these events are not commonplace. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

HISTORICAL OCCURRENCES

According to the National Center for Environmental Information, there have been a total of five recorded winter storm events in Stone County since 2002. These events did not result in any property damage. A summary of these events is presented in Table F.53. Detailed information on the recorded winter storm events can be found in Table F.54.

TABLE F.53: SUMMARY OF WINTER STORM EVENTS IN STONE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage	Annualized Property Losses
Stone County	5	0/0	$0	$0

Source: National Center for Environmental Information

TABLE F.54: HISTORICAL WINTER STORM IMPACTS IN STONE COUNTY

Location	Date	Type	Deaths/Injuries	Property Damage*
Wiggins				
None reported	--	--	--	--
Unincorporated Area				
STONE (ZONE)	1/1/2002	Winter Storm	0/0	$0
STONE (ZONE)	12/11/2008	Winter Weather	0/0	$0
STONE (ZONE)	2/12/2010	Winter Storm	0/0	$0
STONE (ZONE)	12/08/2017	Winter Weather	0/0	$0
STONE (ZONE)	1/16/2018	Winter Weather	0/0	$0

Source: National Center for Environmental Information

There have been several severe winter weather events in Stone County. The text below describes one of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

February 2010

An area of low pressure moved across the north central Gulf. Heavy rain changed over to snow across portions of the central gulf coast as the low moved to the east. Snowfall accumulations ranged from a dusting to as much as 4 inches across interior southeast Mississippi. Broadcast media reported 3 inches of snow on cars in Lucedale. The emergency manager reported 1 inch of snow across Stone County. Some power outages were also reported.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

PROBABILITY OF FUTURE OCCURRENCES

Winter storm events will continue to occur in Stone County. Based on historical information, the probability is likely (between 10 and 100 percent annual probability).

FEMA NRI Expected Annual Loss Estimates

Table F.55: Stone County Expected Annual Loss Table

STONE COUNTY, MS FEMA NRI EXPECTED ANNUAL LOSS TABLE FOR WINTER WEATHER EVENTS							
Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Expected Annual Loss Rating
0.2 events/year	0.00	$4,986	$4	$7	$4,997	11.8	Very Low

Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.*
Population: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.*
Expected Annual Loss *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*

Source: FEMA National Risk Index (2023)

FEMA Hazard-Specific Risk Index Table

Table F.56: Stone County Hazard Specific Risk Index Table

STONE COUNTY,MS FEMA HAZARD SPECIFIC RISK INDEX – WINTER WEATHER	
Risk Index Score	**Risk Index Rating**
9.6/100	Very Low
*FEMA Hazard-Type **Risk Index Scores** are calculated using data for only a single hazard type and reflect a community's relative risk for only that hazard type.* *FEMA Hazard-Type **Risk Index Ratings** are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High."*	
Source: FEMA National Risk Index (2023)	

OTHER HAZARDS

Climate Change/Sea Level Rise

LOCATION AND SPATIAL EXTENT

Climate Change

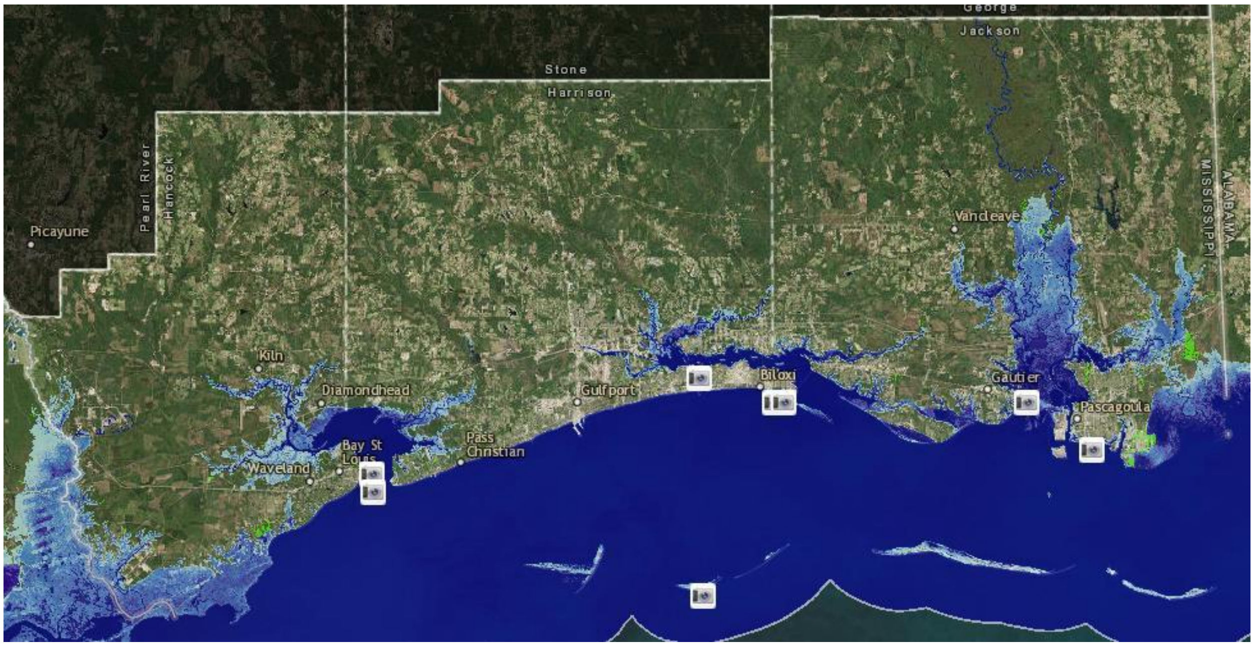
Climate change can have direct implications on many of the other hazards addressed in this plan since it has the potential to alter the nature and frequency of hazards, including increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, strong storms (wind, hurricane). Therefore, it is assumed that Stone County is uniformly exposed to this hazard.

Sea Level Rise

Sea level rise is occurring at a global scale. However, it does not affect areas uniformly and will be more severe in some places. Figure F.24 identifies areas in MEMA District 9 that would be inundated by water as a result of three feet in sea level rise as per projections by NOAA. The highest level of sea level rise projected by NOAA is shown in Figure F.25. This figure shows the inundation areas in the case of six feet of sea level rise. This demonstrates the additional areas that would be impacted beyond the three feet scenario.

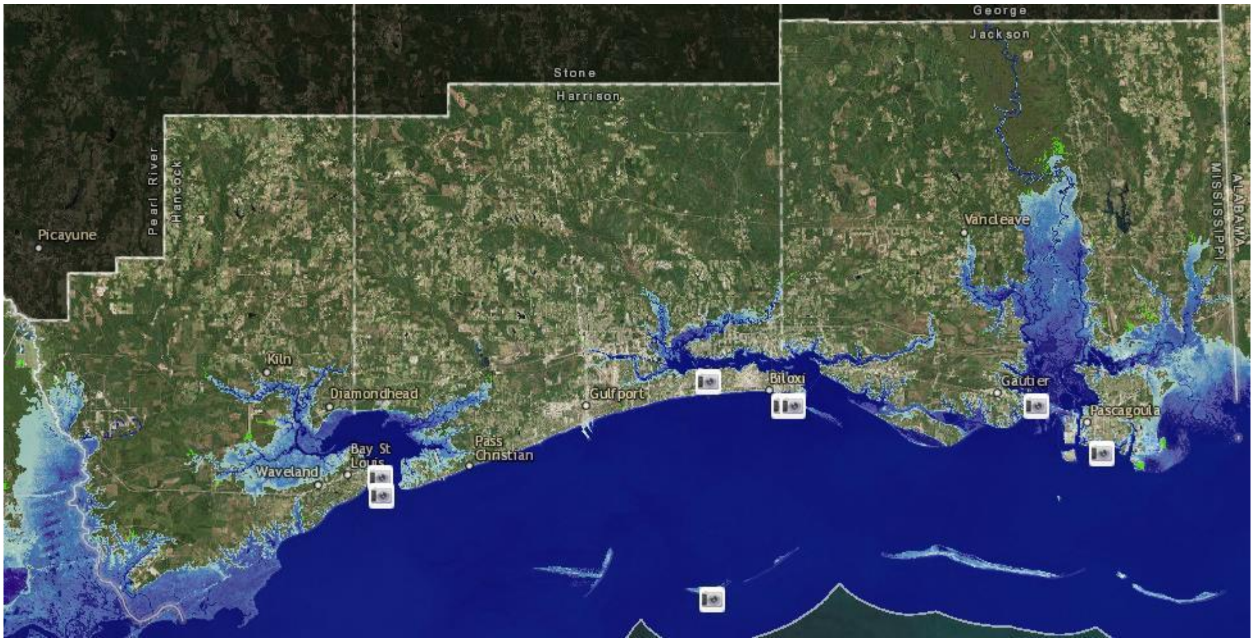
There are no areas in Stone County that would be impacted by projected sea level rise.

FIGURE F.24: THREE FEET SEA LEVEL RISE IN MEMA DISTRICT 9



Source: NOAA

FIGURE F.25: SIX FEET SEA LEVEL RISE IN MEMA DISTRICT 9



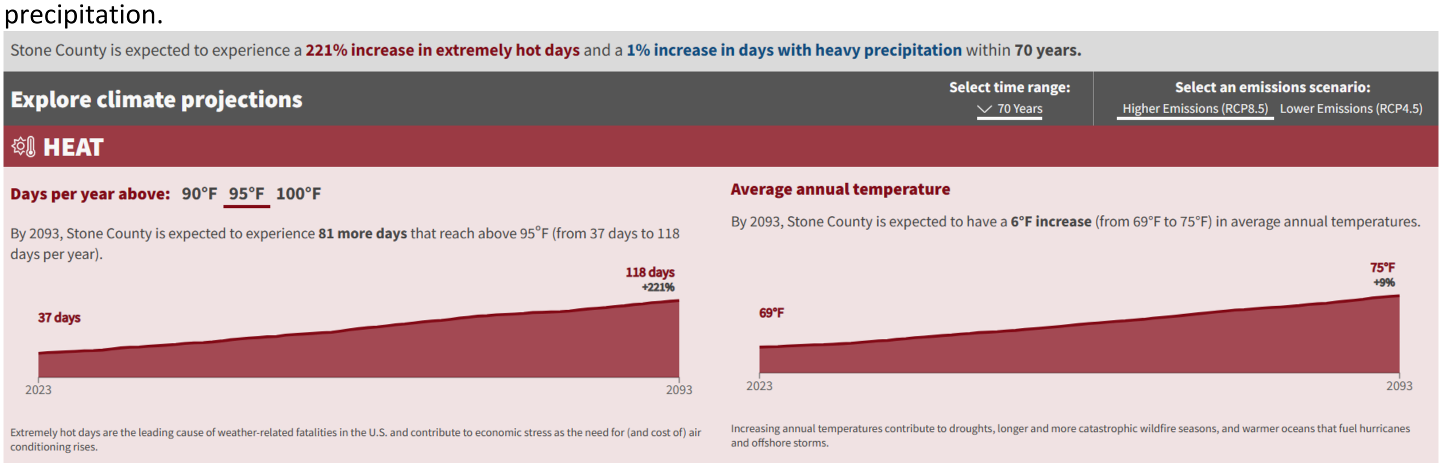
Source: NOAA

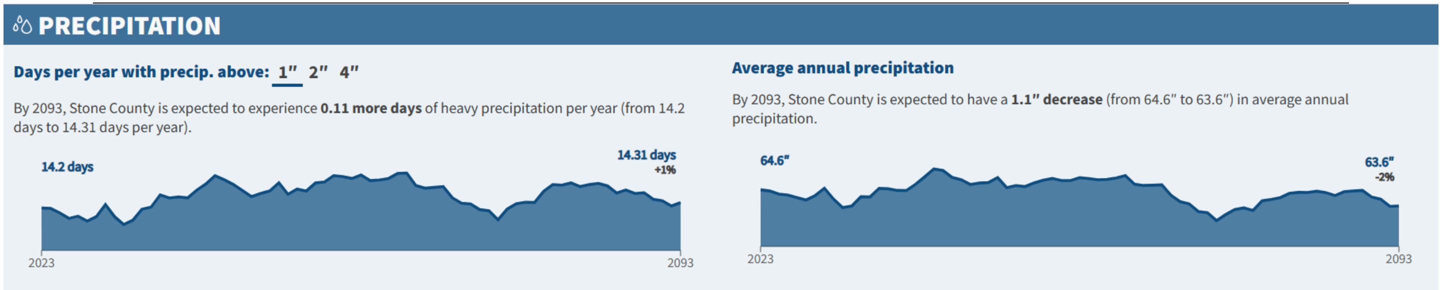
HISTORICAL OCCURRENCES

Climate Change

According to the National Climate Assessment, there have been increasing numbers of days above 95⁰F and nights above 75⁰F, and decreasing numbers of extremely cold days since 1970 in the Southeast. Daily and five-day rainfall intensities have also increased and summers have been either increasingly dry or extremely wet. The number of Category 4 and 5 hurricanes in the Atlantic basin has increased substantially since the early 1980s compared to the historic record that dates back to the mid-1880s. This can be attributed to both natural variability and climate change.

According to Neighborhoods at Risk: George County can experience 81 more days per year reaching 95 degrees over the next 70 year projection with an overall 6 degree increase in average temperatures. In the same time period, the county is projected to experience 0.11 more days of heavy precipitation per year with 1.1" decrease in total annual precipitation.





Sea Level Rise

Sea level rise is a slow-onset hazard and specific events/occurrences are not possible to determine.

PROBABILITY OF FUTURE OCCURRENCES

Climate Change

According to the National Climate Assessment, temperatures across the Southeast are expected to increase during this century, with shorter-term (year-to-year and decade-to-decade) fluctuations over time due to natural climate variability. Major consequences of warming include significant increases in the number of hot days (95^{o}F or above) and decreases in freezing events. Regional average increases are in the range of 4^{o}F to 8^{o}F by the year 2100.

Projections of future precipitation patterns are less certain than projections for temperature increases. Because the Southeast, is located in the transition zone between projected wetter conditions to the north and drier conditions to the southwest, many of the model projections show only small changes relative to natural variations. Additionally, projections further suggest that warming will cause tropical storms to be fewer in number globally, but stronger in force, with more Category 4 and 5 storms, and substantial further increases in extreme precipitation are projected as this century progresses.

Overall, future climate change is considered likely (between 10 and 100 percent annual probability).

Sea Level Rise

There is still much debate regarding the probability of future occurrence of sea level rise. This section will be updated as more information becomes available. Future sea level rise is considered likely (between 10 and 100 percent annual probability).

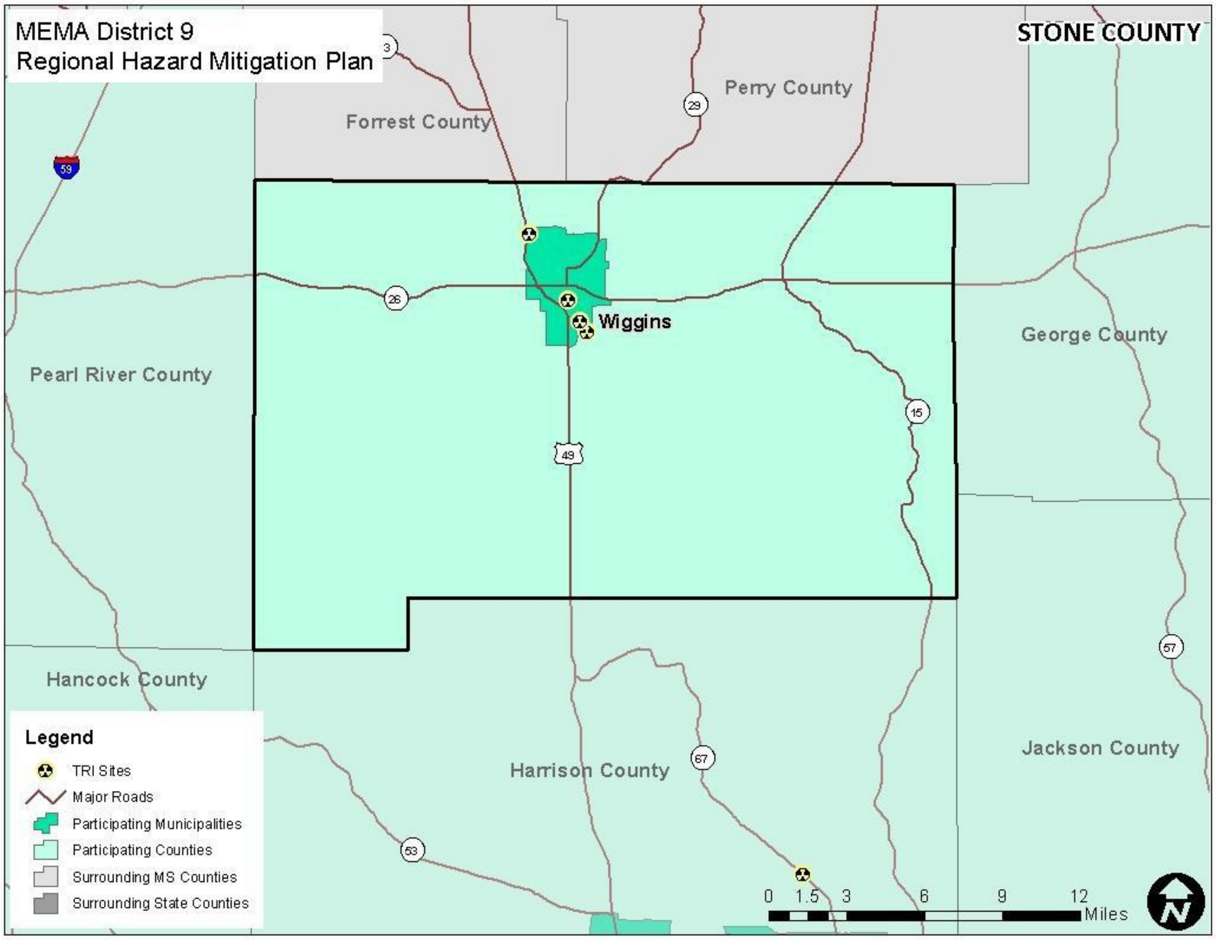
FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess climate change or sea level rise.

Hazardous Materials Incident/Train Derailment

LOCATION AND SPATIAL EXTENT

Stone County has four TRI sites. These sites are shown in Figure F.26.

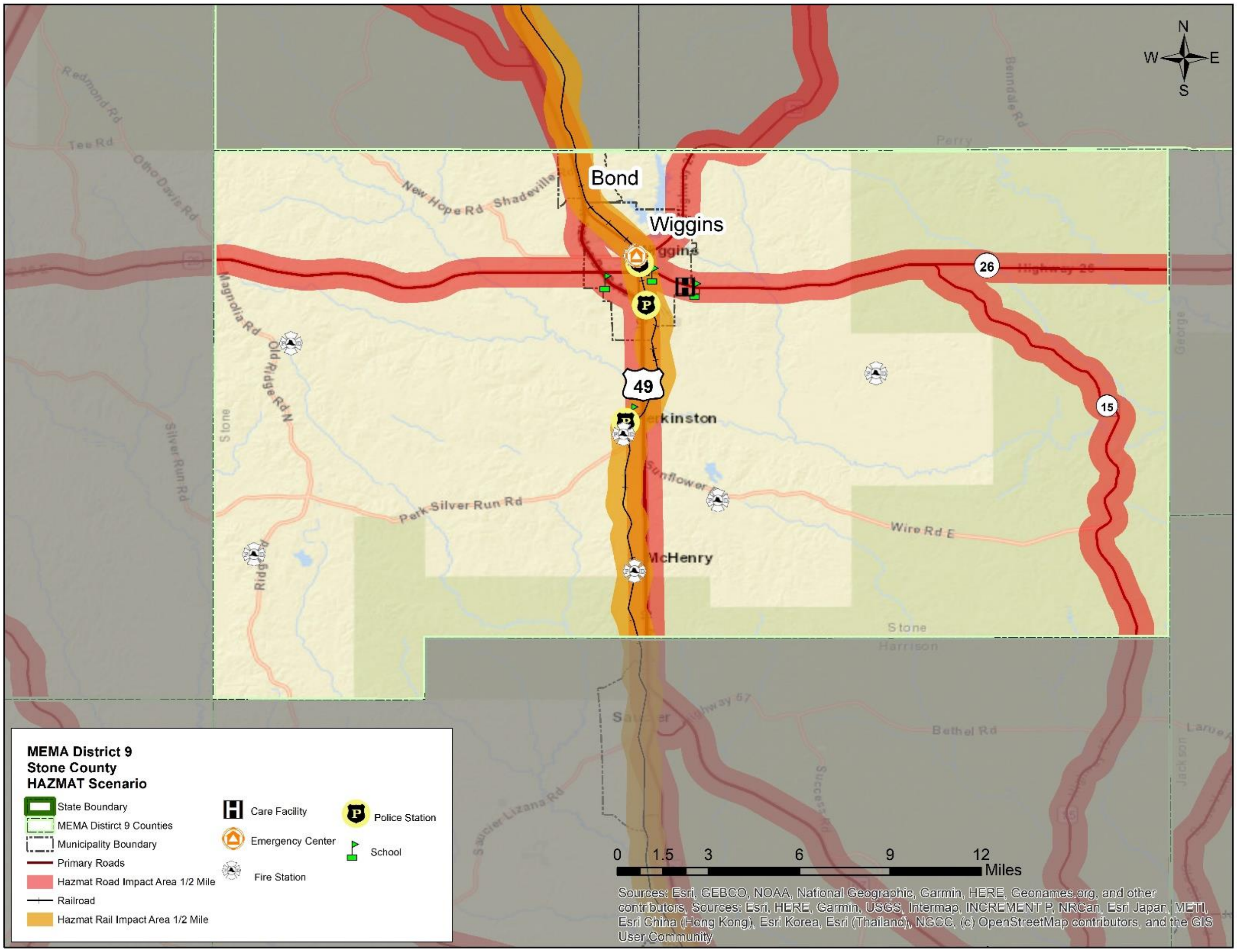
FIGURE F.26: TOXIC RELEASE INVENTORY (TRI) SITES IN STONE COUNTY



Source: Environmental Protection Agency

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and railways. Many roads and railways in the county are subject to hazardous materials transport and all roads and railways that permit hazardous material transport are considered potentially at risk to an incident.

Figure F.27: HAZMAT Scenario



HISTORICAL OCCURRENCES

There have been a total of 10 recorded HAZMAT incidents in Stone County since 1974. These events resulted in almost $84,000 in property damage. Table F.57 summarizes the HAZMAT incidents in Stone County as reported by PHMSA. Detailed information on these events is presented in Table F.58.

TABLE F.57: SUMMARY OF HAZMAT INCIDENTS IN STONE COUNTY

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2016)	Annualized Property Losses
Wiggins	8	0/0	$26	$1
Unincorporated Area	2	0/0	$83,900	$2,996

STONE COUNTY TOTAL	10	0/0	$83,926	$2,997

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE F.58: HAZMAT INCIDENTS IN STONE COUNTY

Report Number	Date	City	Mode	Serious Incident?	Deaths/ Injuries	Damages ($)*	Quantity Released
Wiggins							
I-1975010301	12/29/1974	WIGGINS	Highway	No	0/0	$0	0
I-1978090756	8/18/1978	WIGGINS	Highway	No	0/0	$0	10 LGA
I-1978120660	12/6/1978	WIGGINS	Highway	No	0/0	$0	50 LGA
I-1979070188	6/7/1979	WIGGINS	Highway	No	0/0	$0	5 LGA
I-1980110585	10/31/1980	WIGGINS	Highway	Yes	0/0	$0	300 LGA
I-1987060203	5/14/1987	WIGGINS	Rail	No	0/0	$0	0
I-1994060772	5/19/1994	WIGGINS	Highway	No	0/0	$0	55 LGA
I-2004071106	6/9/2004	WIGGINS	Highway	No	0/0	$26	5 LGA
Unincorporated Area							
I-1988020177	1/17/1988	PERKINSTON	Highway	No	0/0	$0	0
X-2008110194	10/21/2008	McHenry	Rail	No	0/0	$83,900	0

*Property damage is reported in 2016 dollars; all damage may not have been reported.
Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

PROBABILITY OF FUTURE OCCURRENCES

Given the location of four toxic release inventory sites in Stone County and prior roadway and railway incidents, it is highly likely (100 percent annual probability) that a hazardous material incident may occur in the county. County and city officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess HAZMAT events.

Infectious Disease

LOCATION AND SPATIAL EXTENT

Due to the nature of a public health/emerging disease threat, it is difficult to identify a precise location where this type of event would occur. Moreover, a large-scale event would have impacts that spread throughout the county. Therefore, all areas in Stone County are considered equally susceptible to infectious diseases.

HISTORICAL OCCURRENCES

Mosquito-borne illness in Mississippi include West Nile virus, Chikungunya virus, and Zika virus. These illnesses affect birds, animals, and humans, causing flu-like symptoms in people who are bitten by infected mosquitoes. Occasionally illness can be severe, leading to meningitis or encephalitis. According to the Mississippi State Department of Health (MSDH), there have been no reported cases of mosquito-borne illnesses in Stone County as of November 2016. Table

F.59 summarizes the mosquito-borne illnesses in humans reported in the county.

TABLE F.59: SUMMARY OF MOSQUITO-BORNE ILLNESSES IN STONE COUNTY

Location	West Nile Virus	Chikungunya	Zika	Other*	Deaths
Stone County	0	0	0	0	0

*Other mosquito-borne illnesses include La Crosse encephalitis, St. Louis encephalitis, and Eastern Equine encephalitis.
Source: Mississippi State Department of Health

Diseases like influenza and norovirus are regularly occurring health issues in Stone County. These conditions are not legally reportable to county or state public health agencies, so data on disease incidence is not readily available. MSDH relies upon selected sentinel health practitioners across the state to report the percentage and total patient visits consistent with an influenza-like illness (ILI): fever of 100ºF or higher and cough or sore throat. Reports are used to estimate the state's ILI rate and the magnitude of state's influenza activity on a weekly basis. Reports represent only the distribution of flu in the state, not an actual count of all flu cases statewide.

PROBABILITY OF FUTURE OCCURRENCES

Due to some recent incidents that have been recorded across the State of Mississippi and in counties neighboring Stone County, future occurrences are considered possible (between 1 and 10 percent annual probability).

FEMA NRI Expected Annual Loss Estimates and Hazard-Specific Risk
The FEMA NRI does not assess infectious diseases.

Conclusions on Hazard Risk

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

HAZARD EXTENT

Table F.60 describes the extent of each hazard identified for Stone County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE F.60: EXTENT OF STONE COUNTY HAZARDS

Flood-related Hazards	
Dam and Levee Failure	Dam failure extent is defined using the Mississippi Division of Environmental Quality classifications which include Low, Significant, and High. One dam is classified as high-hazard in Stone County.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in Stone County.

<table>
<tr><td>Flood</td><td>Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. Although there are no gages available in Stone County, the county can expect flood extent to be similar to the other counties in the region.
<table>
<tr><th rowspan="2">Location/ Jurisdiction</th><th rowspan="2">Date</th><th rowspan="2">Maximum Historic Crest (ft)</th><th colspan="4">Flood categories</th></tr>
<tr><th>Action Stage (ft)</th><th>Flood Stage (ft)</th><th>Moderate Flood Stage (ft)</th><th>Major Flood Stage (ft)</th></tr>
<tr><td colspan="4">Stone County</td><td></td><td></td><td></td></tr>
<tr><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
</table>
</td></tr>
<tr><td>Storm Surge</td><td>Storm surge can be defined by the depth of inundation which is defined by the category of hurricane/tropical storm. Since the MEMA District 9 Region could easily be impacted by a Category 3 storm, depth of inundation could be at least 9 feet in many areas. However, there are no areas in Stone County that could potentially be impacted.</td></tr>
<tr><th colspan="2">Fire-related Hazards</th></tr>
<tr><td>Drought</td><td>Drought extent is defined by the U.S. Drought Monitor classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought. According to the U.S. Drought Monitor classifications, the most severe drought condition is Exceptional. Stone County has received this ranking twice over the 17-year reporting period.</td></tr>
<tr><td>Lightning</td><td>According to the Vaisala’s flash density map, Stone County is located in an area that experiences 4 to 12 and up lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.</td></tr>
<tr><td>Wildfire</td><td>Wildfire data was provided by the Mississippi Forestry Commission and is reported annually by county from 2007-2022. The greatest number of fires to occur in Stone County in any year 58 in 2011 and 2015. The greatest number of acres to burn in the county in a single year occurred in 2016 when 690 acres were burned. Information on specific occurrences of wildfire and the most severe fires in each jurisdiction is not available. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.</td></tr>
</table>

Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale, the Modified Mercalli Intensity (MMI) scale, and the distance of the epicenter from Stone County. According to data provided by the National Centers for Environmental Information, no earthquakes were reported in Stone County.
Wind-related Hazards	
Extreme Cold	The extent of extreme cold can be defined by the minimum temperature reached. Official long term temperature records are not kept for any areas in Stone County. However, the temperature has previously ranged from 15 to 20 degrees Fahrenheit in southwest and coastal Mississippi (reported on December 18, 1996).
Extreme Heat	The extent of extreme heat can be measured by the record high temperature recorded. Official long term temperature records are not kept for any areas in Stone County. However, the highest recorded temperature in Beaumont (north of the county) was 105°F and heat index values were recorded as high as 115°F (reported in July 2000).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Stone County was 2.00 inches (reported on March 11, 1968). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5. The greatest classification of hurricane to traverse directly through Stone County was Unnamed 1855 Storm, a Category 2 storm which carried tropical force winds of 93 knots upon arrival in the county.
Severe Thunderstorm/High Wind	Thunderstorm extent is defined by wind speeds reported. The strongest recorded wind event in Stone County was 78 knots (reported on March 9, 2011). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by the Fujita/Enhanced Fujita. The greatest magnitude reported in Stone County was an EF2 (reported on December 25, 2012).
Winter Weather	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest snowfall reported in Stone County was 1 inch (reported on February 12, 2010).
Other Hazards	
Climate Change/Sea Level Rise	It is still uncertain what the extent of climate change will be in the future. However, increasing temperature (extreme heat), changes in precipitation (drought, flooding), and more frequent, stronger storms (wind, hurricanes) can be expected. Sea level rise is defined by the areas impacted, but is more often associated with the amount of sea level rise that is expected to take place. Although it is difficult to predict an exact amount of rise, the Climate Change Surging Seas Report intermediate high sea level rise scenario projects 1 foot of rise locally by 2050 and 3.7 feet by 2100.

Hazardous Materials Incident/Train Derailment	According to USDOT PHMSA, the largest hazardous materials incident reported in Stone County was 300 LGA released on the highway (reported on October 31, 1980). It should be noted that larger events are possible.
Infectious Disease	An infectious disease threat could have large-scale effects throughout the county and may cause illness in many people. Possible impacts from a disease threat depend largely on the impacted population, but might include anything from absenteeism and loss of productivity in the workplace to death or serious illness to humans or livestock. A serious disease threat could affect many thousands of people.

PRIORITY RISK INDEX RESULTS

In order to draw some meaningful planning conclusions on hazard risk for Stone County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Risk Index" (RI). More information on the PRI and how it was calculated can be found in Section 5.21.2.

Table F.61 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the RI. Assigned risk levels were based on the detailed hazard profiles developed for this subsection, as well as input from the Regional Hazard Mitigation Council. The results were then used in calculating RI values and making final determinations for the risk assessment.

TABLE F.61: SUMMARY OF PRI RESULTS FOR STONE COUNTY

Hazard Event	Probability	Consequence				Total Risk Score (Probability x Consequence)
	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Factors	Sum of Weighted Impact Factors	Consequence Score	
Dam and Levee Failure	1	4	6	13	23	15
Erosion	2	0	8	16	24	28
Flood	3	8	12	31	51	77
Storm Surge	0	0	4	-	4	0
Drought	2	8	11	17	36	40
Lightning	3	7	11	19	37	59
Wildfire	2	8	6	21	35	39
Earthquake	0	0	4	12	16	0
Extreme Cold	3	4	5	19	28	46
Extreme Heat/Heat Wave	3	7	10	23	40	63
Hailstorm	2	4	6	13	23	27
Hurricane Tropical Storm	3	12	17	36	65	95
Severe Thunderstorm/High Wind	3	11	16	29	56	84
Tornado	2	8	15	32	55	58
Winter Weather	3	3	7	26	36	57
Climate Change/Sea Level Rise	2	3	6	15	24	28
HAZMAT/Train Derailment	1	4	6	17	27	17
Infectious Disease	2	8	12	27	47	51

Full risk index document attached as an excel link.
Note: To access the document within Microsoft Word, double-click on the icon below to access the entire risk index document. The first tab includes the assessment, and the second tab includes the final scores.

StoneCounty_RankingSpreadsheet.xlsx

Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Stone County, including the PRI results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (Table F.62). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Stone County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: Vulnerability Assessment and below in Section F.3. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

Some priorities have changed since the previous plans were adopted due to the merging of multiple local plans to form this regional plan; however, most priorities remain the same.

TABLE F.62: CONCLUSIONS ON HAZARD RISK FOR STONE COUNTY

HIGH RISK	Flood Extreme Heat/Heat Wave Hurricane Tropical Storm Severe Thunderstorm/High Wind
MODERATE RISK	Drought Lightning Wildfire Extreme Cold Tornado Winter Weather Infectious Disease
LOW RISK	Dam and Levee Failure Erosion Hailstorm Climate Change/Sea Level Rise Earthquake Storm Surge Hazardous Materials Incident/Train Derailment

SECTION 27 STONE COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Stone County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: Vulnerability Assessment.

Asset Inventory

Table F.63 lists the estimated number of buildings, parcels, and the total value of improvements for Stone County and its participating jurisdictions (study area of vulnerability assessment). Because digital parcel data was not available for every community, data obtained from Hazus-MH 3.2 inventory was utilized to supplement the analysis where gaps existed.

TABLE F.63: IMPROVED PROPERTY IN STONE COUNTY

Location	Counts of Buildings	Counts of Parcels	Total Value of Improvements
Wiggins	3,187	2,416	$132,113,728
Unincorporated Area	12,583	10,819	$287,065,278
STONE COUNTY TOTAL	15,770	13,235	$419,179,006

Source: MDEQ, Hazus-MH 3.2

Table F.64 lists the critical facilities located in Stone County by type according to data provided by local government officials.

In addition, Figure F.28 shows the locations of critical facilities in Stone County. Table F.81, at the end of this subsection, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. Further, it should be noted that the table below may show that some communities do not have any critical facilities of in certain type, when in reality, that particular type of facility may actually be located within the community. This may occur because spatial data for that facility type was not available or because the facility may have been classified under a different category type for that particular community.

TABLE F.64: CRITICAL FACILITY INVENTORY IN STONE COUNTY

Location	Communications	EOC	Fire Stations	Medical	Police Station	Power/ Gas	Private/Non-Profit
Wiggins	1	1	0	0	1	0	0
Unincorporated Area	0	0	1	1	1	3	0
STONE COUNTY TOTAL	1	1	1	1	2	3	0

Source: Local Governments

TABLE F.65: CRITICAL FACILITY INVENTORY IN STONE COUNTY (CONT.)

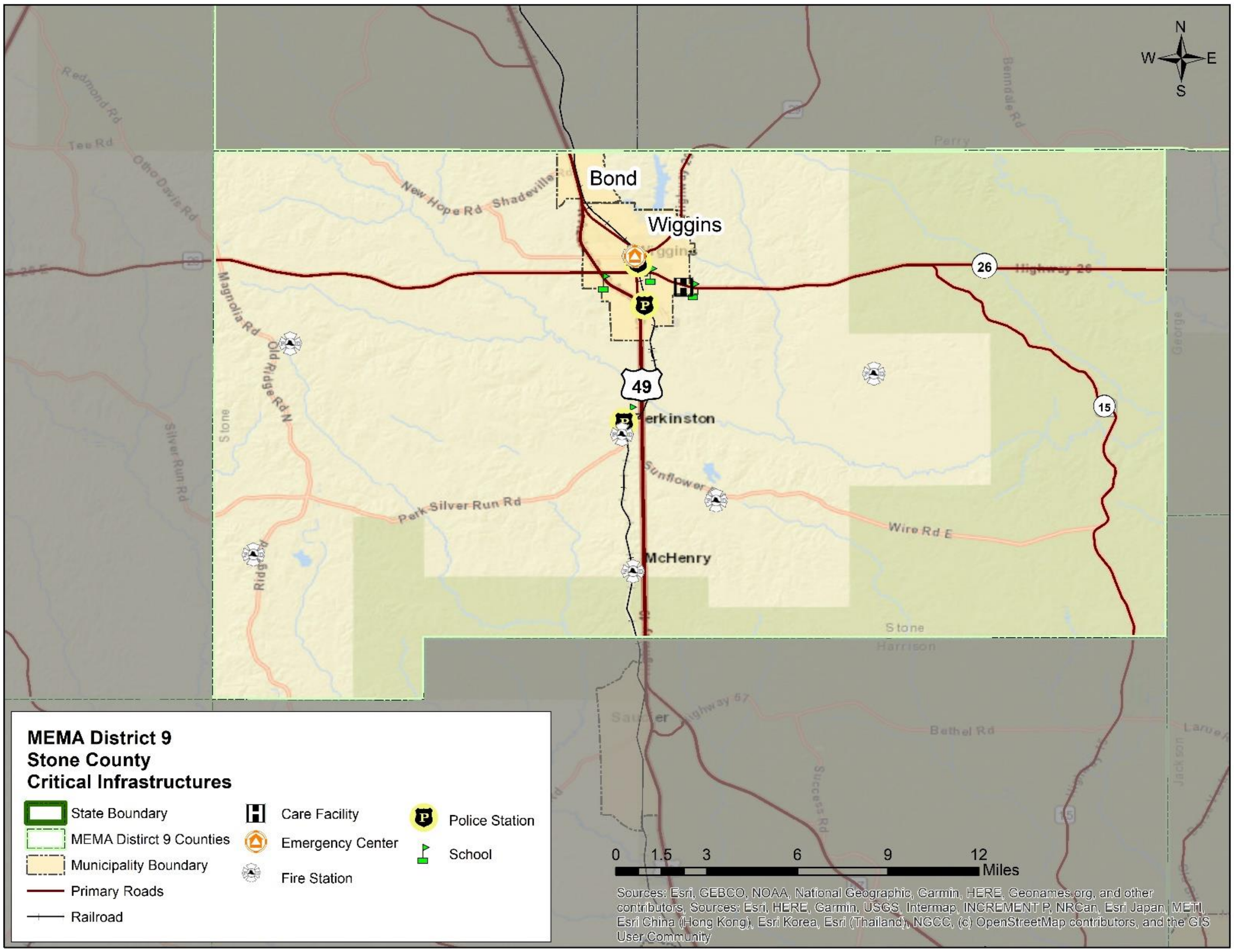
Location	Public Facility	School	Shelter	Special Populations	Transportation	Water/ Wastewater
Wiggins	1	0	0	0	0	0
Unincorporated Area	6	5	4	0	2	0

Location	Public Facility	School	Shelter	Special Populations	Transportation	Water/ Wastewater
STONE COUNTY TOTAL	7	5	4	0	2	0

Source: Local Governments

FIGURE F.28: CRITICAL FACILITY LOCATIONS IN STONE COUNTY

Source: Local Governments



Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Stone County that are potentially at risk to these hazards.

Table F.66 lists the population by jurisdiction according to American Community Survey 2015 population estimates. The total population in Stone County according to Census data is 17,978 persons. Additional population estimates are presented above in Section F.1.

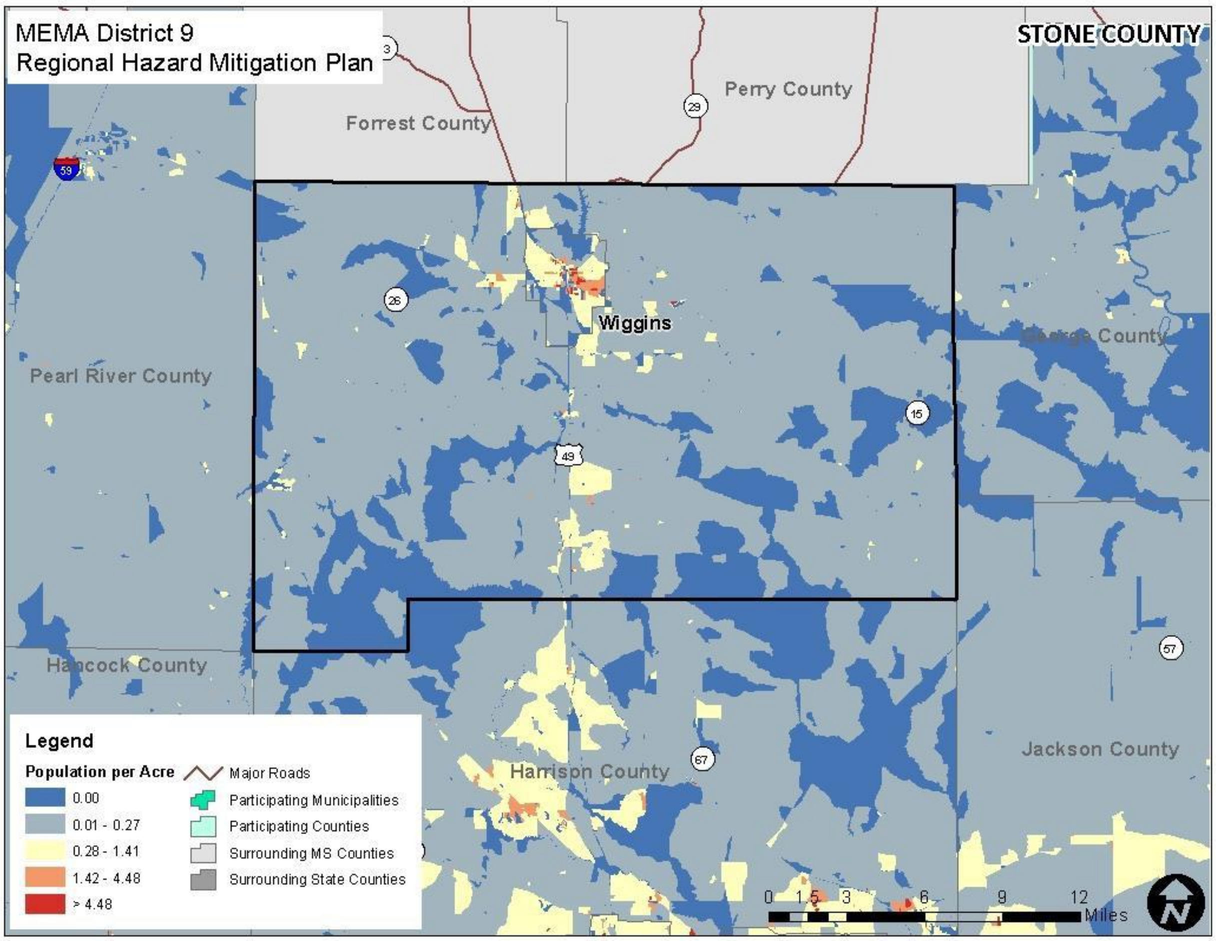
TABLE F.66: TOTAL POPULATION IN STONE COUNTY

Location	Total 2015 Population
Wiggins	4,487
Unincorporated Area	13,491
STONE COUNTY TOTAL	17,978

Source: United States Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

In addition, Figure F.29 illustrates the population density per acre by census block as it was reported by the U.S. Census Bureau in 2010. As can be seen in the figure, the population is spread out through most of the county, with a heavier concentration in Wiggins.

FIGURE F.29: POPULATION DENSITY IN STONE COUNTY



Source: United States Census Bureau, 2010 Census

Development Trends and Changes in Vulnerability

Since the previous local-level hazard mitigation plans were approved, Stone County has experienced moderate growth and development. Table F.67 shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

TABLE F.67: BUILDING COUNTS FOR STONE COUNTY

Location	2010	2011	2012	2013	2014	2015	% Building Stock Built Post-2010
Wiggins	1,437	1,660	1,460	1,439	1,459	1,513	5.3%
Unincorporated Area	5,444	5,388	5,627	5,705	5,733	5,703	4.8%
STONE COUNTY TOTAL	6,881	7,048	7,087	7,144	7,192	7,216	4.9%

Source: United States Census Bureau, American Community Survey

Table F.68 shows population growth estimates for the county from 2010 to 2015 based on the based on the American Community Survey's annual population estimates.

TABLE F.68: POPULATION GROWTH FOR STONE COUNTY

Location	Population Estimates						% Change 2010-2015
	2010	2011	2012	2013	2014	2015	
Wiggins	4,281	4,237	4,399	4,446	4,463	4,487	4.8%
Unincorporated Area	12,642	13,057	13,258	13,408	13,478	13,491	6.7%
STONE COUNTY TOTAL	16,923	17,294	17,657	17,854	17,941	17,978	6.2%

Source: United States Census Bureau, American Community Survey

Based on the data above, there has been a moderate rate of residential development and population growth in the county since 2010, resulting in an increased number of structures and people that are vulnerable to the potential impacts of the identified hazards. Therefore, development and population growth have impacted the county's vulnerability since the previous local hazard mitigation plans were approved and there has been an increase in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains or other identified areas of high risk.

Vulnerability Assessment Results

As noted in Section 6: Vulnerability Assessment, only hazards with a specific geographic boundary, available modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Stone County, are presented here. All other hazards are assumed to impact the entire planning region (e.g., drought) or, due to lack of data, analysis would not lead to credible results (e.g., infectious disease). The total county exposure, and thus risk to these hazards, was presented in Table F.64.

The hazards to be further analyzed in this subsection include: flood, wildfire, earthquake, hurricane and tropical storm winds and storm surge, hazardous materials incident, dam and levee failure, and sea level rise.

The annualized loss estimate for all hazards is presented near the end of this subsection in Table F.80.

FLOOD

Historical evidence indicates that Stone County is susceptible to flood events. A total of 24 flood events have been reported by the National Center for Environmental Information resulting in $146,318 (2016 dollars) in property damage. On an annualized level, these damages amounted to $8,226 for Stone County.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with improved property records for Stone County. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified floodplain.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table F.69 shows the results of the analysis.

TABLE F.69: ESTIMATED EXPOSURE OF PROPERTY TO THE FLOOD HAZARD

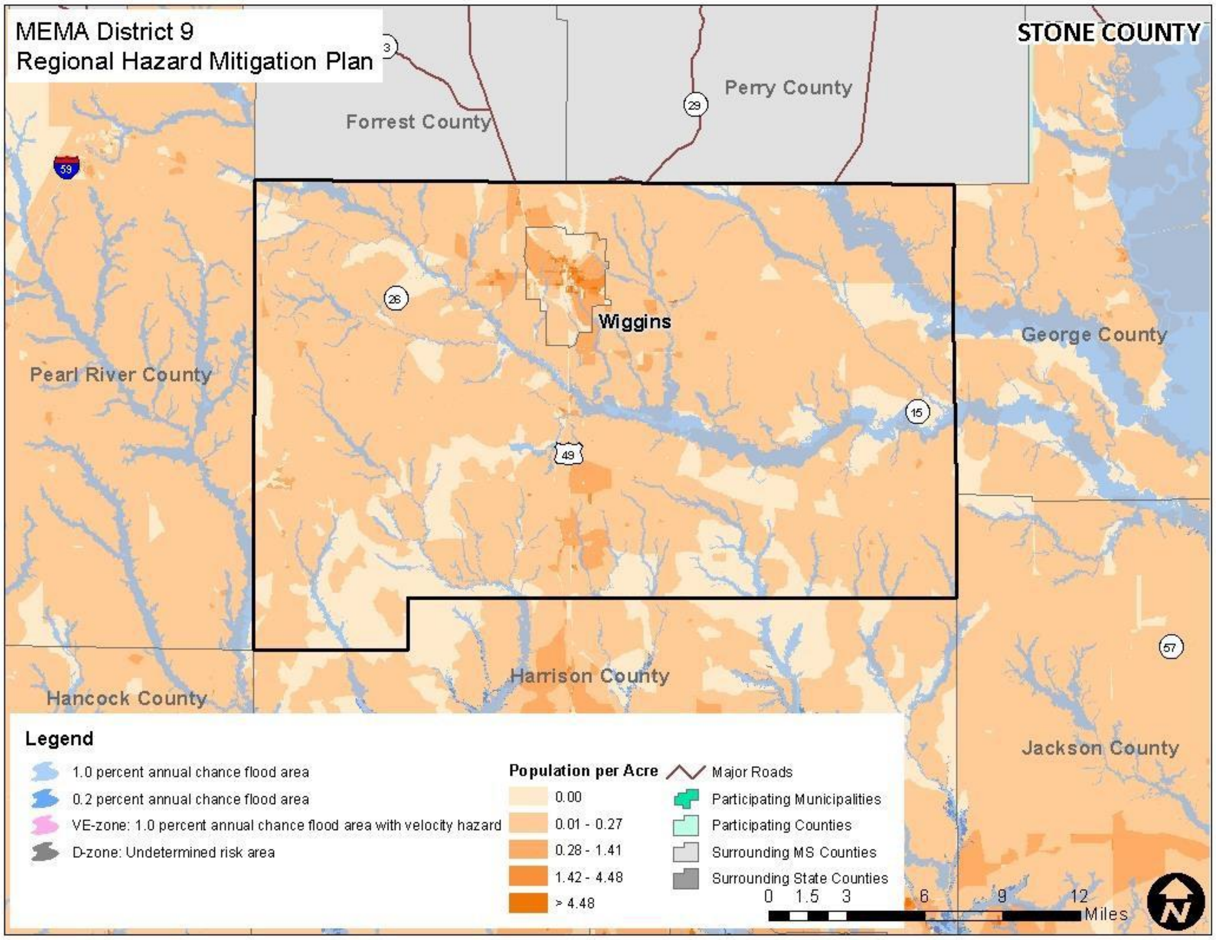
Location	1.0-percent ACF		0.2-percent ACF		VE Zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Wiggins	12	$873,286	0	$0	0	$0
Unincorporated Area	199	$3,246,802	0	$0	0	$0
STONE COUNTY TOTAL	211	$4,120,088	0	$0	0	$0

Source: Federal Emergency Management Agency DFIRM, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Figure F.30 is presented to gain a better understanding of at-risk population by evaluating census block level population data against mapped floodplains. There are areas of concern in several of the population centers in the county. Therefore, there is significant population vulnerability to flooding.

FIGURE F.30: POPULATION DENSITY NEAR FLOODPLAINS IN STONE COUNTY



Source: Federal Emergency Management Agency DFIRM, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are no facilities located in one of the identified floodplain zones. A list of specific critical facilities and their associated risk can be found in Table F.81 at the end of this subsection.

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in Stone County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. Such site-specific vulnerability determinations are outside the scope of this assessment but may be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

WILDFIRE

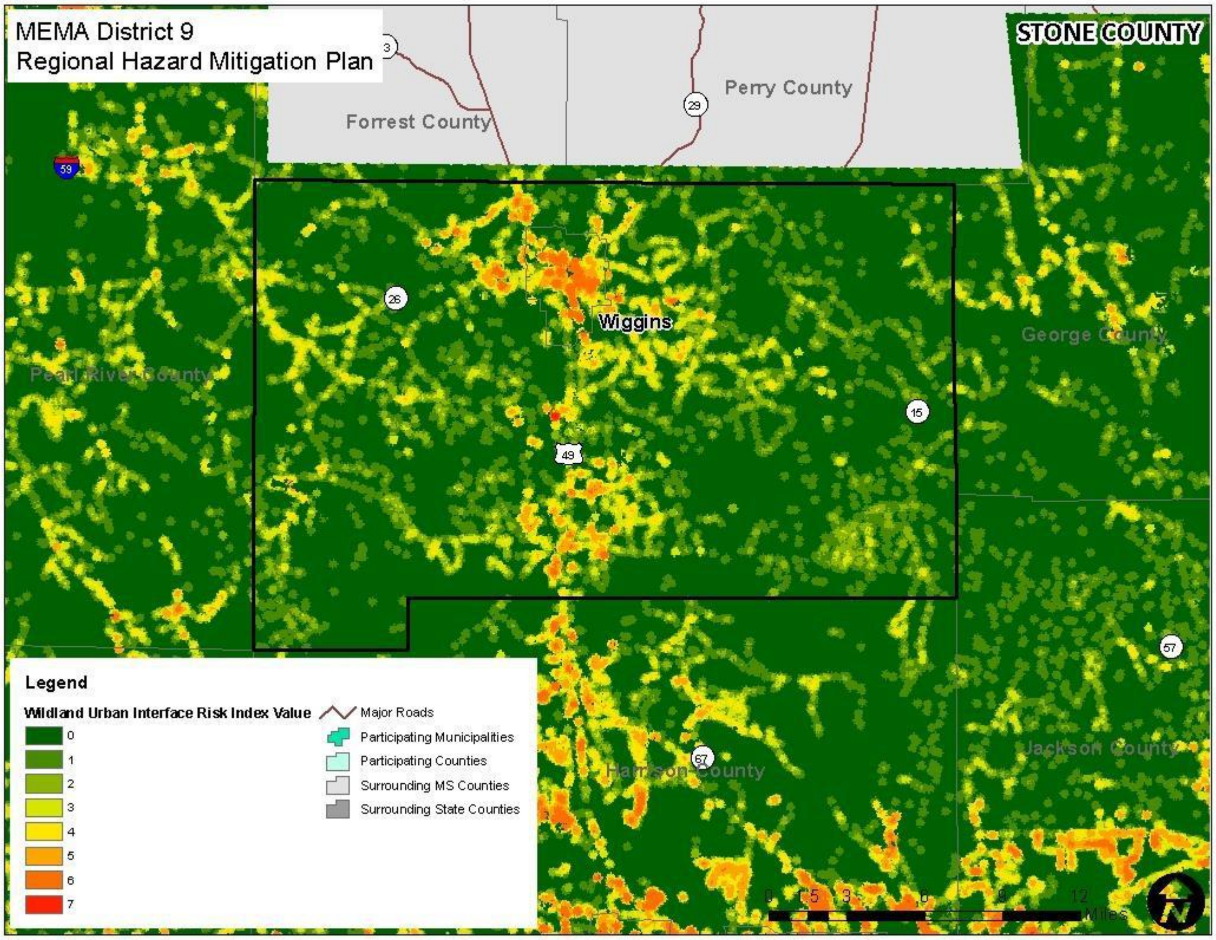
Although historical evidence indicates that Stone County is susceptible to wildfire events, there are few reports which include information on historic dollar losses. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered relatively low, though it should be noted that a single event could result in significant damages throughout the county.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones. For the critical facility analysis, areas of concern were intersected with critical facility locations.

Figure F.31 shows the Wildland Urban Interface Risk Index (WUIRI) data, which is a data layer that shows a rating of the potential impact of a wildfire on people and their homes. The key input, Wildland Urban Interface (WUI), reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the WUI and rural areas is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, it was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to 7 with higher values being most severe (as noted previously, this is only a measure of relative risk). Figure F.32 shows the areas of analysis where any grid cell is less than 3. Areas with a value below 3 were chosen to be displayed as areas of risk because this showed the upper echelon of the scale and the areas at highest risk.

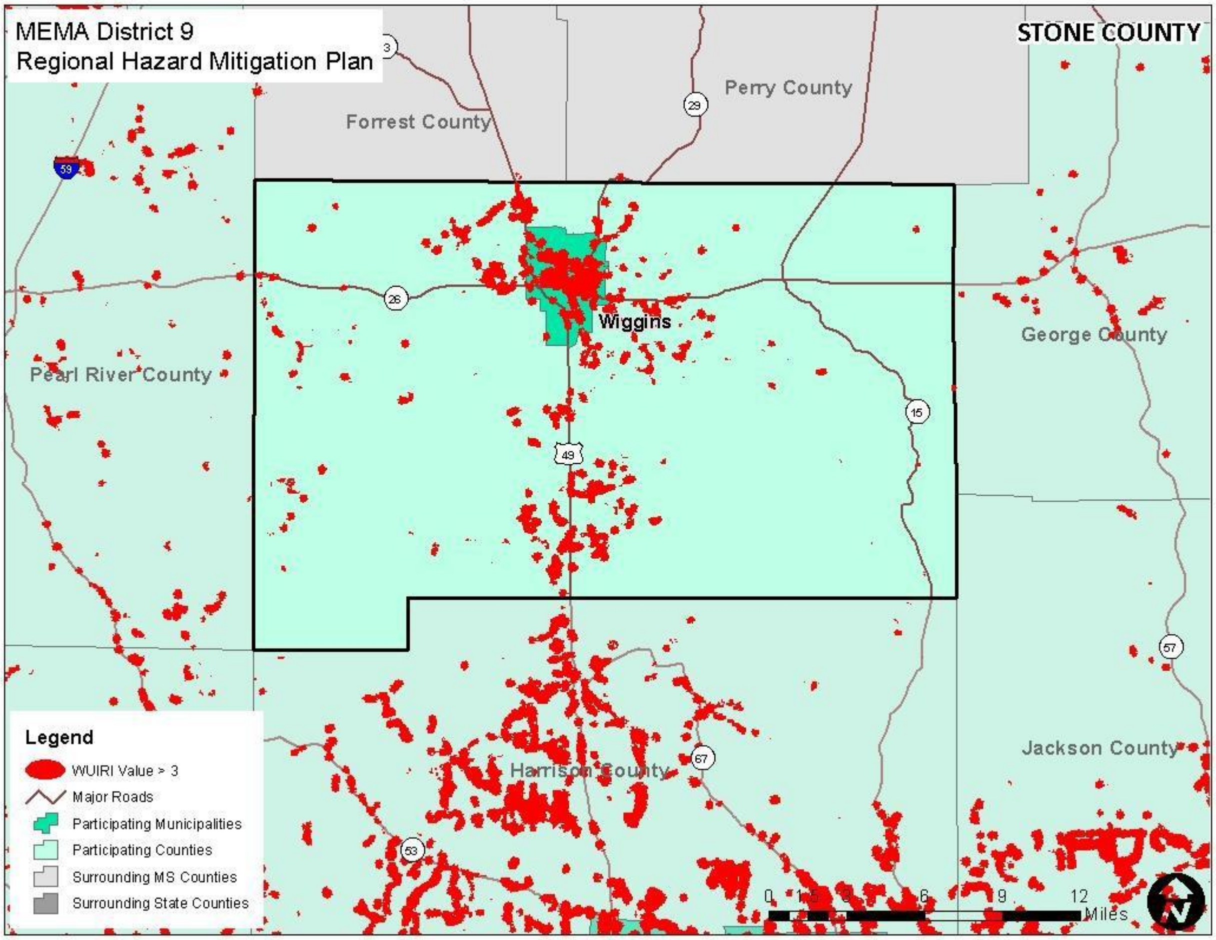
Table F.70 shows the results of the analysis.

FIGURE F.31: WUI RISK INDEX AREAS IN STONE COUNTY



Source: Southern Wildfire Risk Assessment Data

FIGURE F.32: WILDFIRE RISK AREAS IN STONE COUNTY



Source: Southern Wildfire Risk Assessment Data

TABLE F.70: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE RISK AREAS

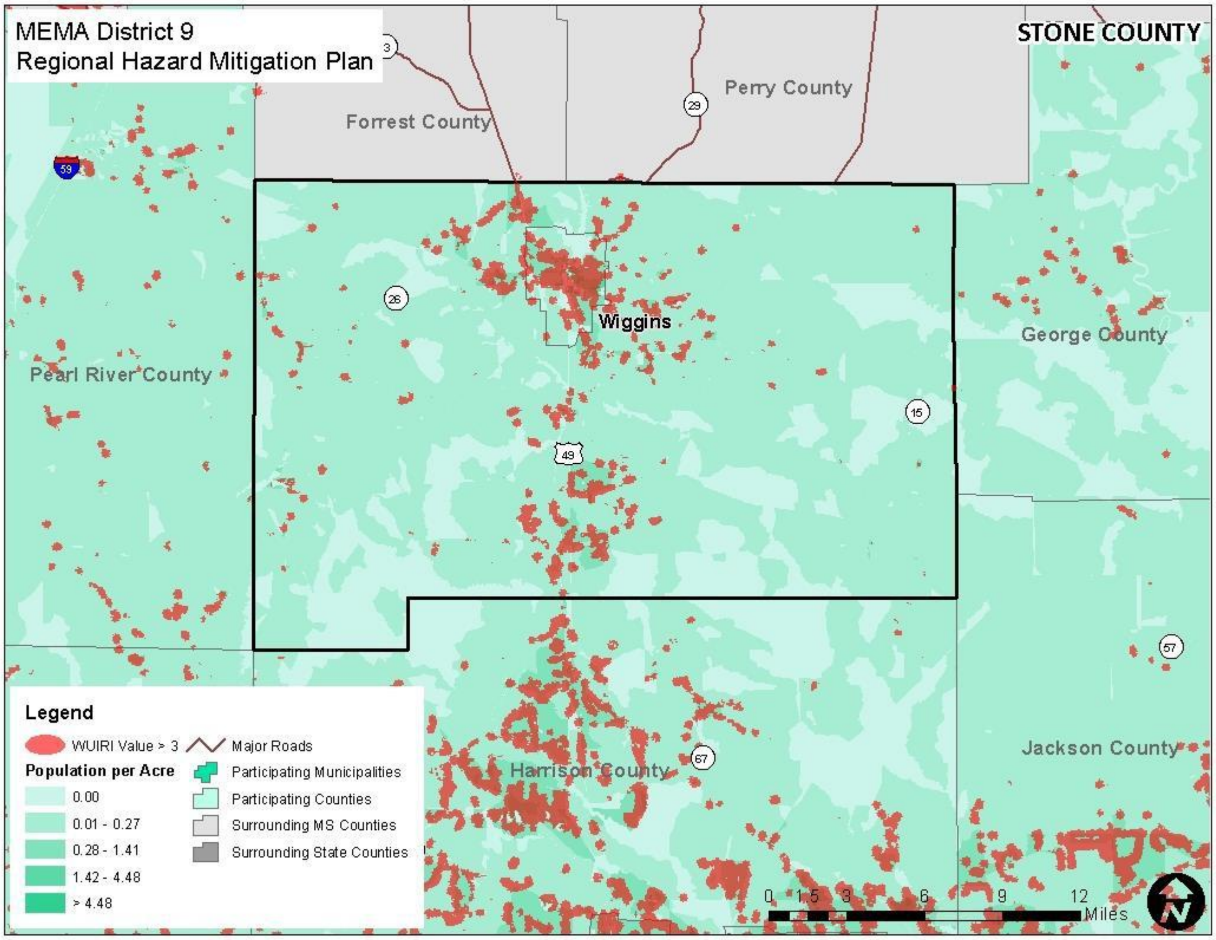
Location	Wildfire Risk	
	Approx. Number of Buildings	Approx. Improved Value
Wiggins	2,664	$104,838,031
Unincorporated Area	4,082	$87,845,059
STONE COUNTY TOTAL	6,746	$192,683,090

Source: SWRA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Given some level of susceptibility across the entire county, it is assumed that the total population is at risk to the wildfire hazard. Figure F.33 shows an overlay of the wildfire risk areas identified above with the population density by census block. This shows that many of the areas of high population concentration are susceptible to wildfire because of their proximity to the wildland urban interface.

FIGURE F.33: WILDFIRE RISK AREAS IN STONE COUNTY



Source: Southern Wildfire Risk Assessment Data; United States Census

Critical Facilities

The critical facility analysis revealed that there are 20 critical facilities located in wildfire areas of concern, including 1 communications, 1 EOC, 1 fire station, 2 police stations, 2 power/gas, 5 public facilities, 4 schools, and 4 shelters. It should be noted, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in Table F.81 at the end of this subsection.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Stone County.

EARTHQUAKE

As the Hazus-MH model suggests below, and historical occurrences confirm, any earthquake activity in the area is likely to inflict only minor to moderate damage to the county. Hazus-MH 3.2 estimates a total annualized loss of $8,000 which includes buildings, contents, and inventory throughout the county.

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the average annualized loss for the county. The results of the analysis are generated at the Census Tract level within Hazus-MH and then aggregated to the county level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to structure failure, building loss, contents damage, and inventory loss. They do not include losses to business interruption, lost income, or relocation. Table F.71 summarizes the findings with results rounded to the nearest thousand.

TABLE F.71: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Structural Damage	Non-Structural Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Stone County	$2,000	$5,000	$1,000	$0	$8,000

Source: Hazus-MH 3.2

Social Vulnerability
It can be assumed that all existing and future populations are at risk to the earthquake hazard.

Critical Facilities
The Hazus-MH probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. Specific vulnerabilities for these assets will be greatly dependent on their individual design and the mitigation measures in place. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Stone County. The Hazus-MH scenario indicates that minimal to moderate damage is expected from an earthquake occurrence. While Stone County may not experience a large earthquake, localized damage is possible with an occurrence. A list of specific critical facilities and their associated risk can be found in Table F.81 at the end of this subsection.

HURRICANE AND TROPICAL STORM

Historical evidence indicates that Stone County has very significant risk to the hurricane and tropical storm hazard. There have been 10 disaster declarations due to hurricanes or tropical storms (Hurricanes Camille, Frederic, Elena, Georges, Ivan, Dennis, Katrina, Gustav, and Isaac, as well as Tropical Storms Isidore). A large number tracks have come near or traversed through the county, as shown and discussed in Section F.2.12. Hazus-MH 3.2 estimates a total annualized loss of $5,329,000 which includes buildings, contents, and inventory throughout the county.

Hurricane Winds

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and storm surge and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore, only these two aspects of hurricane losses are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to hurricane and tropical storm wind hazard. Hazus-MH 3.2 was used to determine average annualized losses for the county as shown below in Table F.72. Only losses to buildings, inventory, and contents are included in the results.

TABLE F.72: AVERAGE ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Stone County	$3,629,000	$1,683,000	$17,000	$5,329,000

Source: Hazus-MH 3.2

Storm Surge

In addition, although it was treated as a separate hazard throughout this plan, storm surge is most often associated with hurricanes and tropical storms. Indeed, Hazus incorporates the storm surge model for estimating damage from storm surge as part of the hurricane model. The storm surge model can only be run as part of a historic hurricane model run and not as part of an annualized loss model. Unfortunately, in this model, storm surge impacts are calculated as part of the total damage from the historic event and thus could not be separated out and evaluated solely in terms of storm surge loss. As such, the estimated losses presented below are combined losses from hurricane winds and storm surge. The historic Hurricane Katrina model was utilized as this was certainly one of the most impactful storms in the region and therefore estimates the potential losses that are possible from a large hurricane event. Table F.73 presents the losses from this modeled event.

TABLE F.73: POTENTIAL LOSS ESTIMATIONS FOR LARGE HURRICANE EVENT

Location	Building Damage	Contents Damage	Inventory Loss	Total Annualized Loss
Stone County	$88,416,000	$39,047,000	$495,000	$127,958,000

Source: Hazus-MH 3.2

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population, both current and future, is at risk to the hurricane and tropical storm wind hazard. In terms of social vulnerability to storm surge, coastal populations are at much higher risk than inland populations. Since Stone County is not located on the coast, there is lower social vulnerability to storm surge compared to the rest of the region.

Critical Facilities

Given equal vulnerability across Stone County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among factors. Determining individual building response to wind and storm surge is beyond the scope of this plan. However, this plan will consider mitigation action for especially vulnerable structures and/or critical facilities to mitigate against the effects of the hurricane hazard. A list of specific critical facilities can be found in Table F.81 at the end of this subsection.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Stone County.

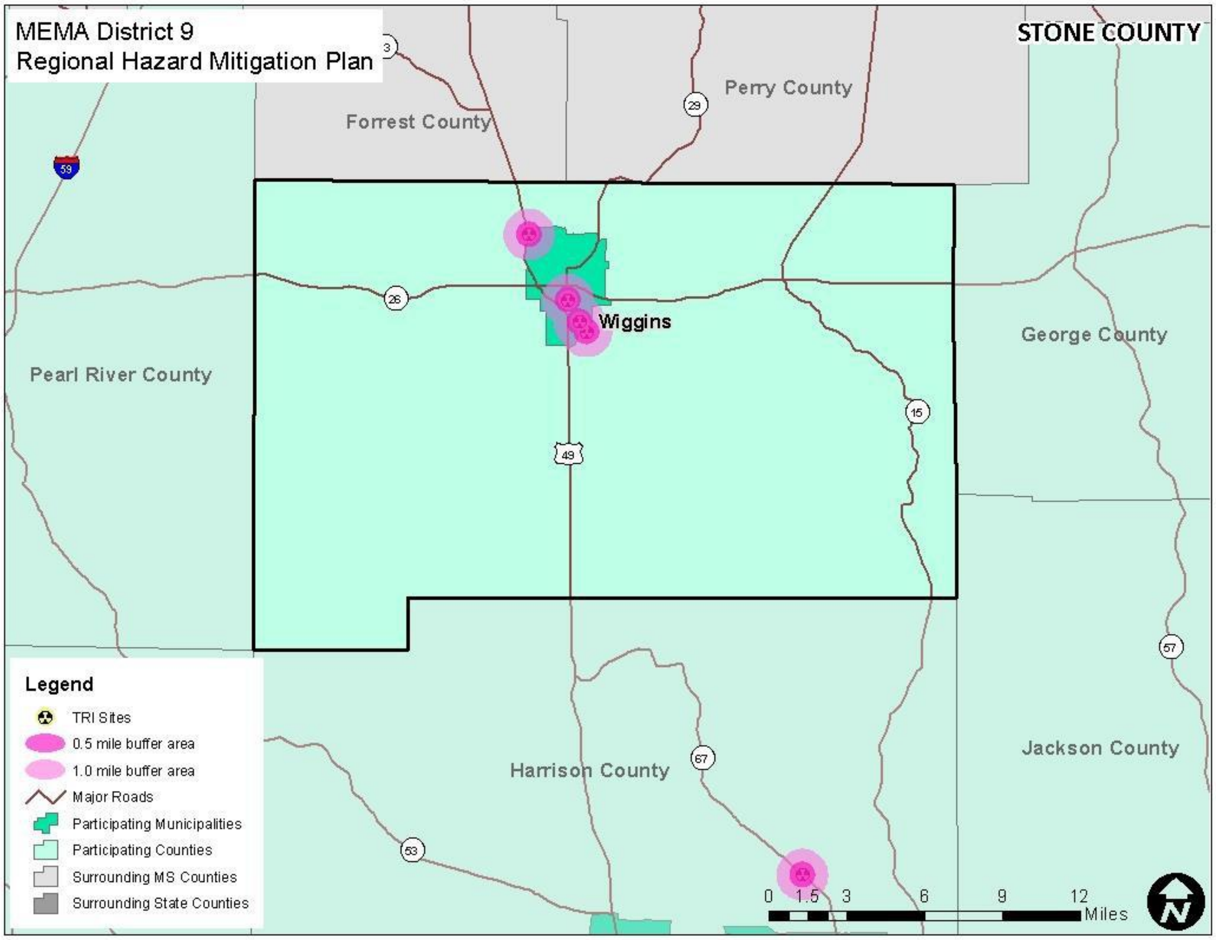
HAZARDOUS MATERIALS INCIDENT

Historical evidence indicates that Stone County is susceptible to hazardous materials events. A total of 10 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration, resulting in $83,926 in property damage. On an annualized level, these damages amount to
$2,997 for the county.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities, and cause affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and building footprints/parcels where available and Census block data where footprints/parcels were not available. In both scenarios, two sizes of buffers—0.5-mile and 1.0-mile— were used. These areas are assumed to represent the different levels of effect: immediate (primary) and secondary. Primary and secondary impact zones were selected based on guidance from the PHMSA Emergency Response Guidebook. For the fixed site analysis, geo-referenced TRI sites in the region, along with buffers, were used for analysis as shown in Figure F.34. For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. Figure F.35 shows the areas used for mobile road toxic release buffer analysis and Figure F.36 shows the areas used for the mobile railroad toxic release buffer analysis. The results indicate the approximate number of improved properties and improved value, as shown in Table F.74 (fixed sites), Table F.75 (mobile roads), and Table F.76 (mobile railroad sites).

FIGURE F.34: TRI SITES WITH BUFFERS IN STONE COUNTY



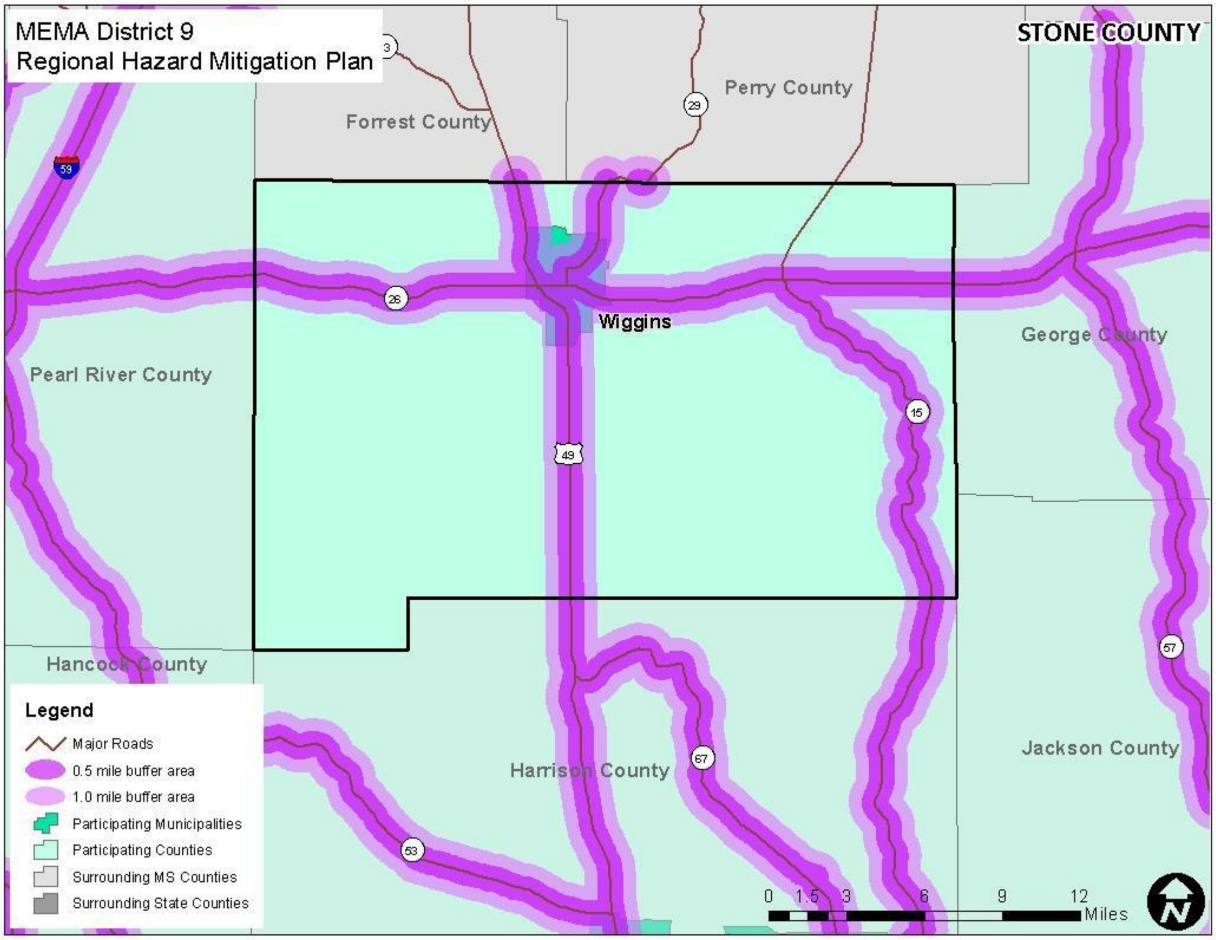
Source: Environmental Protection Agency

TABLE F.74: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Wiggins	387	$17,016,665	1,349	$56,455,906
Unincorporated Area	80	$4,522,067	510	$14,347,640
STONE COUNTY TOTAL	467	$21,538,732	1,859	$70,803,546

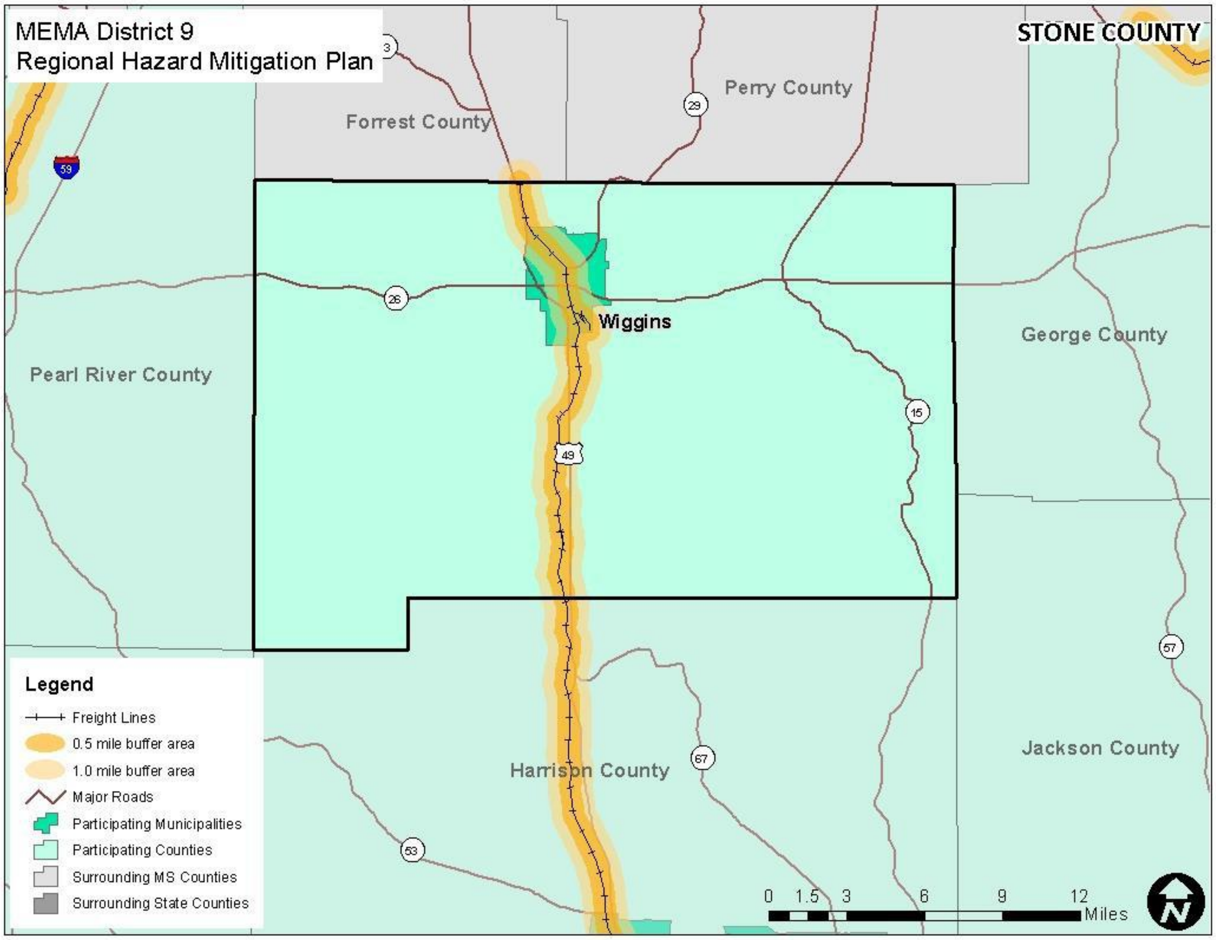
Source: EPA, MDEQ, Hazus MH 3.2 Data

FIGURE F.35: MOBILE (ROAD) HAZMAT BUFFERS IN STONE COUNTY



Source: Federal Highway Administration National Highway Planning Network

FIGURE F.36: MOBILE (RAIL) HAZMAT BUFFERS IN STONE COUNTY



Source: U.S. Department of Transportation Federal Railroad Administration

TABLE F.75: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Wiggins	2,630	$106,292,189	3,183	$126,862,624
Unincorporated Area	3,718	$72,302,731	5,744	$116,173,128
STONE COUNTY TOTAL	6,348	$178,594,920	8,927	$243,035,752

Source: NHPN, MDEQ, Hazus MH 3.2 Data

TABLE F.76: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer zone		1.0-mile buffer zone	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Wiggins	1,729	$62,551,284	2,535	$102,100,359
Unincorporated Area	1,667	$36,131,066	2,539	$52,541,034
STONE COUNTY TOTAL	3,396	$98,682,350	5,074	$154,641,393

Source: USDOT FRA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 12 facilities located in a fixed HAZMAT risk zone. Of these, 4 facilities are in the primary (0.5 mile) risk area including 1 police station, 2 power/gas, and 1 public facility. A list of specific critical facilities and their associated risk can be found in Table F.81 at the end of this subsection.

Mobile Analysis:

The critical facility analysis for transportation corridors revealed that there are 25 facilities located in the primary and secondary road HAZMAT buffer areas. All 25 of these critical facilities were located in the primary risk zone including 1 communications, 1 EOC, 1 fire station, 1 medical, 2 police stations, 2 power/gas, 7 public facilities, 5 schools, 4 shelters, and 1 transportation.

For the rail line buffer areas, there were a total of 21 critical facilities located in primary and secondary buffer areas. Of these, 20 facilities are located within the primary buffer area including communications, 1 EOC, 1 fire station, 2 police stations, 2 power/gas, 6 public facilities, 4 schools, and 3 shelters.

A list of specific critical facilities and their associated risk can be found in Table F.81 at the end of this subsection.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Stone County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in condition that could alter the impact area (i.e., direction and speed of wind, volume of release, etc.).

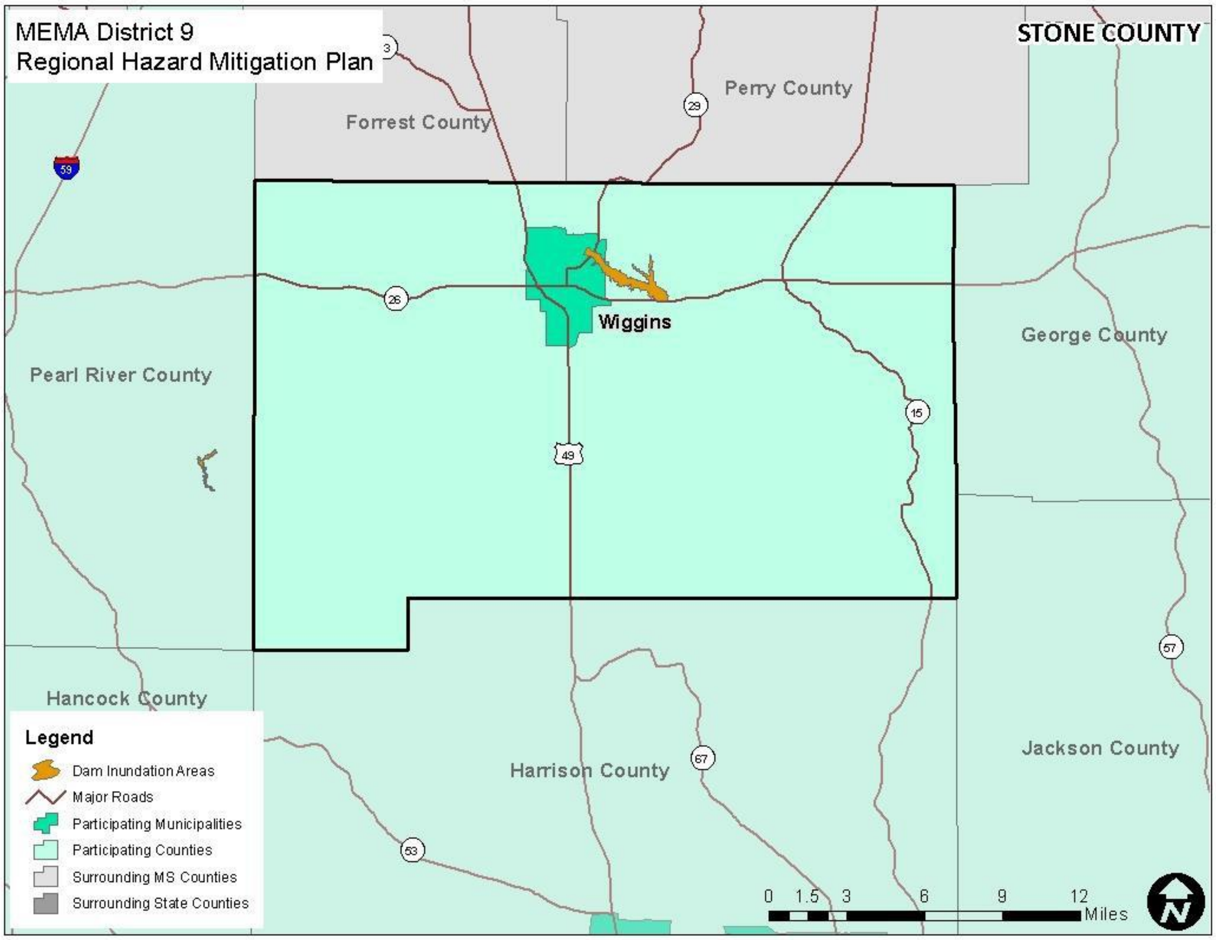
DAM/LEVEE FAILURE

In order to assess risk to a dam or levee failure, a GIS-based analysis was used to estimate exposure to one of the areas delineated by the Mississippi Department of Environmental Quality as a potential inundation area in the event of a failure. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within an identified inundation area. As mentioned previously, this type of inundation mapping has not been completed for every dam/levee in the region, so the results of this analysis likely underestimate the overall vulnerability to a dam or levee failure. However, the analysis is still useful as a sort of baseline minimum of property that is potentially at-risk. The identified inundation areas can be found in Figure F.37.

In general, building footprint and parcel data were used in this analysis. However, in some communities, due to a lack of digital parcel data, it was determined that analysis using the inventory from Hazus-MH 3.2 would be used to supplement the building/parcel data. It should be noted that this data will merely be an estimation and may not reflect actual counts or values located in dam inundation areas. Indeed, in almost all cases, this data likely overestimates the amount of property in the identified risk zones.

Table F.77 presents the potential at-risk property. Both the number of buildings and the approximate improved value are presented

FIGURE F.37: DAM INUNDATION AREAS IN STONE COUNTY



Source: Mississippi Department of Environmental Quality

TABLE F.77: ESTIMATED EXPOSURE OF IMPROVEMENTS TO THE DAM/LEVEE FAILURE HAZARD

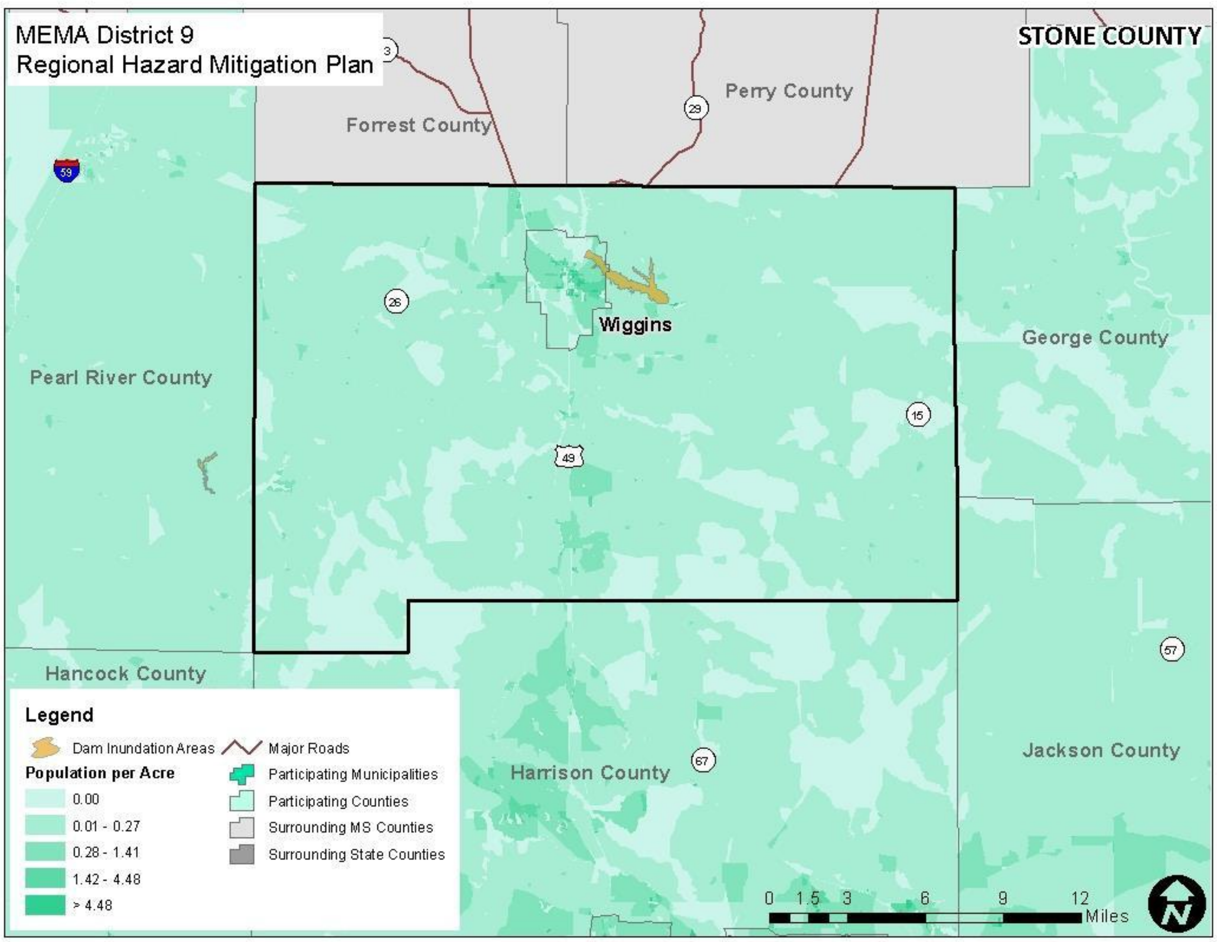
Location	Dam Inundation Area	
	Approx. Number of Buildings	Approx. Improved Value
Wiggins	18	$808,698
Unincorporated Area	11	$341,490
STONE COUNTY TOTAL	29	$1,150,188

Source: MDEQ, Hazus 3.2

Social Vulnerability

Figure F.38 is presented to gain a better understanding of at-risk population by evaluating census block level population data against dam inundation areas. There is an area of concern in the northern part of the county, although it should be noted that most of the population of the county is not at risk to a dam/levee failure.

FIGURE F.38: POPULATION DENSITY NEAR DAM INUNDATION AREAS IN STONE COUNTY



Source: MDEQ, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there is 1 dam located in dam inundation areas. Since it is a dam itself, it is not surprising that it is located in the inundation area. A list of specific critical facilities and their associated risk can be found in Table F.81 at the end of this subsection.

In conclusion, a dam has the potential to impact a number of existing and future buildings, facilities, and populations in Stone County, though this analysis is not all-encompassing in terms of risk to a dam or levee failure because inundation mapping is not available for all dams in the region.

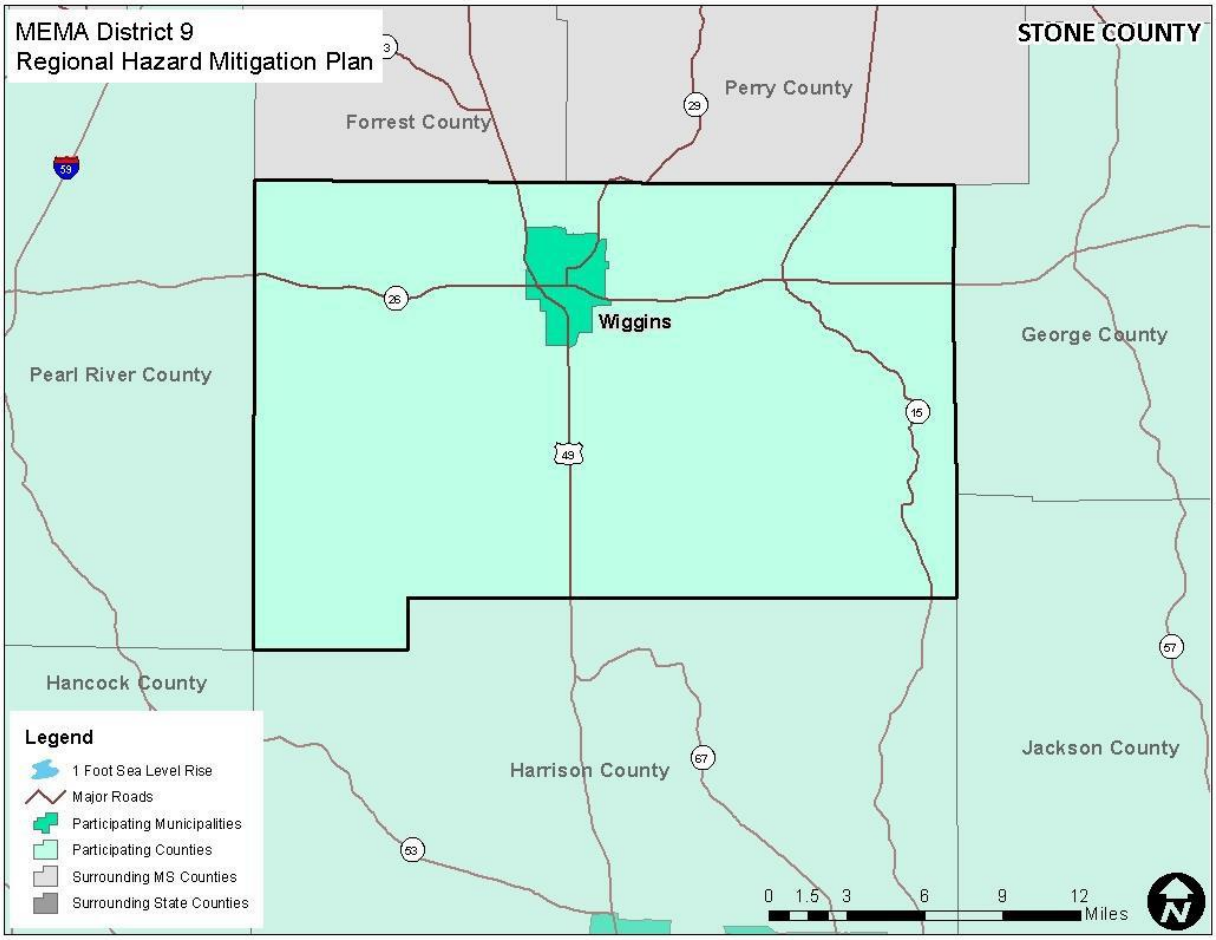
CLIMATE CHANGE/SEA LEVEL RISE

Most assessments carried out across the globe have concluded that climate change is a phenomenon that will impact our planet in the foreseeable future. Among others, the National Climate Assessment, International Panel on Climate Change, and National Oceanic and Atmospheric Administration all project that climate change will impact the United States and will have a major impact on coastal communities due to the effects of sea level rise. As such, projections concerning sea level rise are important to incorporate into planning efforts in order to identify people and property that may be impacted.

In order to assess sea level rise risk, a GIS-based analysis was used to estimate exposure to future projections of sea level rise using data produced by the National Oceanic and Atmospheric Administration in combination with improved property records for the county. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the values for improved properties that were located within the inundation zone that would be created in the event of 1 foot, 3 feet, and 6 feet of sea level rise. A number of different sea level rise scenarios were available via NOAA (from 1 foot to 6 feet, at 1 foot intervals), however these scenarios were selected to demonstrate a range of potential sea level rise scenarios from low to moderate to high projections. These scenarios can be found in Figure F.39, Figure F.40, and Figure F.41.

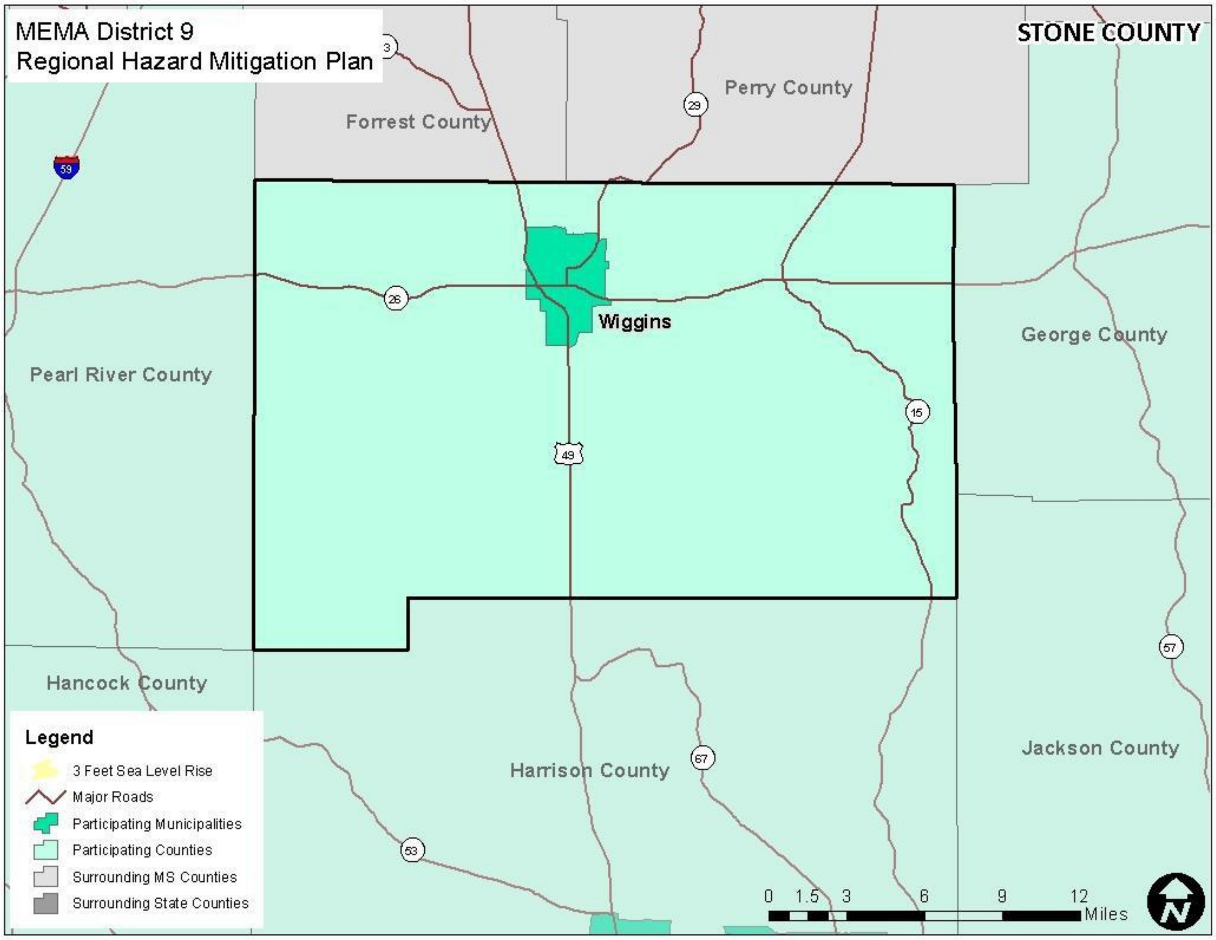
Table F.78 presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

FIGURE F.39: 1 FOOT SEA LEVEL RISE SCENARIO IN STONE COUNTY



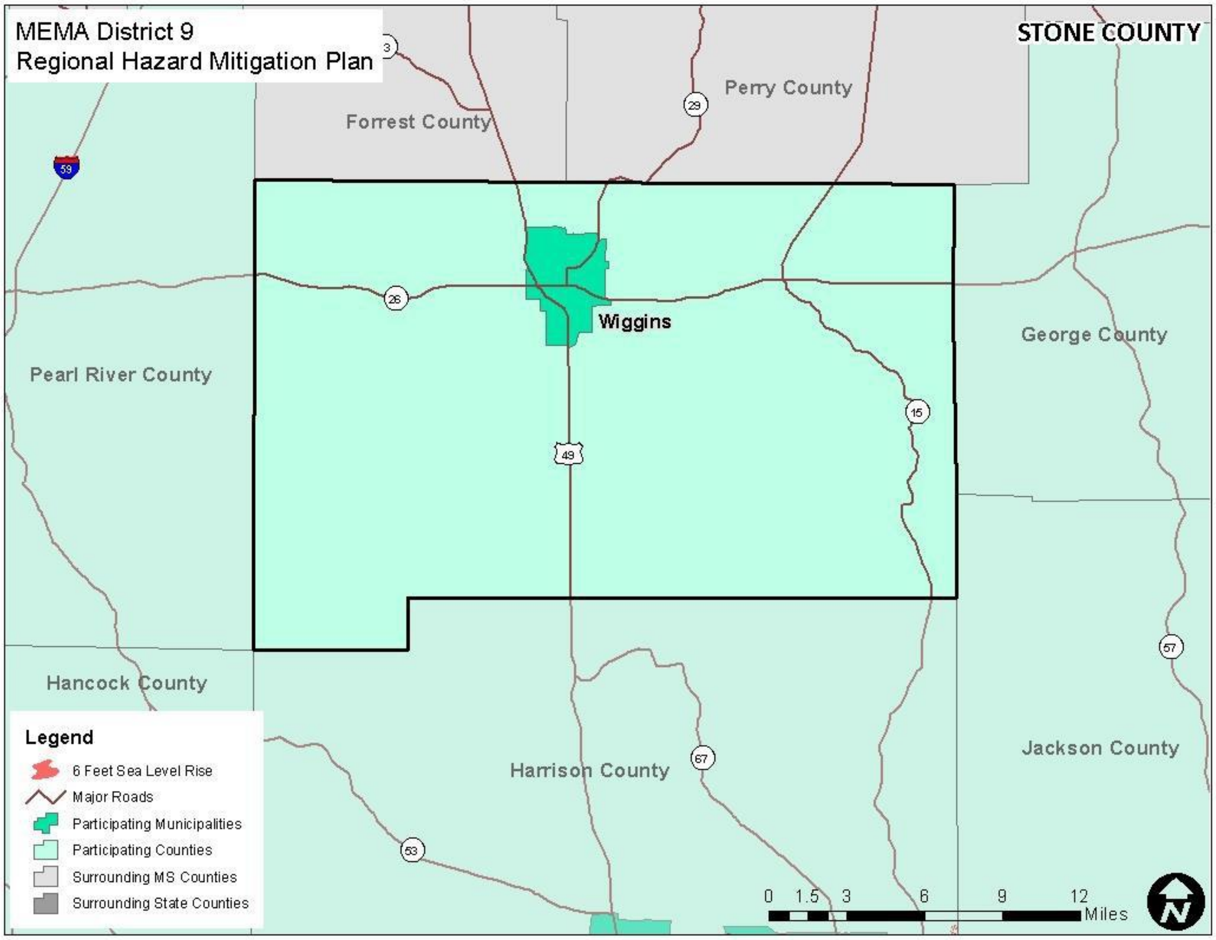
Source: NOAA

FIGURE F.40: 3 FEET SEA LEVEL RISE SCENARIO IN STONE COUNTY



Source: NOAA

FIGURE F.41: 6 FEET SEA LEVEL RISE SCENARIO IN STONE COUNTY



Source: NOAA

TABLE F.78: ESTIMATED EXPOSURE OF PARCELS TO THE SEA LEVEL RISE HAZARD

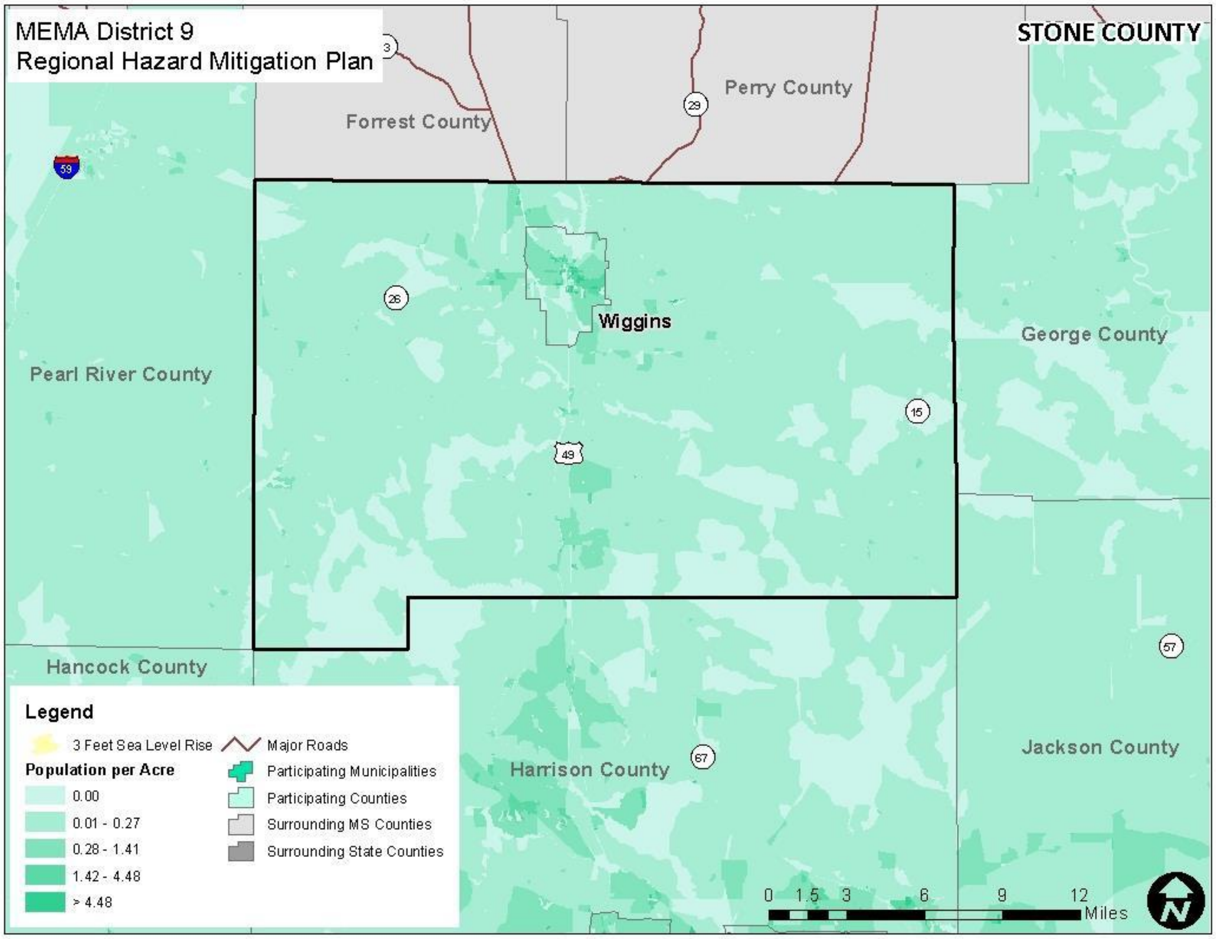
Location	1.0 foot		3.0 feet		6.0 feet	
	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value	Approx. Number of Buildings	Approx. Improved Value
Wiggins	0	$0	0	$0	0	$0
Unincorporated Area	0	$0	0	$0	0	$0
STONE COUNTY TOTAL	0	$0	0	$0	0	$0

Source: NOAA, MDEQ, Hazus MH 3.2 Data

Social Vulnerability

Figure F.42 is presented to gain a better understanding of at-risk population by evaluating census block level population data against the 3 feet sea level rise scenario. The three feet scenario was selected since this is a moderate level projection. Based on this analysis, there is no part of the population in the county that is vulnerable to sea level rise.

FIGURE F.42: POPULATION DENSITY WITH 3 FEET SEA LEVEL RISE IN STONE COUNTY



Source: NOAA, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are no facilities located in the 3 feet of sea level rise scenario inundation area. As mentioned above, this scenario was selected as it is a mid-range projection for sea level rise based on a number of studies. A list of specific critical facilities and their associated risk can be found in Table F.81 at the end of this subsection.

CONCLUSIONS ON HAZARD VULNERABILITY

Table F.79 presents an overall summary of the community's vulnerability for each jurisdiction. This summary provides key problem statements and identifies the community's greatest vulnerabilities that will be addressed in the mitigation strategy.

TABLE F.79: SUMMARY OF VULNERABILITY FOR STONE COUNTY

	Key Problem Statements
Stone County	Stone County and Wiggins have a large amount of timber, open, and agriculture land, creating an enhanced risk to wildfires across the county. The county is also more vulnerable to drought which can damage crop yields or reduce stock and crop production in the agricultural sector, resulting in economic loss.

Table F.80 presents a summary of annualized loss for each hazard in Stone County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the county.

It should also be noted that many of these estimates are based on incomplete data and likely underestimate the historic dollar damage sustained in each county. Especially for hazards such as extreme cold, extreme heat, hail, lightning, and winter weather, it is very likely that more damage occurred historically than has been identified.

TABLE F.80: ANNUALIZED LOSS FOR STONE COUNTY

Hazard	Stone County
Flood-related Hazards	
Dam and Levee Failure	Not Available
Erosion	Not Available
Flood	$8,226
Storm Surge	$0
Fire-related Hazards	
Drought	Not Available
Lightning	$6,483
Wildfire	Not Available
Geologic Hazards	
Earthquake†	$2,000
Wind-related Hazards	
Extreme Cold	$0
Extreme Heat/Heat Wave	Not Available
Hailstorm	$0
Hurricane and Tropical Storm	$19,180,679
Severe Thunderstorm/High Wind	$35,155
Tornado	$33,495
Winter Weather	Not Available
Other Hazards	

Hazard	Stone County
Climate Change/Sea Level Rise	Not Available
Hazardous Materials Incident/Train Derailment	$2,997
Infectious Disease	Not Available

†Historic dollar damage was not available for this hazard, but since estimated annualized losses from Hazus were available, those numbers were used in this table.
*In this table, the term “Not Available” is used to indicate that no records of dollar losses for the particular hazard were recorded. This could be the case either because there were no events that caused dollar damage or because documentation of that particular type of event is not well kept.

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to impacts from atmospheric hazards such as drought and hailstorm. Some buildings may be more vulnerable to some of these hazards based on locations, construction, and building type. In addition, all populations are vulnerable to hazards like infectious disease which could presumably impact any segment of the population without regard to geographic location. Table F.81 shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an “X”).

For a full listing of vulnerable critical assets please click the below link for tabular data:

MEMA_District9_Hazard_TabularData.xlsx

STONE COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Stone County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: Capability Assessment.

Planning and Regulatory Capability

Table F.82 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Stone County. An x (x) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. A dagger (†) indicates that the given item is administered for that municipality by the county. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the MEMA District 9 Regional Hazard Mitigation Plan.

TABLE F.82: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Threat and Hazard Identification and Risk Assessment (THIRA)	Comprehensive Land Use Plan	Floodplain Management Plan/Flood Mitigation Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Emergency Management Accreditation Program (EMAP Accreditation)	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment/ Reconstruction Plan/ Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System (CRS
STONE COUNTY	x		x						x				x	x	x		x		x			x	x	x	x
Wiggins	†		x						†				x		†		x	x	x	x		x	x	x	

A more detailed discussion on the county's planning and regulatory capabilities follows.

EMERGENCY MANAGEMENT

Hazard Mitigation Plan
Stone County has previously adopted a hazard mitigation plan. The City of Wiggins was also included in this plan.

Disaster Recovery Plan
Stone County and the City of Wiggins have adopted a disaster recovery plan, the Stone County/City of Wiggins Long-Term Community Recovery Plan.

Emergency Operations Plan
Stone County maintains an emergency operations plan through its Emergency Management Agency. The City of Wiggins is covered by this plan.

GENERAL PLANNING

Comprehensive Land Use Plan
Stone County has adopted a county comprehensive plan. The City of Wiggins has also adopted a municipal comprehensive plan.

Capital Improvements Plan
Stone County has adopted a capital improvements plan.

Zoning Ordinance
Stone County does not have a zoning ordinance in place. However, the City of Wiggins has adopted a zoning ordinance and includes zoning regulations as part of its local unified development ordinance.

Subdivision Ordinance
Stone County and the City of Wiggins have each adopted a subdivision ordinance. The City of Wiggins includes subdivision regulations as part of its local unified development ordinance and the county has adopted a stand-alone subdivision ordinance.

Building Codes, Permitting, and Inspections
After Hurricane Katrina, Mississippi Legislature mandated the adoption of the International Building Code and International Residential Code in five coastal counties including Stone County. The City of Wiggins has also adopted a building code.

FLOODPLAIN MANAGEMENT

Table F.83 provides NFIP policy and claim information for each participating jurisdiction in Stone County.

TABLE F.83: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
STONE COUNTY†	09/01/87	06/16/11	31	$7,553,000	11	$115,205
Wiggins	06/16/11	06/16/11	5	$939,600	0	$0

†Includes unincorporated areas of county only
Source: NFIP Community Status information as of 1/10/2017; NFIP claims and policy information as of 10/31/2016

Community Rating System
Stone County (Class 9) participates in the CRS. Participation in the CRS program should be considered as a mitigation action by the City of Wiggins.

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Stone County and the City of Wiggins both participate in the NFIP and have adopted flood damage prevention ordinances.

Implement the substantial improvement/substantial damage provisions:
Damage Estimates are a part of the National Flood Insurance Program (NFIP). If a community participates in the NFIP, part of the responsibility of the local participating community is to perform damage estimates. These estimates are performed using a FEMA Substantial Damage Estimate software program. This program is used by the Mississippi Emergency Management Agency's (MEMA) Office of Mitigation Floodplain Management (FPM) Bureau to assist local communities in determining damage estimates as it relates to the NFIP. The FPM Bureau is tasked with assisting local communities with the training and deployment of the SDE program. Local building officials/Stormwater management and floodplain managers for each participating jurisdiction are responsible for ensuring that the substantial improvement/substantial damage provisions are implemented following a flood related event within their respective jurisdiction. The local officials will ensure that all NFIP criteria/requirements are implemented and met following a flood event, local officials will work with FEMA to ensure proper documentation/designations are made and properly recorded for structures deemed substantially damaged during an event.

Administrative and Technical Capability

Table F.84 provides a summary of the capability assessment results for Stone County with regard to relevant staff and personnel resources. An x (x) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill. A dagger (†) indicates a county-level staff member(s) provides the specified knowledge or skill to that municipality.

TABLE F.84: RELEVANT STAFF/PERSONNEL RESOURCES

Staff/Personnel Resource	Planners with knowledge of land development/land management	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human- caused hazards	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
STONE COUNTY	x	x	x	x	x		x	x	x	
Wiggins	x	x	x	†	x		†	x		

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

Fiscal Capability

Table F.85 provides a summary of the results for Stone County with regard to relevant fiscal resources. An x (x) indicates that the given fiscal resource has previously been used to implement hazard mitigation actions. A dagger (†) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

TABLE F.85: RELEVANT FISCAL RESOURCES

Fiscal Tool/Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: HMGP and other federal, state, and private grants/resources
STONE COUNTY		†							†	†
Wiggins		†							†	†

Political Capability

During the months immediately following a disaster, local public opinion in Stone County is more likely to shift in support of hazard mitigation efforts.

Table F.86 provides a summary of the results for Stone County with regard to political capability. An x (x) indicates the expected degree of political support by local elected officials in terms of adopting/funding information.

TABLE F.86: LOCAL POLITICAL SUPPORT

Political Support	Limited	Moderate	High
STONE COUNTY			x
Wiggins		x	

Conclusions on Local Capability

Table F.87 shows the results of the capability assessment using the designed scoring methodology described in Section 7: Capability Assessment. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. This information was reviewed by all jurisdictions and each jurisdiction provided feedback on the information included in the capability assessment. Local government input was vital to identifying capabilities. According to the assessment, the average local capability score for the county and its jurisdictions is 38.0, which falls into the moderate capability ranking.

TABLE F.87: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
STONE COUNTY	42	Moderate
Wiggins	34	Moderate

SECTION 28 STONE COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Stone County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Council and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: Mitigation Strategy and Section 9: Mitigation Action Plan.

Mitigation Goals

Stone County developed nine mitigation goals in coordination with the other participating MEMA District 9 Region jurisdictions. The regional mitigation goals are presented in Table F.88.

TABLE F.88: MEMA DISTRICT 9 REGIONAL MITIGATION GOALS

	Goal
Goal #1	Minimize risk and vulnerability of the community to hazards. Objective 1: Improve understanding of hazard risks through monitoring and assessment projects.
Goal #2	Minimize loss of life, injury, and damages to property, the economy, and the environment. Objective 1: Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment. Objective 2: Improve hazard assessment information to make recommendations for encouraging higher standards for safer development in areas vulnerable to natural and technological hazards. Objective 3: Implement sustainable activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resilient to natural and technological hazards.
Goal #3	Minimize loss to critical facilities and infrastructure, utilities, and services. Objective 1: Prioritize mitigation projects for critical facilities, services, and infrastructure.
Goal #4	Improve, expand, and enhance public education, awareness, and preparedness. Objective 1: Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.
Goal #5	Build and enhance local mitigation capabilities to improve the region’s ability to prepare for, respond to, and recover. Objective 1: Strengthen communication and coordinate participation among and within public agencies, community members, non-profit organizations, business, and industry to gain a vested interest in implementation.

Goal #6	Enter into partnerships with neighboring jurisdictions, federal and state agencies, and others to share information and develop a more hazard resistant community. Objective 1: Encourage leadership within the public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.
Goal #7	Enhance response procedures and emergency management capabilities. Objective 1: Coordinate and integrate natural and technological hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
Goal #8	Reduce economic losses, minimize social disruptions, and maintain quality of life. Objective 1: Reduce losses and repetitive damages for hazard events while promoting insurance coverage for catastrophic hazards.
Goal #9	Protect the environment and natural resources. Objective 1: Preserve, rehabilitate, re-establish, and enhance natural systems to serve natural hazard mitigation functions.

Mitigation Action Plan

The mitigation actions proposed by Stone County and the City of Wiggins are listed in the following individual Mitigation Action Plans.

Stone County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Provide flood monitors along Red Creek to monitor flood levels to inform/warn people of dangerous water levels.	Flood	High	Emergency Operations Director; Stone County Board of Supervisors; U.S. Geological Survey	MEMA, Environmental Protection Agency, South Mississippi Land Trust	2028	Ongoing
P-2	Study ways to provide property value protection for residents from encroachment but limiting restraints on property owners. (Study, plan, and implement selected land use ordinances.)	All	High	Stone County Board of Supervisors; City of Wiggins	MDA, Coastal Impact Assistance Program (CIAP)	2027	Ongoing
P-3	Update and enhance Geographic Information System (GIS) and connect EOC building in order to improve the county/city capacity to respond to disasters; to create and manage spatial data; and to enhance the tax assessment, environmental preservation, mapping, and other county functions that rely on detailed	All	Moderate	Stone County Tax Assessor's Office; Emergency Operations	MEMA/FEMA, local, GORR	2028	Partially completed/Ongoing

	geographic information.						

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Conduct a comprehensive study to determine the best possible location for new schools and district lines to accommodate future growth in Stone County School System.	Coastal Storms	Moderate	Stone County School Board; Stone County; City of Wiggins	Local, private foundations	2026	Ongoing
P-5	Secure and preserve county records to digitized format and develop and maintain electronic data storage.	Hurricane, Tornado	High	Stone County Chancery Clerk	MEMA, USDA Rural Development, state funding, local	2024	Completed/Ongoing
P-6	Promote economic development in Wiggins by continuing to revitalize the downtown area, thereby increasing its attractiveness to new businesses, the growing population, and visitors.	All	Moderate	City of Wiggins; Stone County Economic Development Partnership; Stone County	CDBG, USDA, local	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Develop a retail targeting strategy for City of Wiggins and Stone County.	All	Moderate	City of Wiggins; Stone County Economic Development Partnership	CDBG, USDA, local	2028	Partially completed/Ongoing
P-8	Provide an entrepreneurial initiative for developing small businesses in Stone County and City of Wiggins.	All	Moderate	Stone County Economic Development Partnership; Mississippi Gulf Coast Community College; Stone County Board of Supervisors; private partners	MDA, private foundations, MGCCC, Stone County EDP	2028	Ongoing initiatives
P-9	Expand technology infrastructure (Broadband telecommunication) to support small business development in Stone County.	All	Moderate	Stone County Economic Development Partnership; Stone County	USDA Rural Development, AT&T	2028	Ongoing
Property Protection							

	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	Expand sewer service and enhance potable water service in county and City of Wiggins; provide additional fire plugs in city and unincorporated areas of county.	All	Moderate	Stone County Utility Authority; rural water systems; City of Wiggins	USDA, local budget, CDBG	2028	Ongoing contingent upon funding
SP-2	Widen Highway 26 to encourage safer, more efficient traffic flow through Wiggins and across Stone County.	All	Moderate	MDOT; City of Wiggins	MDOT	2028	Ongoing contingent upon funding
SP-3	Build safer access roads from U.S. Highway 49 into Perkinston Elementary School and Mississippi Gulf Coast Community College.	All	Moderate	MDOT; Stone County Board of Supervisors; MGCCC	MDOT, CDBG, MDA	2028	Ongoing contingent upon funding

SP-4	Upgrade major artery roads and bridges throughout high growth areas of county (roads: East McHenry, West McHenry, East Wire Road, West Wire Road, King Bee, New Hope Road, Perkinston-Silver Run, City Road, and City Bridge Road; bridges: Inda Road Bridge).	All	Moderate	Stone County board of Supervisors	State Aid Roads, local MDA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-5	Implement erosion protection procedures/projects on Red Creek at City Bridge, Highway 49/Perkinston, and Ramsey Springs infrastructure.	Erosion	Low	Stone County Board of Supervisors; Land Trust of South Mississippi; MDEQ	Mississippi Game and Fish, local, Land Trust of South Mississippi	2026	Ongoing contingent upon funding
SP-6	Upgrade railroad crossings with safety cross arms and warning lights.	Hazardous Materials/ Railroad Incidents	High	MDOT and KCS Railroad	MDOT and KCS Railroad	2026	Ongoing
SP-7	Improve drainage throughout the county at identified flood prone areas as delineated by county flood maps.	Flood	High	Stone County Board of Supervisors, U.S. Geological Survey	Pat Harrison Waterway District, local, MEMA/FEMA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Improve county-wide emergency communications to include radios, base stations, satellite phones, warning systems, and enhanced CAD system and staffing for 911.	All	High	Emergency Operations Director	Homeland Security, MEMA/FEMA	2028	Ongoing contingent upon funding
ES-2	Provide sufficient evacuation routes and notify public of evacuation routes and procedures and shelter locations in a timely manner.	Hurricane, Coastal Storm	Moderate	MEMA; MDOT; Stone County Emergency Operations	MEMA/FEMA	2028	Ongoing contingent upon funding
ES-3	Prepare fire stations on east, west, and south areas of county with safe rooms and in-place generators to allow fire personnel to stay on site during hazard event such as hurricane force winds.	Hurricane, Tornado	Moderate	Stone County Fire Coordinator; Stone County	MEMA/FEMA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-4	Provide personnel to improve the firefighting delivery system, insurance ratings, and assist in coordinating efforts of volunteer fire departments.	All	Moderate	City of Wiggins; Stone County Fire Coordinator	Local	2028	Ongoing
ES-5	Provide firefighting capability for multi-story buildings and commercial/industrial facilities.	All	Moderate	City of Wiggins; Stone County Board of Supervisors	U.S. Fire Administration, FEMA, CDBG	2028	Partially completed/ Ongoing contingent upon funding
ES-6	Provide mobile alternate emergency service site for serving remote areas and as a backup for the Emergency Operations Center if out of commission.	All	High	City of Wiggins; Stone County Board of Supervisors; Emergency Operations Director	FEMA/MEMA, Homeland Security	2026	Ongoing contingent upon funding will be retained.
ES-7	Upgrade emergency operations 911 system equipment/software and add personnel to support emergency services.	All	High	Stone County Board of Supervisors; Emergency Operations	Homeland Security, FEMA/MEMA, local	2028	Ongoing upgrades

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-8	Provide community centers in areas of concentrated population that can be used for emergency service centers in recovery phase of disasters.	All	High	Stone County Board of Supervisors	CDBG, local budget	2028	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Provide disaster preparedness and recovery education/training to residents, pre-school, and school children/youth/college students to include hurricane/tornadoes, chemical spills, flooding, fire, and railroad crossings.	All	High	Emergency Operations Director	MEMA, Red Cross	2028	Ongoing
PEA-2	Provide fire and emergency preparedness and response education to children/youth/college students and other residents of the county/city.	Wildfire	Low	Stone County Fire Coordinator; City of Wiggins Fire Chief; American Red Cross	MEMA, U.S. Fire Administration, county/city, private sources	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-3	Conduct safety awareness programming alerting residents of Stone County and Wiggins of the increased train activity, speed, and capacity to include dangers at railroad crossing brought forth from the KCS rail upgrade from Gulfport to Hattiesburg, MS.	Hazardous Materials/ Railroad Incident	Moderate	Emergency Operations Director; Stone County Board of Supervisors; City of Wiggins; KCS Railroad	Local and KCS railroad	2028	Ongoing

City of Wiggins Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Prevention							
P-1	Provide flood monitors along Red Creek to monitor flood levels to inform/warn people of dangerous water levels.	Flood	High	Emergency Operations Director; Stone County Board of Supervisors; U.S. Geological Survey	MEMA, Environmental Protection Agency, South Mississippi Land Trust	2028	Ongoing
P-2	Study ways to provide property value protection for residents from encroachment but limiting restraints on property owners. (Study, plan, and implement selected land use ordinances.)	All	High	Stone County Board of Supervisors; City of Wiggins	MDA, Coastal Impact Assistance Program (CIAP)	2027	Ongoing
P-3	Update and enhance Geographic Information System (GIS) and connect EOC building in order to improve the county/city capacity to respond to disasters; to create and manage spatial data; and to enhance the tax assessment, environmental preservation, mapping, and other county functions that rely on detailed	All	Moderate	Stone County Tax Assessor's Office; Emergency Operations	MEMA/FEMA, local, GORR	2028	Partially completed/Ongoing

	geographic information.						

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-4	Conduct a comprehensive study to determine the best possible location for new schools and district lines to accommodate future growth in Stone County School System.	Coastal Storms	Moderate	Stone County School Board; Stone County; City of Wiggins	Local budget, private foundations	2027	Ongoing contingent upon funding
P-5	Secure and preserve county records to digitized format and develop and maintain electronic data storage.	Hurricane, Tornado	High	Stone County Chancery Clerk	MEMA, USDA Rural Development, state funding, local	2025	Partially completed/Ongoing
P-6	Promote economic development in Wiggins by continuing to revitalize the downtown area, thereby increasing its attractiveness to new businesses, the growing population, and visitors.	All	Moderate	City of Wiggins; Stone County Economic Development Partnership; Stone County	CDBG, USDA, local	2028	Ongoing intiatives

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
P-7	Develop a retail targeting strategy for City of Wiggins and Stone County.	All	Moderate	City of Wiggins; Stone County Economic Development Partnership	CDBG, USDA, local	2028	Ongoing
P-8	Provide an entrepreneurial initiative for developing small businesses in Stone County and City of Wiggins.	All	Moderate	Stone County Economic Development Partnership; Mississippi Gulf Coast Community College; Stone County Board of Supervisors; private partners	MDA, private foundations, MGCCC, Stone County EDP	2028	Ongoing
P-9	Expand technology infrastructure (Broadband telecommunication) to support small business development in Stone County.	All	Moderate	Stone County Economic Development Partnership; Stone County	USDA Rural Development, AT&T	2028	Ongoing contingent upon funding
Property Protection							

	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Natural Resource Protection							
	Evaluated and found not appropriate for the jurisdiction.	*N/A*	*N/A*	*N/A*	*N/A*	*N/a*	*N/A*
Structural Projects							
SP-1	Expand sewer service and enhance potable water service in county and City of Wiggins; provide additional fire plugs in city and unincorporated areas of county.	All	Moderate	Stone County Utility Authority; rural water systems; City of Wiggins	USDA, local, CDBG	2028	Ongoing contingent upon funding
SP-2	Widen Highway 26 to encourage safer, more efficient traffic flow through Wiggins and across Stone County.	All	Moderate	MDOT; City of Wiggins	MDOT	2028	Ongoing contingent upon funding
SP-3	Build safer access roads from U.S. Highway 49 into Perkinston Elementary School and Mississippi Gulf Coast Community College.	All	Moderate	MDOT; Stone County Board of Supervisors; MGCCC	MDOT, CDBG, MDA	2028	Ongoing contingent upon funding

SP-4	Upgrade major artery roads and bridges throughout high growth areas of county (roads: East McHenry, West McHenry, East Wire Road, West Wire Road, King Bee, New Hope Road, Perkinston-Silver Run, City Road, and City Bridge Road; bridges: Inda Road Bridge).	All	Moderate	Stone County board of Supervisors	State Aid Roads, local MDA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
SP-5	Implement erosion protection procedures/projects on Red Creek at City Bridge, Highway 49/Perkinston, and Ramsey Springs infrastructure.	Erosion	Low	Stone County Board of Supervisors; Land Trust of South Mississippi; MDEQ	Mississippi Game and Fish, local, Land Trust of South Mississippi	2027	Ongoing contingent upon funding
SP-6	Upgrade railroad crossings with safety cross arms and warning lights.	Hazardous Materials/ Railroad Incidents	High	MDOT and KCS Railroad	MDOT and KCS Railroad	2027	Ongoing
SP-7	Improve drainage throughout the county at identified flood prone areas as delineated by county flood maps.	Flood	High	Stone County Board of Supervisors, U.S. Geological Survey	Pat Harrison Waterway District, local, MEMA/FEMA	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
Emergency Services							
ES-1	Improve county-wide emergency communications to include radios, base stations, satellite phones, warning systems, and enhanced CAD system and staffing for 911.	All	High	Emergency Operations Director	Homeland Security, MEMA/FEMA, local budget	2028	Completed/Ongoing
ES-2	Provide sufficient evacuation routes and notify public of evacuation routes and procedures and shelter locations in a timely manner.	Hurricane, Coastal Storm	Moderate	MEMA; MDOT; Stone County Emergency Operations	MEMA/FEMA, HMGP	2028	Ongoing contingent upon funding
ES-3	Prepare fire stations on east, west, and south areas of county with safe rooms and in-place generators to allow fire personnel to stay on site during hazard event such as hurricane force winds.	Hurricane, Tornado	Moderate	Stone County Fire Coordinator; Stone County	MEMA/FEMA, HMGP, BRIC	2028	Ongoing contingent upon funding

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-4	Provide personnel to improve the firefighting delivery system, insurance ratings, and assist in coordinating efforts of volunteer fire departments.	All	Moderate	City of Wiggins; Stone County Fire Coordinator	Local budget	2028	Ongoing
ES-5	Provide firefighting capability for multi-story buildings and commercial/industrial facilities.	All	Moderate	City of Wiggins; Stone County Board of Supervisors	U.S. Fire Administration, FEMA, CDBG	2028	Partially completed/Ongoing
ES-6	Provide mobile alternate emergency service site for serving remote areas and as a backup for the Emergency Operations Center if out of commission.	All	High	City of Wiggins; Stone County Board of Supervisors; Emergency Operations Director	FEMA/MEMA, Homeland Security, HMGP. BRIC	2027	Ongoing contingent upon funding
ES-7	Upgrade emergency operations 911 system equipment/software and add personnel to support emergency services.	All	High	Stone County Board of Supervisors; Emergency Operations	Homeland Security, FEMA/MEMA, local budget	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
ES-8	Provide community centers in areas of concentrated population that can be used for emergency service centers in recovery phase of disasters.	All	High	Stone County Board of Supervisors	CDBG, local budget	2028	Ongoing contingent upon funding
Public Education and Awareness							
PEA-1	Provide disaster preparedness and recovery education/training to residents, pre-school, and school children/youth/college students to include hurricane/tornadoes, chemical spills, flooding, fire, and railroad crossings.	All	High	Emergency Operations Director	MEMA, Red Cross	2028	Ongoing
PEA-2	Provide fire and emergency preparedness and response education to children/youth/college students and other residents of the county/city.	Wildfire	Low	Stone County Fire Coordinator; City of Wiggins Fire Chief; American Red Cross	MEMA, U.S. Fire Administration, county/city, private sources	2028	Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2023)
PEA-3	Conduct safety awareness programming alerting residents of Stone County and Wiggins of the increased train activity, speed, and capacity to include dangers at railroad crossing brought forth from the KCS rail upgrade from Gulfport to Hattiesburg, MS.	Railroad Incident	Moderate	Emergency Operations Director; Stone County Board of Supervisors; City of Wiggins; KCS Railroad	Local budget and KCS railroad	2028	Ongoing

APPENDIX A
PLAN ADOPTION

APPENDIX A: PLAN ADOPTION

This appendix includes the FEMA APP and ADD Letters and the local adoption resolutions for each of the participating jurisdictions.

APPENDIX B
PLANNING TOOLS AND DOCUMENTATION

This appendix includes the following:
Meeting Agendas
Stakeholder/Jurisdictional Workshop Materials
Sign in Sheets
Qualitative Hazard Ranking Worksheets
Blank Mitigation Action Worksheet
Public Participation Survey Results

MEMA District 9, 2022 Hazard Mitigation Plan Update

Kick-Off Meeting
June 30 | 2:00 – 3:30 PM (CDT)

AGENDA

- **Introductions**
  - Name, Department/Agency
  - What previous experience do you have (if any) with hazard planning?
  - In your opinion, what is the top hazard/threat to MEMA District 9?
- **Hazard Mitigation Planning**
  - Brief introduction to hazard mitigation planning
  - Mitigation benefits and common projects/measures
- **2022 Plan Update Process**
  - FEMA recommended process and requirements
  - 2022 Plan Update focus areas
  - First steps: hazard events to include, goals of the mitigation plan
- **Roles and Expectations**
- **Public & Stakeholder Involvement**
  - Identify key contacts
  - Define "public" for involvement in plan development
  - Local practices for public involvement
- **Project Timeline**
- **Data Requests**
- **Next Steps**

Support Team Contact
Matt Stanley
Integrated Solutions Consulting
Matt.Stanley@i-s-consulting.com
504.645.1616

Stakeholder/Jurisdictional Workshop Materials:

MEMA District 9, 2023 Hazard Mitigation Plan Update

Jurisdictional Workshop Session #1
March 6, 2023, | 1:00 – 4:30 PM (CST)

AGENDA

Meeting Purpose: The purpose of this meeting is to engage and collect information from the participating jurisdictions within MEMA District 9.

- **Introductions**
- **Mitigation Overview/Recap**
- **Hazard Summary Worksheet Review**
- **Mitigation Goals**
- **Mitigation Strategies**
- **Review Ongoing Mitigation Actions/Projects**
- **Identify New Mitigation Actions**

Support Team Contact
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Integrated Solutions Consulting
Jacob.Halley@i-s-consulting.com
318.381.3429

Hazard Qualitative Ranking Worksheet

Hazards

Name:________________________________; E-mail: ____;
Jurisdiction/Organization/Agency: ____

Please describe any specific and/or unique concerns/risks that this hazard poses to your jurisdiction and/or organization. For example, are there properties that are at risk of repetitive damages from this hazard? Are certain population groups in your jurisdictions more vulnerable to this hazard? Are there specific neighborhoods or areas in your community that are more at risk from one of these hazards?

Potential Magnitude: ***Negligible* =** Less than 10% of the planning area
***Limited* =** 10-25% of the planning area
***Critical* =** 25-50% of the planning area
***Catastrophic* =** More than 50% of the planning area

Hazard	Negligible	Limited	Critical	Catastrophic	Specific Risks
Dam and Levee Failure					
Erosion					
Flood					
Storm surge					
Drought					
Lightning					
Wildfire					
Earthquake					
Extreme Cold					
Extreme Heat/Heat Wave					
Hailstorm					
Hurricane and Tropical Storm					
Severe Thunderstorm/High Wind					
Tornado					
Winter Weather					
Climate Change/Sea Level Rise					
Hazardous Materials Incident/Train Derailment					
Infectious Disease					

Probability: ***Unlikely* =** Occurs every 50 years or greater ***Possible* =** Occurs every 10-50 years
***Likely* =** Occurs every 3-10 years ***Highly Likely* =** Occurs every 1-2 years

Hazard	Unlikely	Possible	Likely	Highly Likely
Dam and Levee Failure				
Erosion				
Flood				
Storm surge				
Drought				
Lightning				
Wildfire				
Earthquake				
Extreme Cold				

Extreme Heat/Heat Wave				
Hailstorm				
Hurricane and Tropical Storm				
Severe Thunderstorm/High Wind				
Tornado				
Winter Weather				
Climate Change/Sea Level Rise				
Hazardous Materials Incident/Train Derailment				
Infectious Disease				
Dam and Levee Failure				

Areas of Vulnerability: ***Negligible* =** Less than 10% of the planning are affected.
***Limited* =** Specific neighborhoods more vulnerable to the hazard (example: Cross streets or cul-de-sac where frequent flooding occurs) Approximately 10-25% of the planning area. If Limited, please identify specific vulnerabilities.
Critical Widespread, approximately 25-50% of planning area vulnerable
***Catastrophic* =** 50% of greater of the planning area vulnerable

Hazard	**Negligible**	**Limited**	**Critical**	**Catastrophic**	**Specific Vulnerabilities**
Dam and Levee Failure					
Erosion					
Flood					
Storm surge					
Drought					
Lightning					
Wildfire					
Earthquake					
Extreme Cold					
Extreme Heat/Heat Wave					
Hailstorm					
Hurricane and Tropical Storm					
Severe Thunderstorm/High Wind					
Tornado					
Winter Weather					
Climate Change/Sea Level Rise					
Hazardous Materials Incident/Train Derailment					

Infectious Disease					

New Mitigation Action Handout:

Name:

Organization/Department:

E-mail:

Phone:

New Mitigation Action (Please Describe):

Year Initiated	**2023 (New Mitigation Action)**
Applicable Jurisdiction	
Lead Agency/Organization	
Supporting Agencies/Organizations	
Potential Funding Source	
Estimated Cost	
Benefits (loss avoided)	
Projected Completion Date	
PRIORITY (High, Medium, Low)	

Please indicate if the mitigation goals and objectives below are applicable to the new mitigation action/project). Check All That Apply.

X	Place an "X" by the applicable goals, if applicable
	Goal 1. Minimize risk and vulnerability of the community to hazards.
	Goal 2. Minimize loss of life, injury, and damages to property, the economy, and the environment.
	Goal 3. Minimize loss to critical facilities and infrastructure, utilities, and services.
	Goal 4. Improve, expand, and enhance public education, awareness, and preparedness.
	Goal 5. Build and enhance local mitigation capabilities to improve the region's ability to prepare for, respond to and recover.
	Goal 6. Enter into partnerships with neighboring jurisdictions, federal and state agencies, and others to share information and develop a more hazard resistant community. Environmental impacts are minimized.
	Goal 7. Enhance response procedures and emergency management capabilities.
	Goal 8. Reduce economic losses, minimize social disruptions, and maintain quality of life.
	Goal 9. Protect the environment and natural resources.

This mitigation action:
Instructions: Circle the best option

	Strongly Disagree (1)	Disagree (2)	Neither Agree or Disagree (3)	Agree (4)	Strongly Agree (5)
Social: Do you agree or disagree that the mitigation action is more likely to: be acceptable to the community; does not adversely affect a particular segment of the population; does not cause relocation of lower income people and is compatible with the community's social and cultural values.	1	2	3	4	5
Technical: Do you agree or disagree that the mitigation action is technically effective in providing a long-term reduction of losses and has minimal secondary adverse impacts.	1	2	3	4	5
Administrative: Do you agree or disagree that your jurisdiction/organization has the necessary staffing and funding to carry-out this mitigation action.	1	2	3	4	5
Political: Do you agree or disagree that the mitigation action has the support of the public and stakeholders who have been offered an opportunity to participate in the planning process.	1	2	3	4	5
Legal: Do you agree or disagree that the jurisdiction or implementing agency has the legal authority to implement and enforce the mitigation action.	1	2	3	4	5
Economic: Budget constraints can significantly deter the implementation of mitigation actions. Do you agree or disagree that the mitigation action is cost-effective, as determined by a cost benefit review, and is possible to fund.	1	2	3	4	5
Environmental: Do you agree or disagree that the mitigation action is sustainable and does not have an adverse effect on the environment, complies with federal, state, and local environmental regulations, and is consistent with the community's environmental goals.	1	2	3	4	5

Place an "X" by the hazard(s) this action/project will mitigate:

Mitigated Hazards			
X	Place an "X" by the applicable hazard		
	Dam and Levee Failure		Extreme Heat/Heat Wave
	Erosion		Hailstorm
	Flood		Hurricane and Tropical Storm
	Storm surge		Severe Thunderstorm/High Wind
	Drought		Tornado
	Lightning		Winter Weather
	Wildfire		Climate Change/Sea Level Rise
	Earthquake		Hazardous Materials/Transportation Incident
	Extreme Cold		Infectious Disease

Stakeholder/Jurisdictional Workshop Sign in Sheets:

EMA/EOC Sign-In Sheet

Event: District 9 HMP

Date: 3/6/2023

Arrival Time	Name	Organization / Role	Email	Cell Phone Number
10:00AM	*Lastname, Firstname*	*Department, Title*	*username@organization.gov*	*xxx-xxx-xxxx*
1250	Evans John	Hancock EMA	Jevans@co.hancock.ms.us	228 493 7813
1230	Henderson, Brian	George County EMA	emadirector@georgecounty.ms.gov	601 508-7508
12:50	Crowley, Michelle	Biloxi EMA	mcrowley258@gmail.com	228-324-7461
12:55	Henderson, Kelly	Code Admin.	kellyhenderson@co.harrison.ms.us	228-669-8790
12:59	Hebert, Tonya	Cont. Mgr/FEMA Coord	thebert@biloxi.ms.us	228-297-8998(pers.)
100PM	Brownlow, Chad	Jackson County EMA	chad.brownlow@co.jackson.ms.us	228 217 0536
1300	DAMBRINO, ROB	HARRISON COUNTY EMA	rdambrino@co.harrison.ms.us	228-236-8607
13:08	William, Calvin	MEMA	Cwilliams@mema.ms.gov.	601-850-8643
13:00	Hill, Frank	MEMA Planning Bureau Dir	fhill@mema.ms.gov	601-933-6613
1300	McCorkle, Thomas	Gulfport Fire	jmccorkle@gulfport-ms.gov	228-424-8722
1:08	McNamee, Kandice	MEMA mitigation	Kmcnamee@mema.ms.gov	601-933-6608
	Halley, Jake	ISC	jacob.halley@i-s-consulting.com	318-381-3429

EMA/EOC Sign-In Sheet

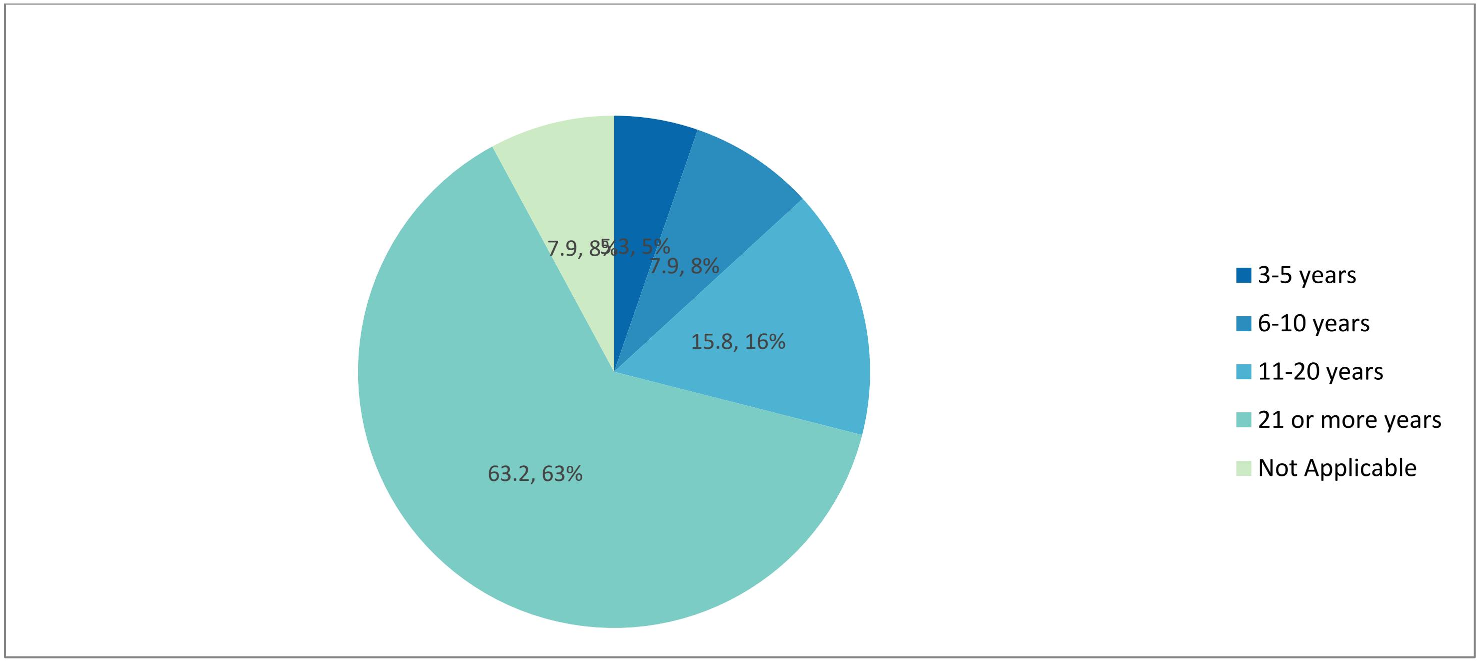
Event: MeMA District 9 Hazard Mitigation Plan Meeting   Date: MARCH 7, 2023

Arrival Time	Name	Organization / Role	Email	Cell Phone Number
10:00AM	*Lastname, Firstname*	*Department, Title*	*username@organization.gov*	*xxx-xxx-xxxx*
	MORAN, LOUIS	BILOXI - CAPT	LMORAN@BILOXI.MS.US	2283480871
	GUNDLACH, MIKE	LONG BEACH	MGUNDLACH@CITYOFLONG-BEACHMS.COM	228-863-1554
	FOUNTAIN, HILLIARD	DIBERVILLE	HFOUNTAIN@DIBERVILLE.MS.US	228-238-9758
	Brenner, Luke	Jackson Co. / B.O.	Luke_Brenner@co.Jackson.MS.US	228-219-7827
	Wright, Cathy	Jackson Co.	cathy_wright@co.jackson.ms.us.	228-623-6744
	Hill, Frank	MEMA / Mit Plan Director	fhill@mema.ms.gov	769-777-8233
	Williams, Calvin	MEMA / Mitigation Plan	Cwilliams@mema.ms.gov	601-850-8643
	Halley, Jake	ISC	jacob.halley@i-s-consulting.com	318.381.3429
	STANLEY, MATT	ISC	MATT.STANLEY@i-s-CONSULTING.COM	504.645.1616
	McNamee Kandice	MEMA mitigation	KmcNamee@mema@ms.gov	601-933-6608
	Louise Smith	Poplarville Mayor	mayor@poplarville ms.gov	601 620 7797
	Carter, Sonya	Jackson County BOS	sonya_carter@co.jackson.ms.us	228-938-2850
	Obst, Lawrence	Picayune Build. Insp.	Lobst@picayune.ms.us	601-273-2131 cell

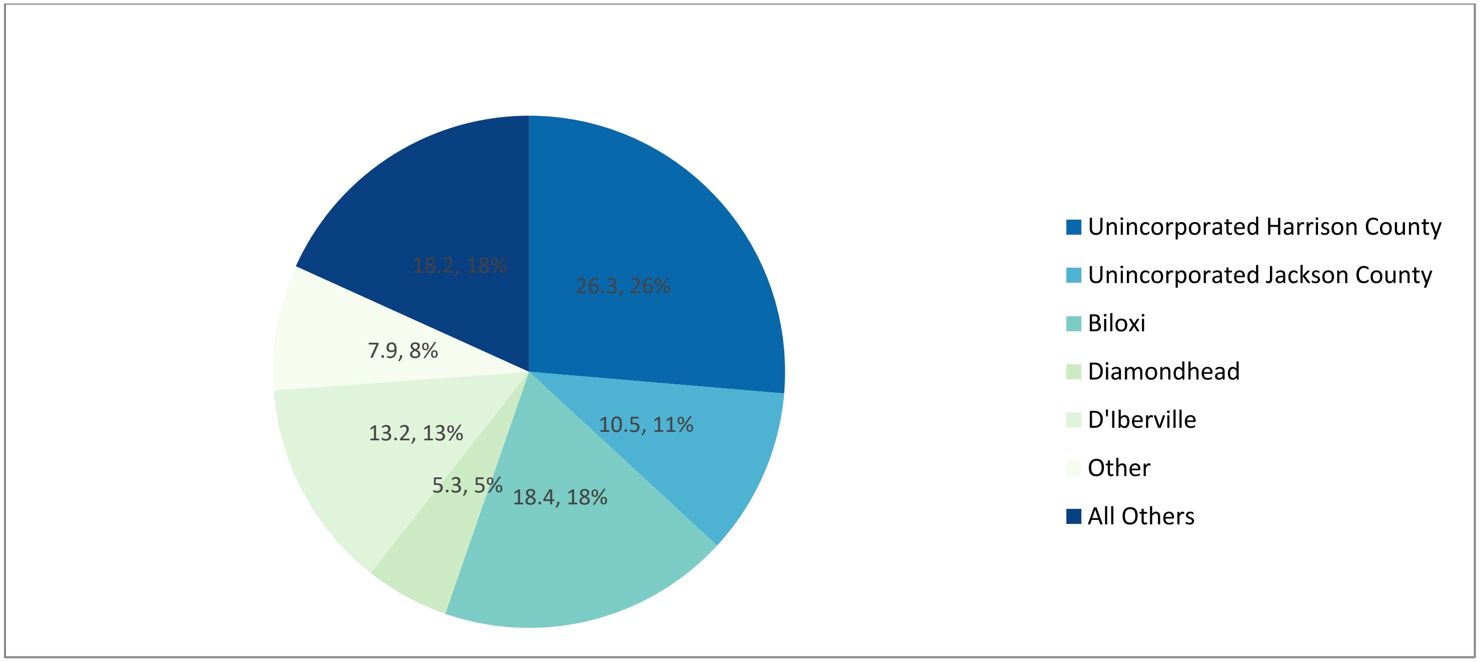
Report for 2022 MEMA District 9: Disaster Preparedness and Mitigation Questionnaire

2022 MEMA District 9: Disaster Preparedness and Mitigation Questionnaire

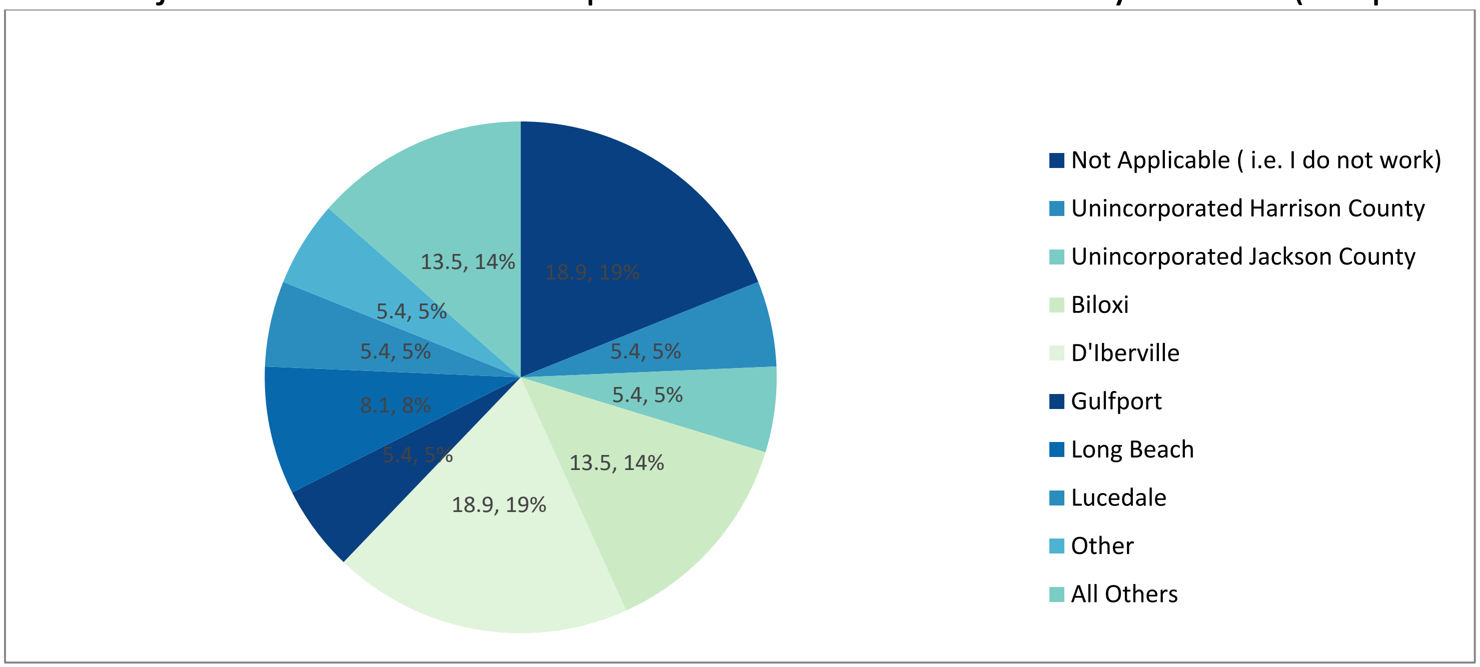
1.Approximately how many years have you lived or worked (if you are not a resident) in Mississippi's, MEMA District 9 (George, Hancock, Harrison, Jackson, Pearl River and Stone County)?



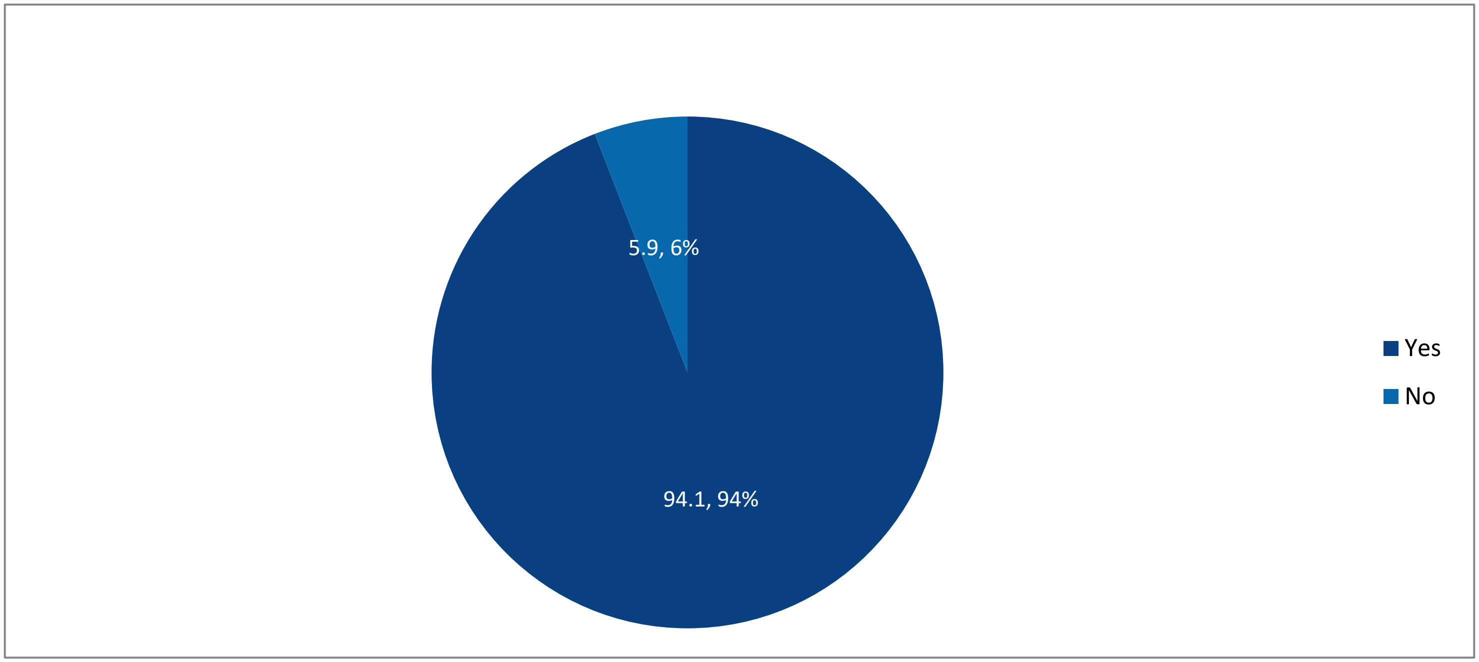
2.Please indicate the jurisdiction that best represents the location of your home address/place of residence.



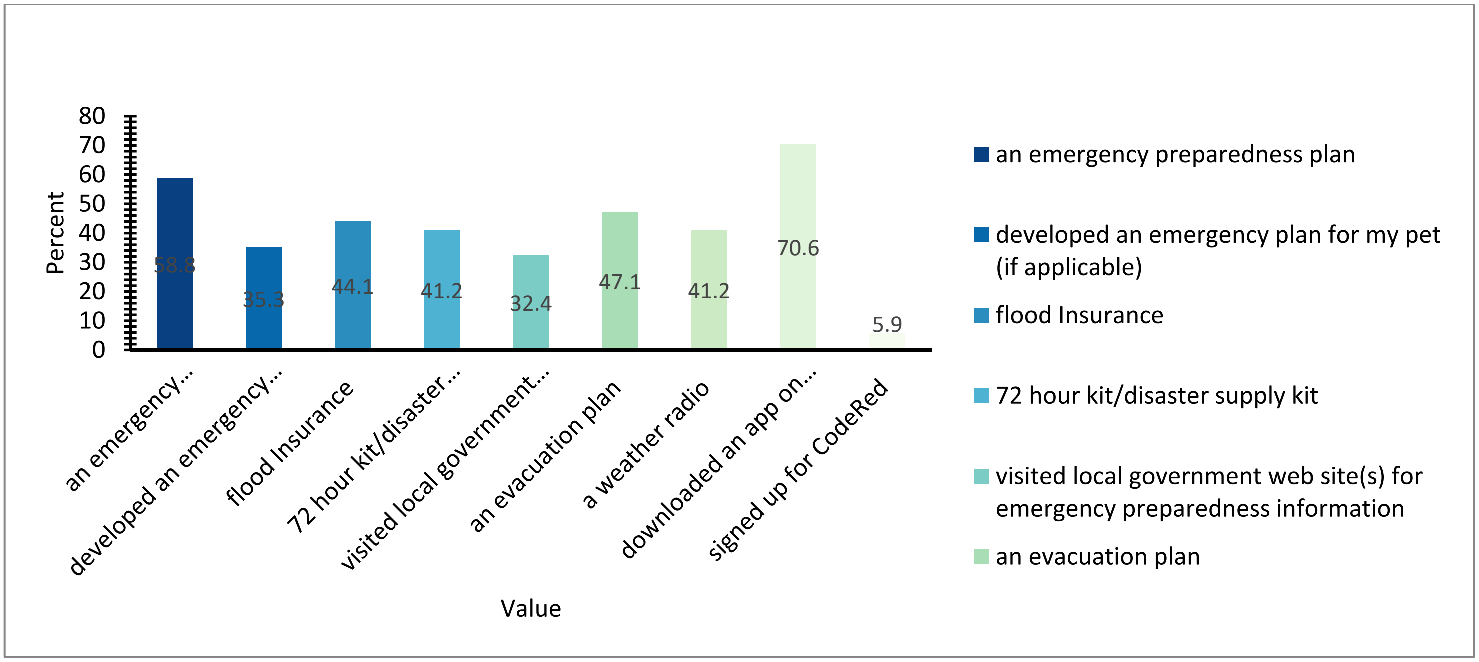
3.Please indicate the jurisdiction that best represents the location where you work (i.e. place of business).



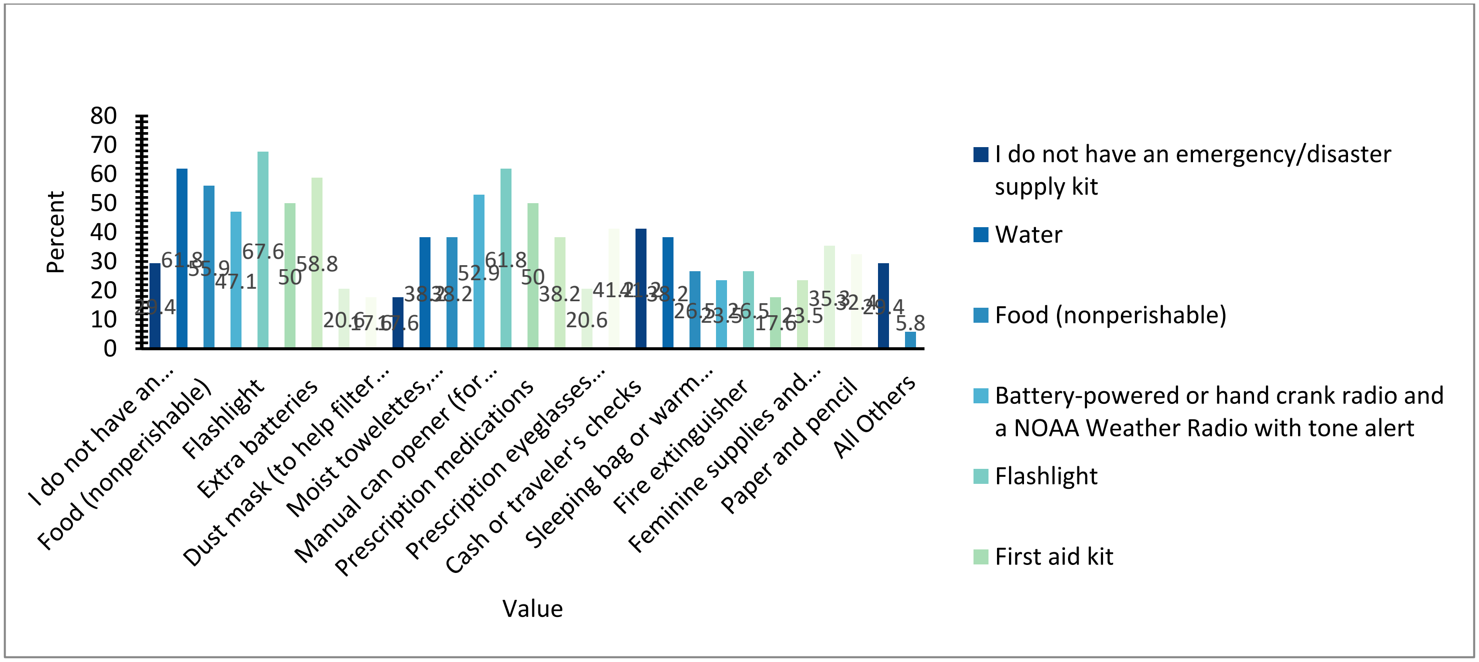
4.Do you have consistent, and stable internet access?



5.Please indicate those activities you have done to prepare for emergencies and disasters. Please select ALL that apply.
I have…



6.If you have an emergency supply kit, what items do you have in your kit? Please select ALL that apply.

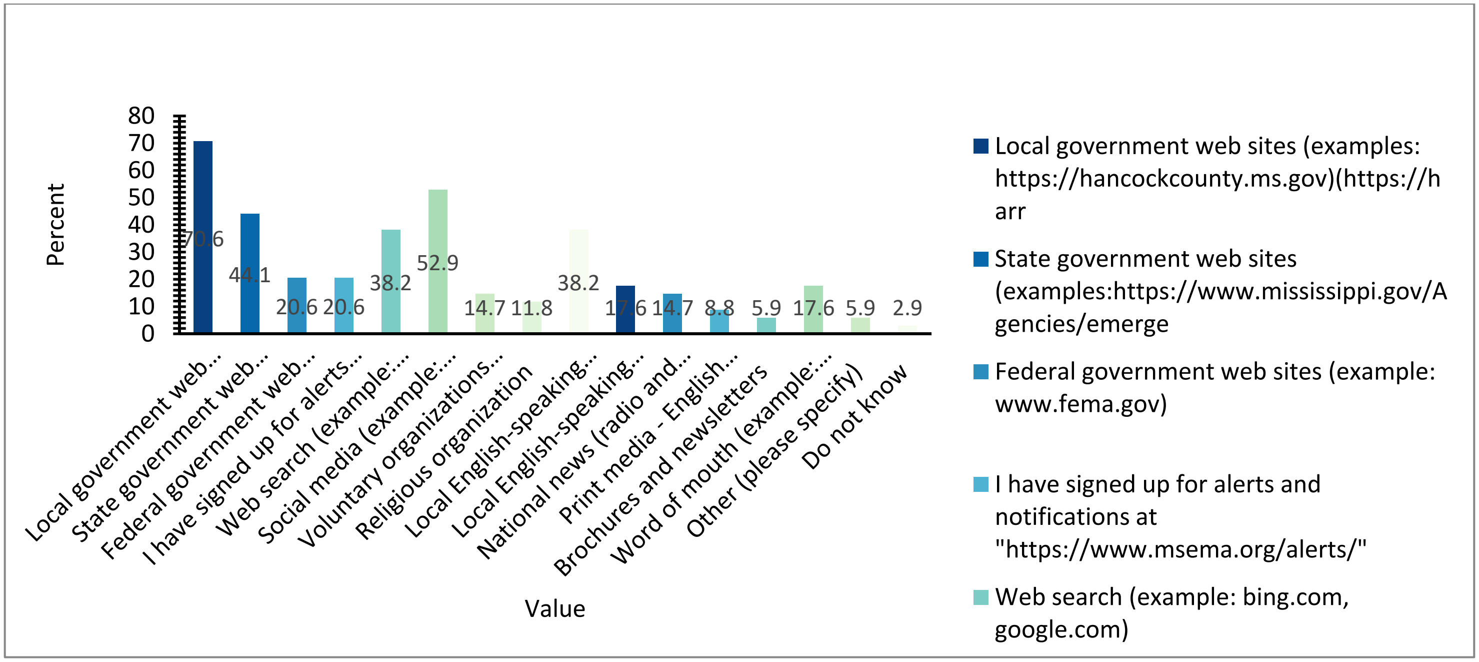


7.Please indicate where you go to obtain emergency and disaster related information? Please select ALL that apply.

	Strongly Agree		Agree		Neither Agree nor Disagree		Disagree		Strongly Disagree		Do Not Know		Responses
	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count

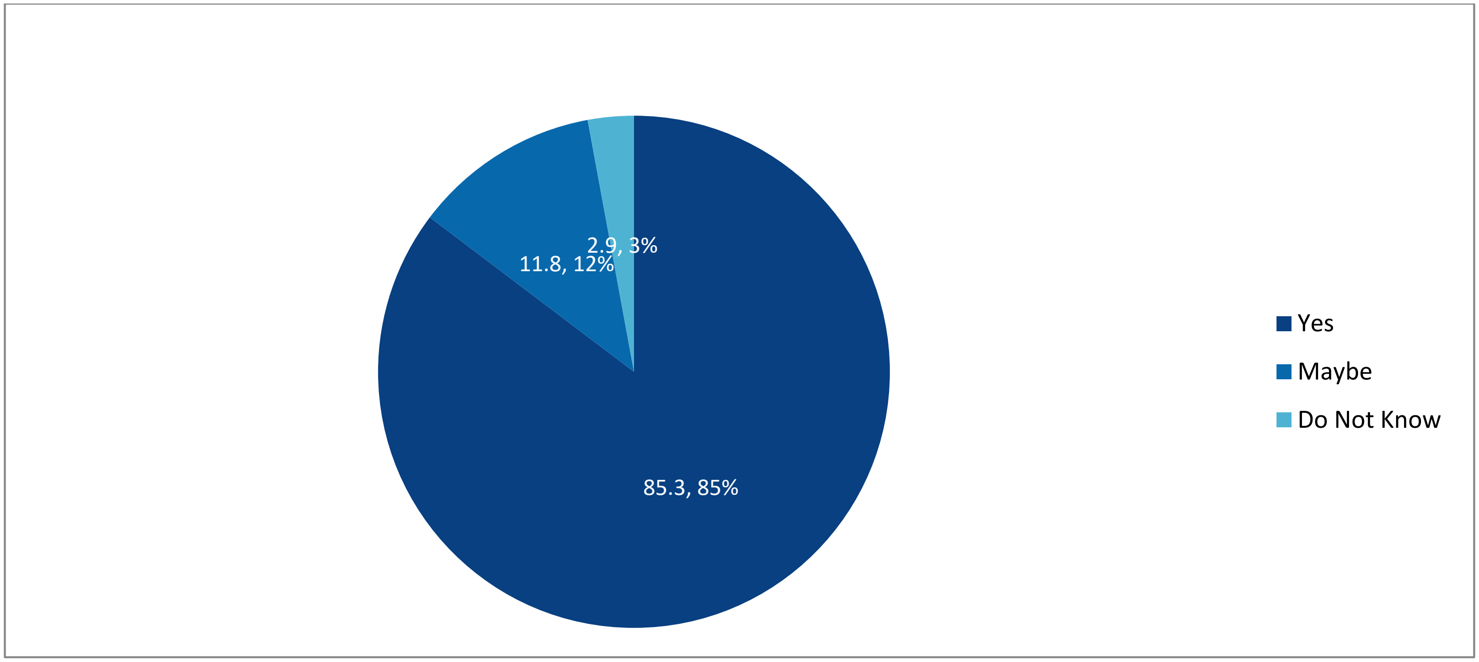
My jurisdiction is providing the services necessary to prepare me for a disaster.	3	8.8%	13	38.2%	12	35.3%	3	8.8%	1	2.9%	2	5.9%	34
I am familiar with MEMA and county web sites in District 9 and can easily obtain information about emergencies and disasters.	5	14.7%	17	50.0%	7	20.6%	3	8.8%	0	%	2	5.9%	34
During times of emergency, information is provided in a format I can understand.	10	29.4%	17	50.0%	5	14.7%	1	2.9%	0	%	1	2.9%	34
I can easily obtain emergency information in times of crisis.	9	26.5%	19	55.9%	3	8.8%	2	5.9%	0	%	1	2.9%	34

8.Would you agree or disagree with the following statements?



9.Please indicate how your jurisdiction can better assist you in preparing for emergencies and disasters (example: provide preparedness materials in my language).

10.If a disaster (i.e. hurricane) impacted your jurisdiction, knocking out electricity and running water, would your household be able to manage on its own for at least three (3) days?

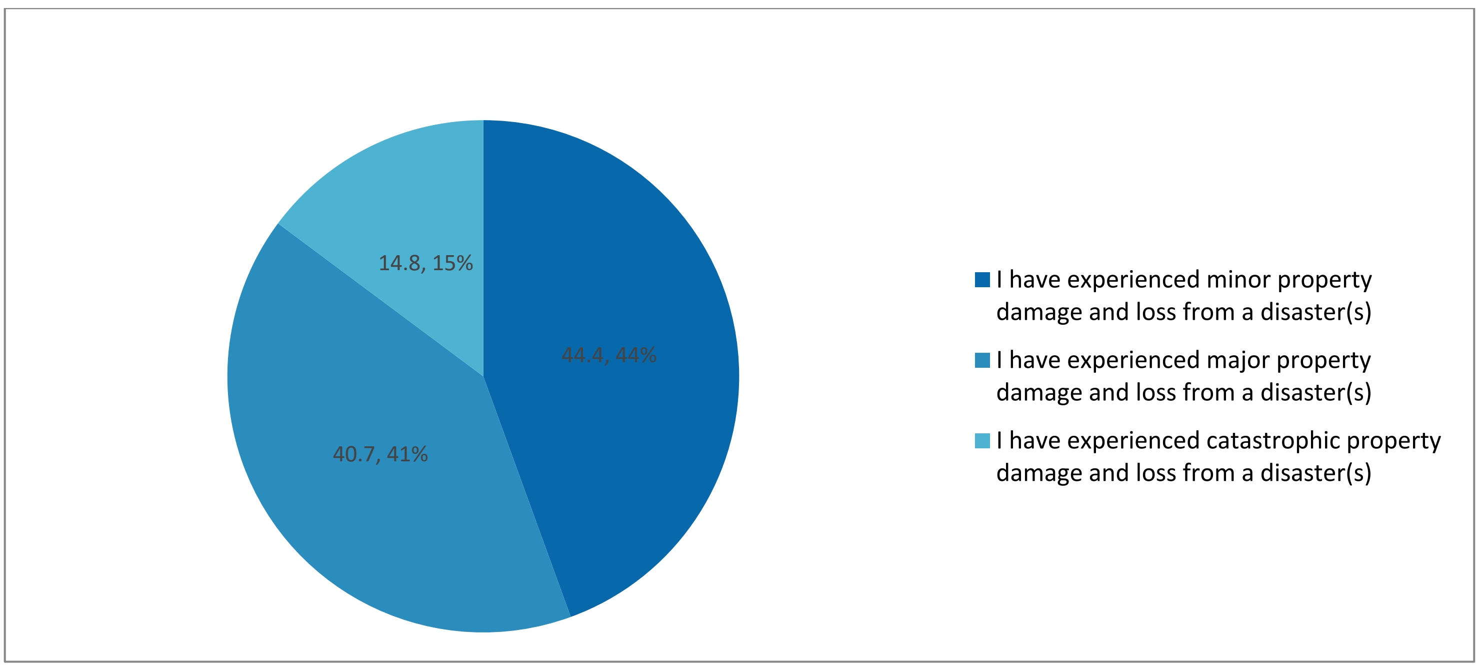


11.Do you believe that your household and/or place of business might ever be threatened by the following hazards? Please rate what hazards present the greatest risk. Low Risk = Low impact on threat to life and property damage

	Low Risk		Medium Risk		High Risk		Not Applicable		Responses
	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count
Dam and Levee Failure	18	66.7%	1	3.7%	0	%	8	29.6%	27
Erosion	18	66.7%	4	14.8%	2	7.4%	3	11.1%	27
Flood	13	48.1%	7	25.9%	7	25.9%	0	%	27
Storm Surge	13	48.1%	5	18.5%	6	22.2%	3	11.1%	27
Drought	15	55.6%	6	22.2%	6	22.2%	0	%	27
Lightning	3	11.1%	13	48.1%	11	40.7%	0	%	27
Wildfire	16	59.3%	8	29.6%	3	11.1%	0	%	27
Earthquake	22	81.5%	3	11.1%	0	%	2	7.4%	27
Extreme Cold	20	74.1%	4	14.8%	2	7.4%	1	3.7%	27

Extreme Heat/Heatwave	6	22.2%	7	25.9%	14	51.9%	0	%	27
Hailstorm	13	48.1%	8	29.6%	6	22.2%	0	%	27
Hurricane and Tropical Storm	1	3.7%	3	11.1%	23	85.2%	0	%	27
Severe Thunderstorm/High Wind	1	3.7%	8	29.6%	18	66.7%	0	%	27
Tornado	4	14.8%	12	44.4%	11	40.7%	0	%	27
Winter Weather	16	59.3%	9	33.3%	1	3.7%	1	3.7%	27
Climate Change/Sea Level Rise	16	59.3%	8	29.6%	2	7.4%	1	3.7%	27
Hazardous Materials Incident/Train Derailment	14	51.9%	11	40.7%	1	3.7%	1	3.7%	27
Infectious Disease	13	48.1%	11	40.7%	3	11.1%	0	%	27

12.Please select the answer that best describes your experience.



13.If you have experienced any damage(s) or injury(ies) from a disaster, please list the hazard(s) that caused the damages/losses and/or injuries (Example: flooding, wind, winter storm)

14.If you have experienced any damage(s) or injury(ies) from a disaster, please indicate where this occurred (Example: my home, on a roadway or intersection, at work, on vacation, etc.)

	No Mitigation Needed		Low Priority		Medium Priority		High Priority		Responses
	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count
Dam and Levee Failure	17	70.8%	3	12.5%	2	8.3%	2	8.3%	24
Erosion	4	16.7%	7	29.2%	11	45.8%	2	8.3%	24
Flood	0	%	3	13.0%	8	34.8%	12	52.2%	23
Storm Surge	4	16.7%	3	12.5%	6	25.0%	11	45.8%	24
Drought	11	45.8%	6	25.0%	5	20.8%	2	8.3%	24
Lightning	4	16.7%	10	41.7%	5	20.8%	5	20.8%	24
Wildfire	5	20.8%	6	25.0%	11	45.8%	2	8.3%	24
Earthquake	14	58.3%	6	25.0%	4	16.7%	0	%	24
Extreme Cold	7	29.2%	11	45.8%	5	20.8%	1	4.2%	24
Extreme Heat/Heat Wave	4	16.7%	8	33.3%	5	20.8%	7	29.2%	24
Hailstorm	9	37.5%	7	29.2%	7	29.2%	1	4.2%	24
Hurricane and Tropical Storm	0	%	1	4.2%	2	8.3%	21	87.5%	24
Severe Thunderstorm/High Wind	1	4.2%	4	16.7%	5	20.8%	14	58.3%	24
Tornado	0	%	9	37.5%	6	25.0%	9	37.5%	24
Winter Weather	7	29.2%	13	54.2%	4	16.7%	0	%	24
Climate Change/Sea Level Rise	8	32.0%	9	36.0%	5	20.0%	3	12.0%	25

Hazardous Materials Incident/Train Derailment	5	20.8%	6	25.0%	8	33.3%	5	20.8%	24
Infectious Disease	5	20.8%	8	33.3%	7	29.2%	4	16.7%	24

15.If you have experienced any damage(s) or injury(ies) from a disaster, please describe the damages and/or injuries. (Example: basement flooded, roof was damaged, vehicle was damaged, broken bones, lacerations, etc.)

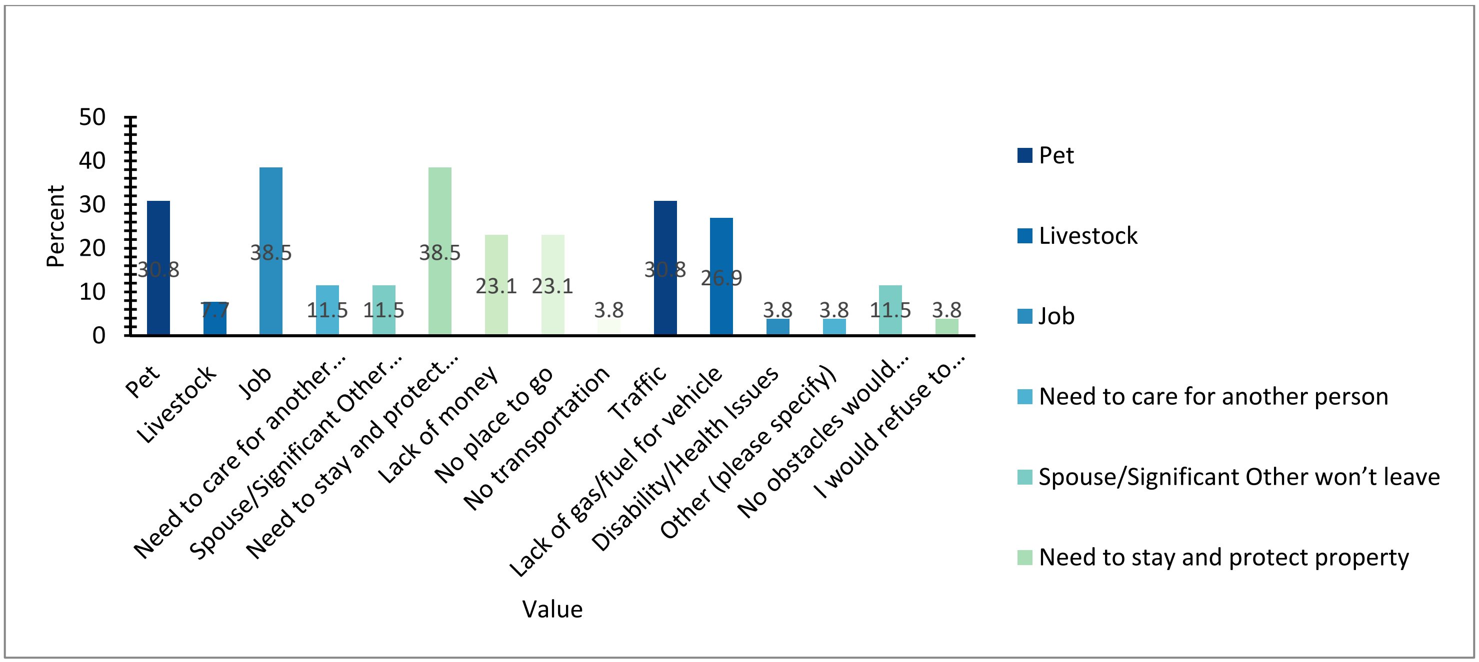
16. Based on YOUR PERCEPTION of your jurisdiction's hazards, to what degree of emphasis would you expect your jurisdiction to mitigate the following hazards?

	Very Likely		Somewhat Likely		Not Very Likely		Not Likely at All		Do Not Know		Not Applicable		Responses
	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count
Immediately evacuate as instructed.	2	8.0%	11	44.0%	3	12.0%	7	28.0%	1	4.0%	1	4.0%	25
I would first consult with family and friends outside my household before making a decision to evacuate.	12	48.0%	4	16.0%	3	12.0%	4	16.0%	1	4.0%	1	4.0%	25
Wait and see how bad the situation is going to be before deciding to evacuate.	5	20.0%	9	36.0%	2	8.0%	7	28.0%	1	4.0%	1	4.0%	25

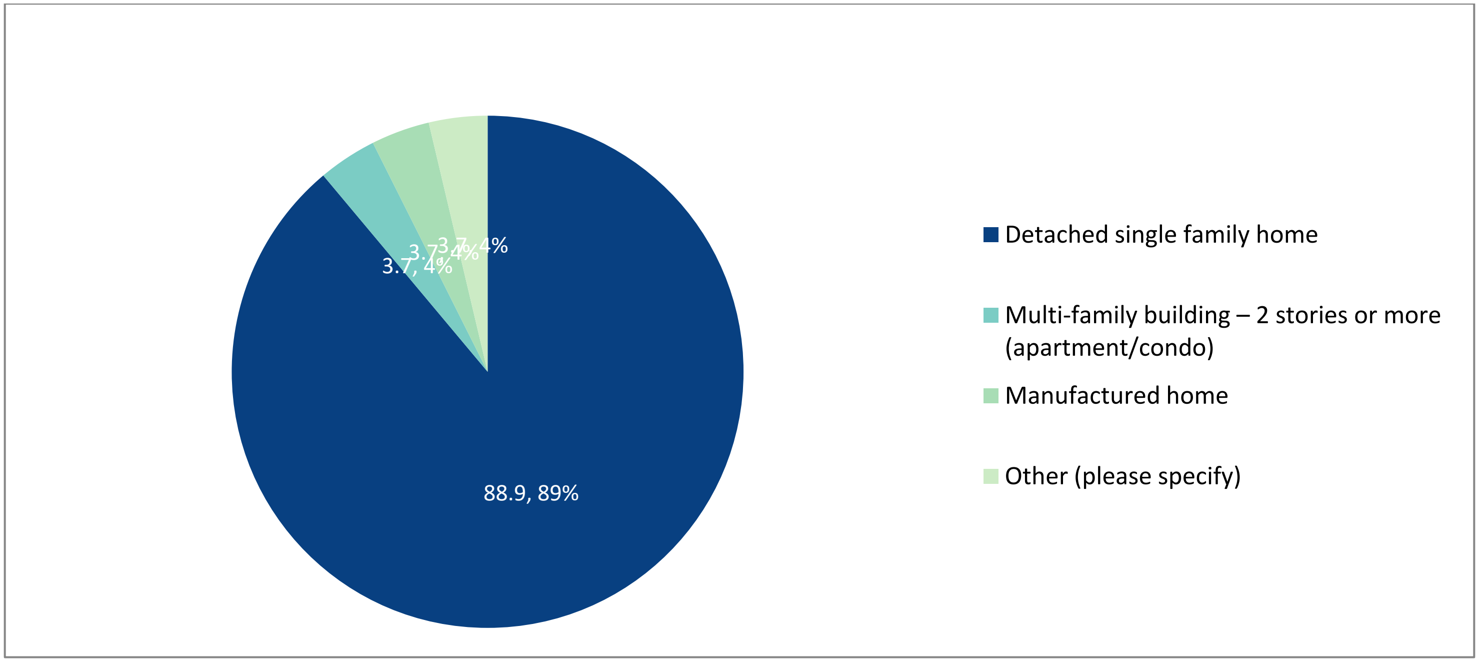
Refuse to evacuate no matter what.	3	12.0%	2	8.0%	6	24.0%	9	36.0%	1	4.0%	4	25

17.If an evacuation was ordered for your area, please indicate how likely you would be to do the following.

18.What might prevent you from leaving your place of residence if there was an evacuation order? Please select ALL that apply.



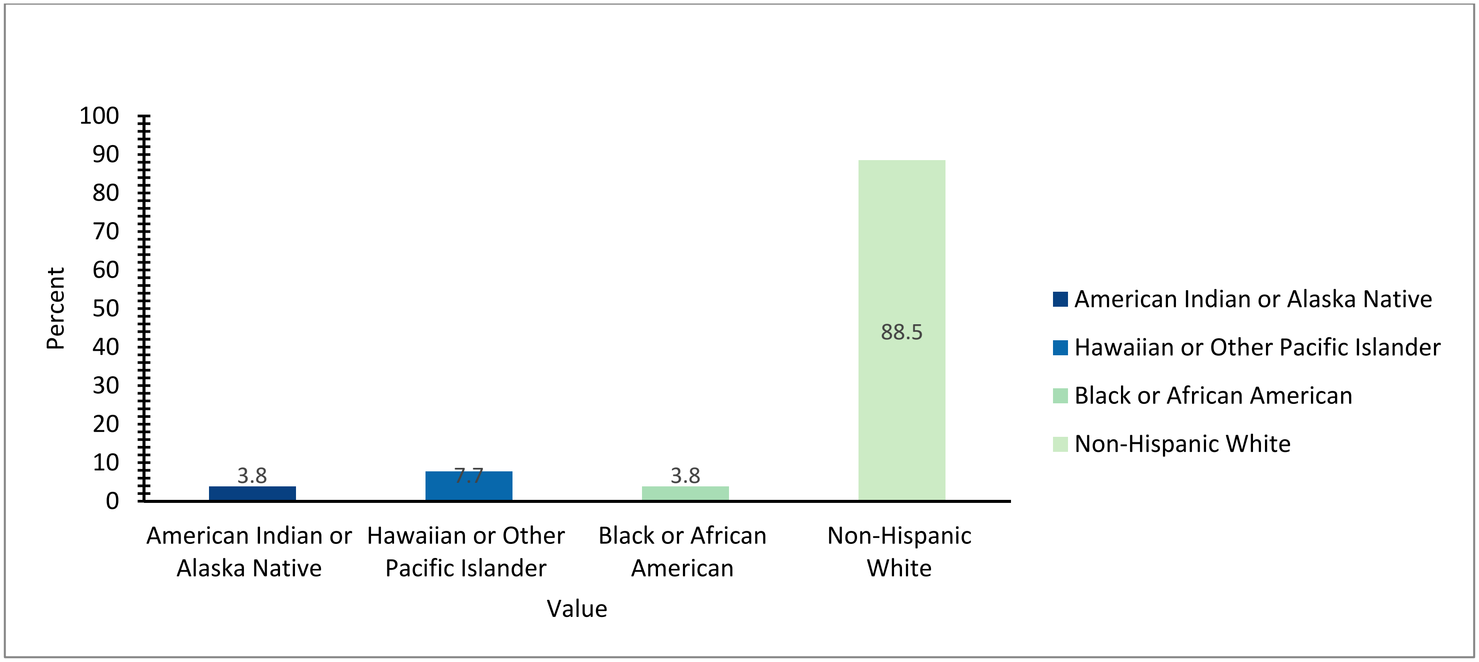
19.What type of structure do you live in?



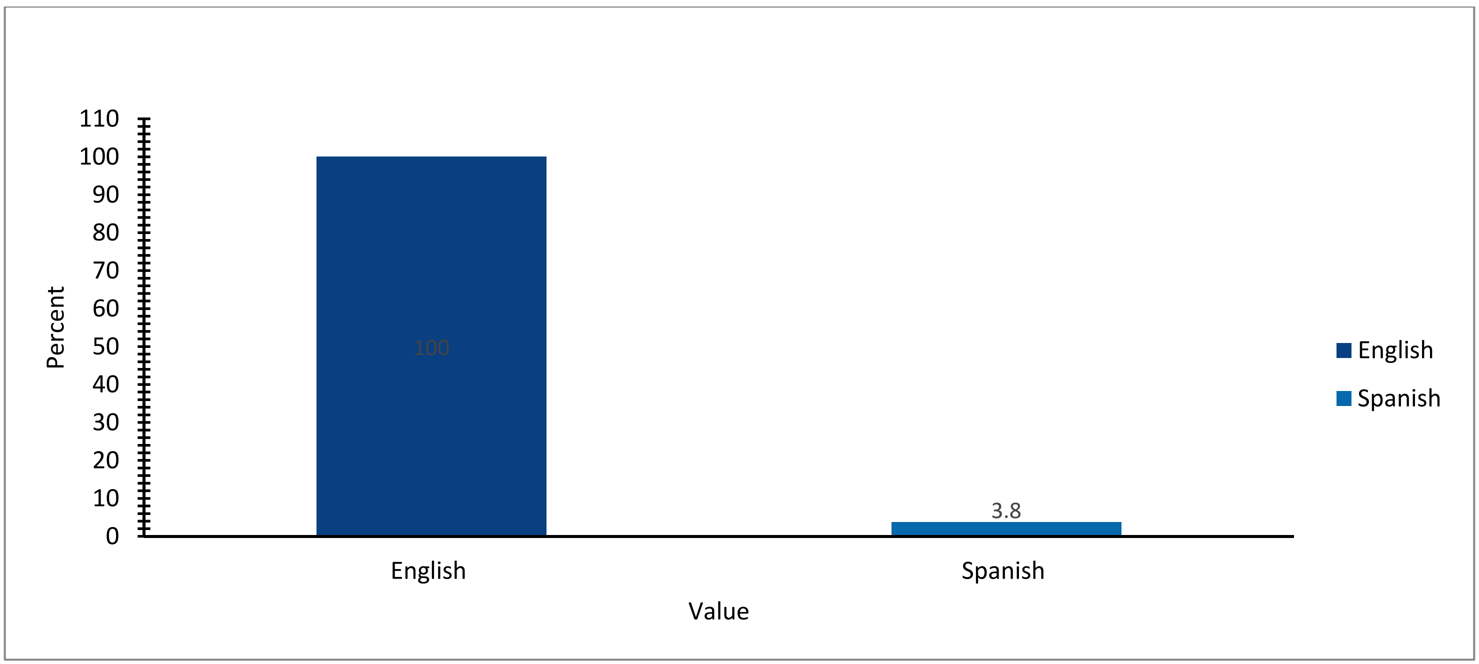
20.How many persons, including yourself, are currently living in your household?

	Number of people in household		Responses
	Row %	Count	
Under age 5:	100.0%	15	15
Ages 6-10:	100.0%	14	14
Ages 11-19:	100.0%	17	17
Ages 20-44:	100.0%	18	18
Ages 45-64:	100.0%	19	19
Ages 65-79:	100.0%	16	16
Ages 80+	100.0%	15	15

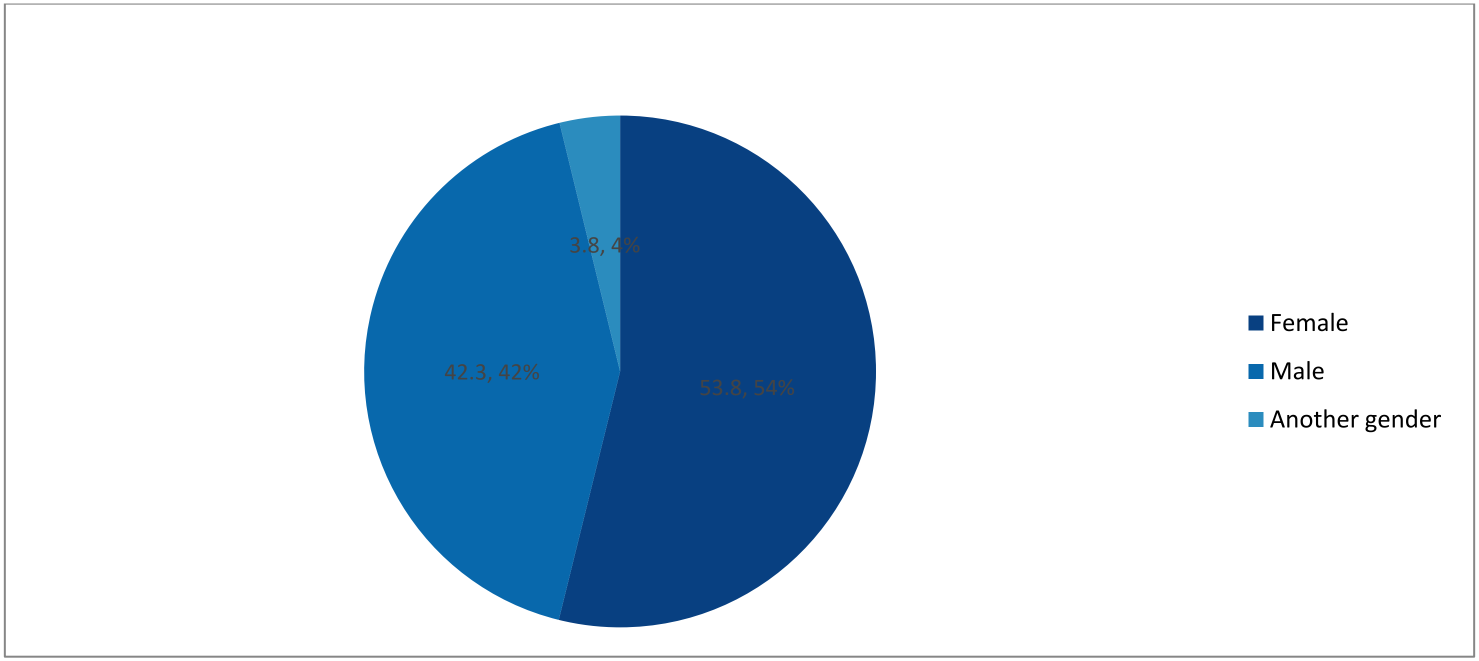
21.Which of the following best describes your race/ethnicity? Please select ALL that apply.



22.Please indicate the language(s) spoken in your household. Please select ALL that apply.



23.Please indicate your gender.



24.(OPTIONAL): If you would like someone to contact you regarding emergency preparedness in MEMA District 9, please leave your contact information below, and a representative will contact you. We will ensure your information is kept confidential.

APPENDIX C
LOCAL MITIGATION PLAN REVIEW TOOL

APPENDIX C

LOCAL MITIGATION PLAN REVIEW TOOL

APPENDIX D
CRITICAL FACILITIES

George County Facilities

Id	EfClass	Name	Address	City	Zipcode	Statea	PhoneNumbe	YearBuilt	Cost	Latitude	Longitude	Comment
MS000789	EFS1	AGRICOLA ELEMENTARY SCHOOL	6165 HWY 613 S	LUCEDALE	39452	MS	(601) 947-8447	1982	6164.12	30.81733600000	-88.51949900000	ELEMENTARY AND SECONDARY SCHOOLS
MS000648	EFS1	ROCKY CREEK ELEMENTARY SCHOOL	2183 ROCKY CREEK ROAD	LUCEDALE	39452	MS	(601) 947-3886	1982	5507.38	30.95643200000	-88.52741700000	ELEMENTARY AND SECONDARY SCHOOLS
MS000394	EFS1	LUCEDALE INTERMEDIATE SCHOOL	159 MABLE ST	LUCEDALE	39452	MS	(601) 947-6065	1970	2799.78	30.91509500000	-88.59850400000	ELEMENTARY AND SECONDARY SCHOOLS
MS000574	EFS1	LC HATCHER ELEMENTARY SCHOOL	689 CHURCH ST	LUCEDALE	39452	MS	(601) 947-3110	1970	4286.08	30.91859400000	-88.59046200000	ELEMENTARY AND SECONDARY SCHOOLS
MS000975	EFS1	GEORGE COUNTY MIDDLE SCHOOL	330 CHURCH STREET	LUCEDALE	39452	MS	(601) 947-3106	1970	7673.46	30.92046900000	-88.59617800000	ELEMENTARY AND SECONDARY SCHOOLS
MS000100	EFS1	GEORGE COUNTY HIGH SCHOOL	9284 HWY 63S	LUCEDALE	39452	MS	(601) 947-3116	1984	14793.88	30.87545800000	-88.59518100000	ELEMENTARY AND SECONDARY SCHOOLS
MS000502	EFS1	CENTRAL ELEMENTARY SCHOOL	14159 HWY 26 WEST	LUCEDALE	39452	MS	(601) 947-2429	1984	6786.29	30.88039700000	-88.65406100000	ELEMENTARY AND SECONDARY SCHOOLS
MS001405	EFS2	MISSISSIPPI GULF COAST COMMUNITY COLL...	11203 OLD HIGHWAY 63 SOUTH	LUCEDALE	39452	MS	(228) 896-2536	1984	6842.00	30.90131500000	-88.59898400000	JUNIOR COLLEGES
MS000435	EFS1	BENNDALE ELEMENTARY SCHOOL	5204 HWY 26 WEST	LUCEDALE	39452	MS	(601) 766-6341	1983	2304.34	30.87464200000	-88.79861200000	ELEMENTARY AND SECONDARY SCHOOLS
MS000007	EFPS	LUCEDALE POLICE DEPARTMENT	545 OAK STREET	LUCEDALE	39452	MS	(601) 947-3261	1970	2237.22	30.92552700000	-88.58923500000	POLICE PROTECTION
MS000421	EFPS	GEORGE COUNTY SHERIFFS DEPARTMENT	355 COX STREET	LUCEDALE	39452	MS	(601) 947-4811	1970	2237.22	30.92348800000	-88.58993900000	POLICE PROTECTION
MS000954	EFFS	MOVELLA VOLUNTEER FIRE DEPARTMENT	1131 STATE HIGHWAY 613	LUCEDALE	39452	MS	601-947-3261	1982	2237.22	30.75040800000	-88.50573200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000956	EFFS	WARD VOLUNTEER FIRE DEPARTMENT	2164 COOKS CORNER ROAD	LUCEDALE	39452	MS	601-947-3261	1982	2237.22	30.84474600000	-88.56385000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000957	EFFS	AGRICOLA VOLUNTEER FIRE DEPARTMENT	6191 STATE HIGHWAY 613	LUCEDALE	39452	MS	601-947-3261	1982	2237.22	30.81885300000	-88.51856500000	AMBULANCE AND FIRE SERVICE COMBINED
MS000953	EFFS	LUCEDALE FIRE DEPARTMENT	575 OAK STREET	LUCEDALE	39452	MS	601-947-3406	1970	2237.22	30.92553000000	-88.58901100000	AMBULANCE AND FIRE SERVICE COMBINED
MS000955	EFFS	BARTON VOLUNTEER FIRE DEPARTMENT	2112 GRAIN ELEVATOR ROAD	LUCEDALE	39452	MS	601-947-3261	1984	2237.22	30.76525300000	-88.60104700000	AMBULANCE AND FIRE SERVICE COMBINED
MS001009	EFFS	BENNDALE VOLUNTEER FIRE DEPARTMENT	4271 STATE HIGHWAY 26 WEST	LUCEDALE	39452	MS	601-947-7557	1984	2237.22	30.87053400000	-88.80914900000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000958	EFFS	SALEM VOLUNTEER FIRE DEPARTMENT	7269 STATE HIGHWAY 57 NORTH	MC LAIN	39456	MS	601-945-2400	1983	2237.22	30.97843600000	-88.77919500000	AMBULANCE AND FIRE SERVICE COMBINED
MS000015	EFEO	GEORGE COUNTY EMERGENCY OPERATIONS CE...	355 COX STREET	LUCEDALE	39452	MS	601-947-7557	1970	2237.22	30.92350000000	-88.58996300000	EMERGENCY PLANNING AND MANAGEMENT OFF...
MS000029	EFHS	GEORGE REGIONAL HOSPITAL	859 WINTER STREET	LUCEDALE	39452	MS	(601) 947-3161	1970	0.00	30.92192400000	-88.59393800000	GENERAL MEDICAL AND SURGICAL HOSPITALS

Hancock County Facilities

ID	EfClass	Tract	Name	Address	City	Zipcode	Statea	PhoneNumbe	YearBu	Cost	Latitude	Longitude	Comment
MS001209	EFS1	28045030100	HOLY TRINITY CATHOLIC SCHOOL	301 S SECOND ST	BAY ST LOUIS	39520	MS	NOT AVAILABLE	1983	2761.32	30.30810500000	-89.32965000000	ELEMENTARY AND SECONDARY SCHOOLS
MS001212	EFS1	28045030100	OUR LADY ACADEMY	222 S BEACH BLVD	BAY ST LOUIS	39520	MS	NOT AVAILABLE	1983	2928.68	30.30790000000	-89.32802000000	ELEMENTARY AND SECONDARY SCHOOLS
MS001298	EFS1	28045030100	ST STANISLAUS HIGH SCHOOL	304 S BEACH BLVD	BAY ST LOUIS	39520	MS	NOT AVAILABLE	1983	4602.20	30.30666700000	-89.32914700000	ELEMENTARY AND SECONDARY SCHOOLS
MS000034	EFS1	28045030200	WAVELAND ELEMENTARY SCHOOL	1101 ST JOSEPH STREET	WAVELAND	39576	MS	(228) 467-6630	1996	5666.09	30.29929500000	-89.38030000000	ELEMENTARY AND SECONDARY SCHOOLS
MS000121	EFS1	28045030300	SOUTH HANCOCK ELEMENTARY SCHOOL	6590 LAKESHORE ROAD	BAY ST. LOUIS	39520	MS	(228) 467-4655	1998	7793.86	30.26993000000	-89.44918000000	ELEMENTARY AND SECONDARY SCHOOLS
MS000229	EFS1	28045030300	NORTH BAY ELEMENTARY SCHOOL	602 PINE ST.	BAY ST LOUIS	39520	MS	(228) 467-4052	1998	5594.37	30.32479700000	-89.33898800000	ELEMENTARY AND SECONDARY SCHOOLS
MS000816	EFS1	28045030300	BAY WAVELAND MIDDLE SCHOOL	600 PINE ST.	BAY ST. LOUIS	39520	MS	(228) 463-0315	1998	6168.15	30.32231900000	-89.34810400000	ELEMENTARY AND SECONDARY SCHOOLS
MS000886	EFS1	28045030300	BAY HIGH SCHOOL	750 BLUE MEADOW ROAD	BAY ST LOUIS	39520	MS	(228) 467-6611	1998	7375.48	30.32073900000	-89.34903000000	ELEMENTARY AND SECONDARY SCHOOLS
MS001415	EFS2	28045030300	PEARL RIVER COMMUNITY COLLEGE - HANCO...	454 US 90	WAVELAND	39576	MS	(228) 252-7000	1998	7098.58	30.30610600000	-89.38270300000	JUNIOR COLLEGES
MS000272	EFS1	28045030601	HANCOCK NORTH CENTRAL ELEMENTARY	6122 CUEVAS TOWN ROAD	KILN	39556	MS	(228) 255-7641	1991	5809.54	30.50319400000	-89.44054300000	ELEMENTARY AND SECONDARY SCHOOLS
MS000464	EFS1	28045030602	HANCOCK COUNTY CAREER TECHNICAL CEN	7180 AIRPORT ROAD	KILN	39556	MS	(228) 467-3568	1995	119.54	30.37493400000	-89.44924000000	ELEMENTARY AND SECONDARY SCHOOLS
MS000729	EFS1	28045030602	HANCOCK HIGH SCHOOL	7084 STENNIS AIRPORT DRIVE	KILN	39556	MS	(228) 467-2251	1995	16603.80	30.37474700000	-89.44689200000	ELEMENTARY AND SECONDARY SCHOOLS
MS000971	EFS1	28045030602	HANCOCK MIDDLE SCHOOL	7070 STENNIS AIRPORT DRIVE	KILN	39556	MS	(228) 467-1889	1995	13459.96	30.37635600000	-89.44252000000	ELEMENTARY AND SECONDARY SCHOOLS
MS001013	EFS1	28045030602	EAST HANCOCK ELEMENTARY SCHOOL	4221 KILN DELISLE RD.	KILN	39556	MS	(228) 255-6637	1995	8618.67	30.40912300000	-89.39547000000	ELEMENTARY AND SECONDARY SCHOOLS
MS001048	EFS1	28045030602	WEST HANCOCK ELEMENTARY SCHOOL	23350 HIGHWAY 43	PICAYUNE	39466	MS	(228) 586-6054	1995	4387.04	30.47992800000	-89.49497600000	ELEMENTARY AND SECONDARY SCHOOLS
MS000009	EFPS	28045030100	BAY SAINT LOUIS POLICE DEPARTMENT	698 UNITED STATES HIGHWAY 90	BAY SAINT LOUIS	39520	MS	(228) 467-9222	1983	2321.12	30.31688400000	-89.34511400000	POLICE PROTECTION
MS000013	EFPS	28045030200	WAVELAND POLICE DEPARTMENT	1602 MCLAURIN STREET	WAVELAND	39576	MS	(228) 467-3669	1996	2321.12	30.29847500000	-89.37593300000	POLICE PROTECTION
MS000353	EFPS	28045030602	HANCOCK COUNTY SHERIFFS DEPARTMENT	17531 STATE HIGHWAY 603	KILN	39556	MS	(228) 466-6900	1995	2321.12	30.42418500000	-89.43540400000	POLICE PROTECTION
MS000890	EFFS	28045030100	CITY OF BAY SAINT LOUIS FIRE DEPARTME...	310 OLD SPANISH TRAIL	BAY SAINT LOUIS	39520	MS	228-467-4736	1983	2321.12	30.31003100000	-89.34302100000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000889	EFFS	28045030200	CLERMONT HARBOR VOLUNTEER FIRE DEPART...	5272 CLERMONT BOULEVARD	BAY SAINT LOUIS	39520	MS	228-304-0181	1996	2321.12	30.26575900000	-89.41733400000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000895	EFFS	28045030200	WAVELAND FIRE DEPARTMENT - COLEMAN ST...	335 COLEMAN AVENUE	WAVELAND	39576	MS	228-467-6154	1996	2321.12	30.28694900000	-89.37505300000	AMBULANCE AND FIRE SERVICE COMBINED
MS000896	EFFS	28045030200	WAVELAND FIRE DEPARTMENT - GULFSIDE S...	322 GULFSIDE STREET	WAVELAND	39576	MS	228-467-6154	1996	2321.12	30.29540800000	-89.38194300000	AMBULANCE AND FIRE SERVICE COMBINED
MS000891	EFFS	28045030300	CITY OF BAY SAINT LOUIS FIRE DEPARTME...	10316 CHAPMAN ROAD	BAY SAINT LOUIS	39520	MS	228-466-3932	1998	2321.12	30.31938100000	-89.37979300000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000965	EFFS	28045030300	BAY SIDE VOLUNTEER FIRE DEPARTMENT	6218 WEST HINDS STREET	BAY SAINT LOUIS	39520	MS	228-467-5020	1998	2321.12	30.29269400000	-89.44139000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000972	EFFS	28045030400	WEST HANCOCK VOLUNTEER FIRE DEPARTMENT	16016 WASHINGTON STREET	PEARLINGTON	39572	MS	228-533-7847	2002	2321.12	30.24653500000	-89.61165300000	AMBULANCE AND FIRE SERVICE COMBINED
MS000892	EFFS	28045030500	DIAMONDHEAD FIRE DEPARTMENT	4440 KALANI DRIVE	DIAMONDHEAD	39525	MS	228-255-1314	1992	2321.12	30.37732100000	-89.37462600000	AMBULANCE AND FIRE SERVICE COMBINED
MS000893	EFFS	28045030601	POST 58 VOLUNTEER FIRE DEPARTMENT STA...	25150 STATE HIGHWAY 603	KILN	39556	MS	228-255-3496	1991	2321.12	30.53449500000	-89.42579700000	AMBULANCE AND FIRE SERVICE COMBINED
MS000973	EFFS	28045030601	LEETOWN VOLUNTEER FIRE DEPARTMENT	24440 RESTER ROAD	PICAYUNE	39466	MS	601-799-3755	1991	2321.12	30.52867800000	-89.52317100000	AMBULANCE AND FIRE SERVICE COMBINED
MS000894	EFFS	28045030602	FENTON VOLUNTEER FIRE DEPARTMENT	20224 FENTON-DEDEAUX ROAD	KILN	39556	MS	228-255-1855	1995	2321.12	30.46417200000	-89.37499800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000970	EFFS	28045030602	STENNIS INTERNATIONAL AIRPORT AIRCRAF...	7250 AIRPORT DRIVE	KILN	39556	MS	228-467-7070	1995	2321.12	30.37296600000	-89.45143900000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000971	EFFS	28045030602	KILN VOLUNTEER FIRE DEPARTMENT	16148 FIRE DEPARTMENT ROAD	KILN	39556	MS	228-342-8494	1995	2321.12	30.40986600000	-89.44062900000	AMBULANCE AND FIRE SERVICE COMBINED
MS000014	EFHM	28045030300	HANCOCK MEDICAL CENTER	149 DRINKWATER BOULEVARD	BAY ST. LOUIS	39521	MS	(228) 467-8600	1998	0.00	30.31677400000	-89.35433800000	GENERAL MEDICAL AND SURGICAL HOSPITALS

Harrison County Facilities

ID	EfClas	Tract	Name	Address	City	Zipcode	Statea	PhoneNumbe	YearBu	Cost	Latitude	Longitude	Comment
MS000341	EFPS	28047000600	BILOXI POLICE DEPARTMENT	170 PORTER AVENUE	BILOXI	39530	MS	(228) 435-6100	1954	2321.11960000000	30.39755300000	-88.90122600000	POLICE PROTECTION
MS000254	EFPS	28047001502	GULF COAST COMMUNITY COLLEGE PUBLIC S...	2226 SWITZER ROAD	GULFPORT	39507	MS	(228) 896-2516	1990	2321.11960000000	30.40740700000	-89.00406800000	POLICE PROTECTION
MS000255	EFPS	28047001800	GULFPORT POLICE DEPARTMENT - STATION 202	8335 TENNESSEE AVENUE	GULFPORT	39501	MS	(228) 868-5959	1977	2321.11960000000	30.40753100000	-89.09349800000	POLICE PROTECTION
MS000026	EFPS	28047002000	HARRISON COUNTY SHERIFF'S OFFICE	1801 23RD AVE	GULFPORT	39501	MS	NOT AVAILABLE	1965	2321.11960000000	30.37225300000	-89.09074300000	POLICE PROTECTION
MS000294	EFPS	28047002400	GULFPORT POLICE DEPARTMENT - STATION 200	2810 34TH AVENUE	GULFPORT	39501	MS	(228) 868-5980	1982	2321.11960000000	30.38712000000	-89.10193300000	POLICE PROTECTION
MS000359	EFPS	28047002700	LONG BEACH POLICE DEPARTMENT	201 ALEXANDER AVENUE	LONG BEACH	39560	MS	(228) 865-1985	1973	2321.11960000000	30.34885700000	-89.16125500000	POLICE PROTECTION
MS000381	EFPS	28047002900	PASS CHRISTIAN HARBOR PATROL	106 SOUTH MARKET STREET	PASS CHRISTIAN	39571	MS	(228) 452-5128	1991	2321.11960000000	30.31212000000	-89.24587900000	POLICE PROTECTION
MS000205	EFPS	28047003102	PASS CHRISTIAN POLICE DEPARTMENT	327 EAST 2ND STREET	PASS CHRISTIAN	39571	MS	(228) 452-3301	1989	2321.11960000000	30.34053800000	-89.20418200000	POLICE PROTECTION
MS000249	EFPS	28047003205	GULFPORT POLICE DEPARTMENT - ORANGE G...	12188 UNITED STATES HIGHWAY 49	GULFPORT	39503	MS	(228) 831-0700	1981	2321.11960000000	30.46154700000	-89.09943200000	POLICE PROTECTION
MS000035	EFPS	28047003206	MISSISSIPPI HIGHWAY PATROL DISTRICT 8	16499A UNITED STATES HIGHWAY 49	SAUCIER	39574	MS	(228) 539-4881	1996	2321.11960000000	30.52783500000	-89.10969500000	POLICE PROTECTION
MS000295	EFPS	28047003208	HARRISON COUNTY SHERIFFS DEPARTMENT /...	10451 LARKIN SMITH DRIVE	GULFPORT	39503	MS	(228) 896-3000	1978	2321.11960000000	30.43918300000	-89.05466700000	POLICE PROTECTION
MS000257	EFPS	28047003301	D'IBERVILLE POLICE DEPARTMENT	10274 3RD AVENUE	D'IBERVILLE	39540	MS	(228) 396-4252	1991	2321.11960000000	30.43543800000	-88.89286800000	POLICE PROTECTION
MS000428	EFPS	28047003403	MISSISSIPPI HIGHWAY PATROL TROOP K	16741 HIGHWAY 67	BILOXI	39532	MS	NOT AVAILABLE	1992	2321.11960000000	30.52857500000	-88.99359900000	POLICE PROTECTION
MS000139	EFPS	28047003800	GULFPORT POLICE DEPARTMENT	2200 15TH STREET	GULFPORT	39501	MS	NOT AVAILABLE	1956	2321.11960000000	30.36965200000	-89.08982800000	POLICE PROTECTION
MS000064	EFPS	28047003900	MISSISSIPPI DEPARTMENT OF MARINE RESO...	1141 BAYVIEW AVENUE	BILOXI	39530	MS	(228) 374-5000	1959	2321.11960000000	30.41109200000	-88.90559100000	POLICE PROTECTION
MS000979	EFFS	28047000100	BILOXI FIRE DEPARTMENT STATION 2 - JA...	274 HOWARD AVENUE	BILOXI	39530	MS	228-435-6222	2005	2321.11960000000	30.39594100000	-88.86678500000	AMBULANCE AND FIRE SERVICE COMBINED
MS000897	EFFS	28047000600	BILOXI FIRE DEPARTMENT STATION 1 - CE...	170 PORTER AVENUE	BILOXI	39530	MS	228-435-6217	1954	2321.11960000000	30.39730000000	-88.90152000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000998	EFFS	28047000900	KEESLER AIR FORCE BASE FIRE DEPARTMEN...	508 L STREET	KEESLER AIR FORCE BASE	39534	MS	228-377-2730	1962	2321.11960000000	30.40096900000	-88.91210200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000981	EFFS	28047001202	BILOXI FIRE DEPARTMENT STATION 5 - BA...	2499 PASS ROAD	BILOXI	39531	MS	228-435-6226	1975	2321.11960000000	30.40092700000	-88.98283000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000980	EFFS	28047001300	BILOXI FIRE DEPARTMENT STATION 4 - LE...	168 VETERANS AVENUE	BILOXI	39531	MS	228-435-6227	1969	2321.11960000000	30.39635700000	-88.94677300000	AMBULANCE AND FIRE SERVICE COMBINED
MS000993	EFFS	28047001400	GULFPORT FIRE DEPARTMENT STATION 7	200 COWAN ROAD	GULFPORT	39507	MS	228-896-7907	1978	2321.11960000000	30.38438400000	-89.02609400000	AMBULANCE AND FIRE SERVICE COMBINED
MS000989	EFFS	28047001600	GULFPORT FIRE DEPARTMENT STATION 5	400 41ST STREET	GULFPORT	39507	MS	228-863-2837	1963	2321.11960000000	30.40203800000	-89.05924000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000994	EFFS	28047001700	GULFPORT FIRE DEPARTMENT STATION 6	1000 EAST PASS ROAD	GULFPORT	39507	MS	228-896-3050	1976	2321.11960000000	30.39774500000	-89.03258200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000995	EFFS	28047001900	GULFPORT FIRE DEPARTMENT STATION 4	1038 EAST RAILROAD STREET	GULFPORT	39501	MS	228-868-5780	1962	2321.11960000000	30.37610000000	-89.06951700000	AMBULANCE AND FIRE SERVICE COMBINED
MS000986	EFFS	28047002000	GULFPORT FIRE DEPARTMENT STATION 3	2324 25TH STREET	GULFPORT	39501	MS	228-863-3347	1965	2321.11960000000	30.38059200000	-89.09141800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000985	EFFS	28047002300	GULFPORT FIRE DEPARTMENT STATION 2	1200 42ND AVENUE	GULFPORT	39501	MS	228-863-3448	1964	2321.11960000000	30.36593300000	-89.11103000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000987	EFFS	28047002400	GULFPORT FIRE DEPARTMENT STATION 12	15550 MARTIN LUTHER KING JUNIOR BC	GULFPORT	39501	MS	228-868-5761	1982	2321.11960000000	30.40425200000	-89.10273900000	AMBULANCE AND FIRE SERVICE COMBINED
MS001002	EFFS	28047002900	PASS CHRISTIAN FIRE DEPARTMENT STATIO...	808 EAST SECOND STREET	PASS CHRISTIAN	39571	MS	228-452-3323	1991	2321.11960000000	30.32648000000	-89.22235000000	AMBULANCE AND FIRE SERVICE COMBINED
MS001003	EFFS	28047003000	PASS CHRISTIAN FIRE DEPARTMENT STATION 2	707 WEST NORTH STREET	PASS CHRISTIAN	39571	MS	228-452-3326	1998	2321.11960000000	30.31987400000	-89.26757300000	AMBULANCE AND FIRE SERVICE COMBINED
MS001000	EFFS	28047003101	LONG BEACH FIRE DEPARTMENT STATION 1 ...	645 KLONDYKE ROAD	LONG BEACH	39560	MS	228-863-7292	1978	2321.11960000000	30.37230900000	-89.15417400000	AMBULANCE AND FIRE SERVICE COMBINED
MS000999	EFFS	28047003102	LONG BEACH FIRE DEPARTMENT STATION 3	20070 JOHNSON ROAD	LONG BEACH	39560	MS	228-863-7292	1989	2321.11960000000	30.35104600000	-89.18918600000	AMBULANCE AND FIRE SERVICE COMBINED
MS001001	EFFS	28047003102	HARRISON COUNTY FIRE SERVICE - CUEVAS...	22338 FIRE STATION ROAD	PASS CHRISTIAN	39571	MS	228-452-3952	1989	2321.11960000000	30.35826900000	-89.21446500000	AMBULANCE AND FIRE SERVICE COMBINED
MS001005	EFFS	28047003102	HARRISON COUNTY FIRE SERVICE - DELISL...	25242 CUEVAS DELISLE ROAD	PASSCHRISTIAN	39571	MS	228-255-2625	1989	2321.11960000000	30.38020900000	-89.26381900000	AMBULANCE AND FIRE SERVICE COMBINED
MS000868	EFFS	28047003204	GULFPORT FIRE DEPARTMENT STATION 9	15239 DEDEAUX ROAD	GULFPORT	39503	MS	228-831-0729	1977	2321.11960000000	30.44921800000	-89.09443600000	AMBULANCE AND FIRE SERVICE COMBINED
MS000992	EFFS	28047003206	GULFPORT FIRE DEPARTMENT STATION 11	13000 THREE RIVERS ROAD	GULFPORT	39503	MS	228-831-0753	1996	2321.11960000000	30.47926800000	-89.06918900000	AMBULANCE AND FIRE SERVICE COMBINED
MS000991	EFFS	28047003208	GULFPORT FIRE DEPARTMENT STATION 10	12001 DEDEAUX ROAD	GULFPORT	39503	MS	228-831-0715	1978	2321.11960000000	30.44936400000	-89.03595200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000983	EFFS	28047003301	DIBERVILLE FIRE DEPARTMENT	3407 BIG RIDGE ROAD	DIBERVILLE	39540	MS	228-392-3525	1991	2321.11960000000	30.44613900000	-88.89623400000	AMBULANCE AND FIRE SERVICE COMBINED
MS000867	EFFS	28047003303	BILOXI FIRE DEPARTMENT STATION 7	1656 POPPS FERRY ROAD	BILOXI	39532	MS	228-354-8051	1993	2321.11960000000	30.44309100000	-88.93079900000	AMBULANCE AND FIRE SERVICE COMBINED
MS000975	EFFS	28047003304	BILOXI FIRE DEPARTMENT STATION 6 - PO...	2139 POPPS FERRY ROAD	BILOXI	39532	MS	228-435-6228	1979	2321.11960000000	30.43631800000	-88.96626000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000976	EFFS	28047003402	HARRISON COUNTY FIRE SERVICE - EAST H...	15519 STATE HIGHWAY 15	BILOXI	39532	MS	228-396-4071	1996	2321.11960000000	30.51214900000	-88.91696800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000977	EFFS	28047003402	BILOXI FIRE DEPARTMENT STATION 8 - WO...	8479 WOOLMARKET ROAD	BILOXI	39532	MS	228-392-2178	1996	2321.11960000000	30.47133400000	-88.98168400000	AMBULANCE AND FIRE SERVICE COMBINED
MS000982	EFFS	28047003402	BILOXI FIRE DEPARTMENT STATION 9 - BA...	9370 WEST OAKLAWN ROAD	BILOXI	39532	MS	228-374-2054	1996	2321.11960000000	30.44942600000	-88.99349400000	AMBULANCE AND FIRE SERVICE COMBINED
MS000978	EFFS	28047003403	HARRISON COUNTY FIRE SERVICE - NORTH ...	16520 SWITZER PARK ROAD	BILOXI	39532	MS	228-396-5764	1992	2321.11960000000	30.52329400000	-88.98758100000	AMBULANCE AND FIRE SERVICE COMBINED
MS000938	EFFS	28047003404	HARRISON COUNTY FIRE SERVICE - SUCCES...	12342 SCHOOL ROAD	SAUCIER	39574	MS	228-832-9645	1989	2321.11960000000	30.61094800000	-89.04765800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000870	EFFS	28047003501	POST 58 VOLUNTEER FIRE DEPARTMENT STA...	2215 STATE HIGHWAY 53	PERKINSTON	39573	MS	228-255-3496	1993	2321.11960000000	30.59483200000	-89.34027900000	AMBULANCE AND FIRE SERVICE COMBINED
MS000936	EFFS	28047003501	HARRISON COUNTY FIRE SERVICE - LIZANA...	20121 WEST WORTHAM ROAD	SAUCIER	39574	MS	228-832-0638	1993	2321.11960000000	30.56671900000	-89.18033800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000937	EFFS	28047003501	HARRISON COUNTY FIRE SERVICE - SAUCIE...	23560 OLD STILL ROAD	SAUCIER	39574	MS	228-832-5936	1993	2321.11960000000	30.63244400000	-89.13829300000	AMBULANCE AND FIRE SERVICE COMBINED
MS000984	EFFS	28047003502	HARRISON COUNTY FIRE SERVICE - LIZANA...	16445 LIZANA SCHOOL ROAD	GULF PORT	39503	MS	228-832-0163	1992	2321.11960000000	30.52773900000	-89.23428600000	AMBULANCE AND FIRE SERVICE COMBINED
MS001004	EFFS	28047003502	HARRISON COUNTY FIRE SERVICE - WEST H...	10071 VIDALIA ROAD	PASSCHRISTIAN	39571	MS	228-255-5787	1992	2321.11960000000	30.43050400000	-89.29255100000	AMBULANCE AND FIRE SERVICE COMBINED
MS000996	EFFS	28047003504	GULFPORT FIRE DEPARTMENT STATION 8	13440 OLD HIGHWAY 49	GULFPORT	39503	MS	228-831-0728	1993	2321.11960000000	30.48396100000	-89.10873800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000997	EFFS	28047003504	HARRISON COUNTY FIRE SERVICE - LIZANA...	13243 COUNTY FARM ROAD	GULFPORT	39503	MS	228-539-4414	1993	2321.11960000000	30.47746100000	-89.18762200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000869	EFFS	28047003505	HARRISON COUNTY FIRE SERVICE - LIZANA...	10126 COUNTY FARM ROAD	GULFPORT	39503	MS	228-832-1789	1993	2321.11960000000	30.43011000000	-89.19200300000	AMBULANCE AND FIRE SERVICE COMBINED
MS000990	EFFS	28047003800	GULFPORT FIRE DEPARTMENT - CENTRAL	1515 23RD AVENUE	GULFPORT	39501	MS	228-868-5950	1956	2321.11960000000	30.36972700000	-89.09064900000	AMBULANCE AND FIRE SERVICE COMBINED
MS000974	EFFS	28047003900	BILOXI FIRE DEPARTMENT STATION 3 - OH...	784 ELDER STREET	BILOXI	39530	MS	228-435-6224	1959	2321.11960000000	30.40897800000	-88.88837400000	AMBULANCE AND FIRE SERVICE COMBINED
MS000988	EFFS	28047980000	MISSISSIPPI AIR NATIONAL GUARD COMBAT...	4600 HEWES AVENUE	GULFPORT	39501	MS	228-214-6081	1979	2321.11960000000	30.40840000000	-89.06325800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000021	EFHS	28047002600	HEALTHSOUTH REHABILITATION HOSPITAL OF G	4500 13TH STREET, 3RD FLOOR	GULFPORT	39501	MS	(228) 822-6965	Hospit	0	30.36741800000	-89.11603600000	PHYSICAL REHABILITATION HOSPITALS
MS000049	EFHM	28047002600	SELECT SPECIALTY HOSPITAL GULF COAST	1520 BROAD AVENUE	GULFPORT	39501	MS	(228) 575-7500	Hospit	0	30.36996900000	-89.11611800000	SPECIALTY (EXCEPT PSYCHIATRIC AND SUB...
MS000115	EFHL	28047002600	MEMORIAL HOSPITAL AT GULFPORT	4500 13TH STREET	GULFPORT	39501	MS	(228) 867-4000	Hospit	0	30.36767500000	-89.11557000000	GENERAL MEDICAL AND SURGICAL HOSPITALS
MS000016	EFHM	28047003204	GARDEN PARK MEDICAL CENTER	15200 COMMUNITY ROAD	GULFPORT	39503	MS	(228) 575-7000	Hospit	0	30.44409000000	-89.09343400000	GENERAL MEDICAL AND SURGICAL HOSPITALS
MS000015	EFHL	28047003600	MERIT HEALTH BILOXI	150 REYNOIR STREET	BILOXI	39530	MS	(228) 432-1571	Hospit	0	30.39593900000	-88.88975100000	GENERAL MEDICAL AND SURGICAL HOSPITALS
MS000082	EFHS	28047003700	GULF COAST VETERANS HEALTH CARE SYSTEM	400 VETERANS AVE	BILOXI	39531	MS	(228) 523-5000	Hospit	0	30.41511400000	-88.94195400000	GENERAL MEDICAL AND SURGICAL HOSPITALS
MS000125	EFHS	28047003700	VETERANS AFFAIRS GULF COAST HEALTH CARE	400 VETERANS AVENUE	BILOXI	39531	MS	(228) 523-5000	Hospit	0	30.41511000000	-88.94195000000	GENERAL MEDICAL AND SURGICAL HOSPITALS
MS000126	EFHS	28047003700	BILOXI VETERANS CENTER	288 VETERANS AVENUE	BILOXI	39531	MS	(228) 388-9938	Hospit	0	30.40225000000	-88.94685500000	GENERAL MEDICAL AND SURGICAL HOSPITALS

Jackson County Facilities

ID	EfClass	Tract	Name	Address	City	Zipcode	Statea	PhoneNumbe	YearBuilt	Cost	Latitude	Longitude	Comment
MS000009	EFS1	28059040101	EAST CENTRAL LOWER ELEMENTARY	5621 HWY 614	MOSS POINT	39562	MS	(228) 588-7060	1985	7255.94	30.65590100000	-88.51405700000	ELEMENTARY AND SECONDARY SCHOOLS
MS000246	EFS1	28059040101	EAST CENTRAL HIGH SCHOOL	21700 SLIDER RD.	MOSS POINT	39562	MS	(228) 588-7000	1985	9515.21	30.65557100000	-88.51594600000	ELEMENTARY AND SECONDARY SCHOOLS
MS000445	EFS1	28059040101	EAST CENTRAL MIDDLE SCHOOL	5404 HURLEY-WADE RD.	MOSS POINT	39562	MS	(228) 588-7009	1985	7674.33	30.65787600000	-88.51992500000	ELEMENTARY AND SECONDARY SCHOOLS
MS000607	EFS1	28059040101	EAST CENTRAL UPPER ELEMENTARY	5400 HURLEY-WADE RD.	MOSS POINT	39562	MS	(228) 588-7019	1985	7638.46	30.65825100000	-88.51888800000	ELEMENTARY AND SECONDARY SCHOOLS
MS000329	EFS1	28059040201	VANCLEAVE HIGH SCHOOL	12424 HWY 57	VANCLEAVE	39565	MS	(228) 826-4701	1991	9144.64	30.52307900000	-88.68843600000	ELEMENTARY AND SECONDARY SCHOOLS
MS000390	EFS1	28059040201	VANCLEAVE MIDDLE SCHOOL	4725 BULLDOG LANE	VANCLEAVE	39565	MS	(228) 826-5902	1991	7471.11	30.52137100000	-88.68744200000	ELEMENTARY AND SECONDARY SCHOOLS
MS000716	EFS1	28059040201	JACKSON COUNTY VOCATIONAL CENTER	12425 HWY 57	VANCLEAVE	39565	MS	(228) 826-5944	1991	71.72	30.52311900000	-88.69132500000	ELEMENTARY AND SECONDARY SCHOOLS
MS000759	EFS1	28059040201	VANCLEAVE LOWER ELEMENTARY	12602 HWY 57	VANCLEAVE	39565	MS	(228) 826-5982	1991	6514.81	30.52585900000	-88.68710100000	ELEMENTARY AND SECONDARY SCHOOLS
MS000860	EFS1	28059040201	VANCLEAVE UPPER ELEMENTARY	13901 HWY 75	VANCLEAVE	39565	MS	(228) 826-4581	1991	6741.93	30.54371500000	-88.68855900000	ELEMENTARY AND SECONDARY SCHOOLS
MS000115	EFS1	28059040400	ST MARTIN HIGH SCHOOL	11300 YELLOW JACKET BLVD.	OCEAN SPRINGS	39564	MS	(228) 875-8418	1987	16041.97	30.43348300000	-88.79396200000	ELEMENTARY AND SECONDARY SCHOOLS
MS000168	EFS1	28059040400	ST MARTIN N ELEMENTARY SCHOOL	11000 YELLOWJACKET STREET	BILOXI	39532	MS	(228) 392-1387	1987	8905.57	30.43516900000	-88.79485200000	ELEMENTARY AND SECONDARY SCHOOLS
MS000200	EFS1	28059040400	ST MARTIN EAST ELEMENTARY SCHOOL	7508 ROSE FARM ROAD	OCEAN SPRINGS	39564	MS	(228) 875-3204	1987	9288.09	30.45091700000	-88.82924100000	ELEMENTARY AND SECONDARY SCHOOLS
MS000338	EFS1	28059040400	ST MARTIN UPPER ELEMENTARY	11000 YELLOW JACKET BLVD.	OCEAN SPRINGS	39564	MS	(228) 818-2849	1987	8367.64	30.43700100000	-88.79348700000	ELEMENTARY AND SECONDARY SCHOOLS
MS000973	EFS1	28059040400	ST. MARTIN MIDDLE SCHOOL	10800 YELLOW JACKET BLVD.	OCEAN SPRINGS	39564	MS	(228) 818-4833	1987	13005.71	30.43348300000	-88.79396200000	ELEMENTARY AND SECONDARY SCHOOLS
MS000036	EFS1	28059040500	OAK PARK ELEMENTARY SCHOOL	2230 GOVERNMENT STREET	OCEAN SPRINGS	39564	MS	(228) 875-5847	1971	7279.85	30.41295600000	-88.81135300000	ELEMENTARY AND SECONDARY SCHOOLS
MS000849	EFS1	28059040500	KEYS VOC CENTER	6710 OLD SPANISH TRAIL	OCEAN SPRINGS	39564	MS	(228) 872-3411	1971	107.58	30.41509600000	-88.81113900000	ELEMENTARY AND SECONDARY SCHOOLS
MS001113	EFS1	28059040500	CHILDREN'S HOUSE MONTESSORI SCHOOL	309 WASHINGTON AVE	OCEAN SPRINGS,	39564	MS	NOT AVAILABLE	1971	203.21	30.40806900000	-88.82848500000	ELEMENTARY AND SECONDARY SCHOOLS
MS001258	EFS1	28059040500	ST ALPHONSUS SCHOOL	504 JACKSON AVE	OCEAN SPRINGS	39564	MS	NOT AVAILABLE	1971	1553.99	30.40994600000	-88.82877300000	ELEMENTARY AND SECONDARY SCHOOLS
MS001310	EFS1	28059040500	FIRST BAPTIST EARLY EDUCATION CENTER	602 WASHINGTON AVE	OCEAN SPRINGS	39564	MS	NOT AVAILABLE	1971	107.58	30.41195500000	-88.82745500000	ELEMENTARY AND SECONDARY SCHOOLS
MS000078	EFS1	28059040600	MAGNOLIA PARK ELEMENTARY	3500 GOVERNMENT STREET	OCEAN SPRINGS	39564	MS	(228) 875-4263	1974	7865.59	30.39856600000	-88.77989500000	ELEMENTARY AND SECONDARY SCHOOLS
MS000243	EFS1	28059040600	PECAN PARK ELEMENTARY SCHOOL	504 HANLEY ROAD	OCEAN SPRINGS	39564	MS	(228) 875-2851	1974	6765.84	30.40847300000	-88.79464000000	ELEMENTARY AND SECONDARY SCHOOLS
MS000468	EFS1	28059040600	OCEAN SPRINGS HIGH SCHOOL	6701 OLD SPANISH TRAIL	OCEAN SPRINGS	39564	MS	(228) 875-0333	1974	22568.73	30.41263100000	-88.80848500000	ELEMENTARY AND SECONDARY SCHOOLS
MS001066	EFS1	28059040600	OCEAN SPRINGS UPPER ELEMENTARY SCHO	2320 GOVERNMENT STREET	OCEAN SPRINGS	39564	MS	(228) 875-4367	1974	16352.77	30.41268400000	-88.80829100000	ELEMENTARY AND SECONDARY SCHOOLS
MS001140	EFS1	28059040700	GRACE BAPTIST ACADEMY	3707 BIENVILLE BLVD	OCEAN SPRINGS	39564	MS	NOT AVAILABLE	1989	777.00	30.41128900000	-88.76972900000	ELEMENTARY AND SECONDARY SCHOOLS
MS000735	EFS1	28059040800	SINGING RIVER ACADEMY	4601 VANCLEAVE ROAD	GAUTIER	39553	MS	(228) 522-8835	1993	6383.32	30.40852100000	-88.65825900000	ELEMENTARY AND SECONDARY SCHOOLS
MS000857	EFS1	28059040800	GAUTIER HIGH SCHOOL	4307 GAUTIER/VANCLEAVE	GAUTIER	39553	MS	(228) 522-8783	1993	10591.05	30.40605100000	-88.66070900000	ELEMENTARY AND SECONDARY SCHOOLS
MS000389	EFS1	28059040900	OCEAN SPRINGS MIDDLE SCHOOL	3600 HANSHAW ROAD	OCEAN SPRINGS	39564	MS	(228) 872-6210	1999	12240.67	30.39642500000	-88.75624100000	ELEMENTARY AND SECONDARY SCHOOLS
MS000595	EFS1	28059041000	MARTIN BLUFF	1306 ROY'S ROAD	GAUTIER	39553	MS	(228) 522-8850	1979	7423.30	30.42537400000	-88.63029500000	ELEMENTARY AND SECONDARY SCHOOLS
MS000697	EFS1	28059041000	GAUTIER ELEMENTARY SCHOOL	505 MAGNOLIA TREE	GAUTIER	39553	MS	(228) 522-8824	1979	4841.28	30.38367800000	-88.61738800000	ELEMENTARY AND SECONDARY SCHOOLS
MS001401	EFS2	28059041000	MISSISSIPPI GULF COAST COMMUNITY COLL...	2300 HIGHWAY 90	GAUTIER	39553	MS	NOT AVAILABLE	1979	7098.58	30.39323900000	-88.64641900000	JUNIOR COLLEGES
MS000256	EFS1	28059041100	GAUTIER MIDDLE SCHOOL	1920 GRAVELINE ROAD	GAUTIER	39553	MS	(228) 522-8806	1986	6215.96	30.36928700000	-88.64193500000	ELEMENTARY AND SECONDARY SCHOOLS
MS001080	EFS1	28059041100	COLLEGE PARK ELEM	2617 LADNIER RD	GAUTIER	39553	MS	(228) 522-8829	1986	4315.31	30.37945100000	-88.64815300000	ELEMENTARY AND SECONDARY SCHOOLS
MS000437	EFS1	28059041300	MOSS POINT ESCATAWPA UPPER ELEM	4208 JAMESTOWN ROAD	MOSS POINT	39562	MS	(228) 474-3300	1977	5988.84	30.43693800000	-88.54194500000	ELEMENTARY AND SECONDARY SCHOOLS
MS000472	EFS1	28059041400	MOSS POINT HIGH SCHOOL	4913 WEEMS STREET	MOSS POINT	39563	MS	(228) 475-5721	1966	7937.31	30.41324800000	-88.54986500000	ELEMENTARY AND SECONDARY SCHOOLS
MS001089	EFS1	28059041400	MOSS POINT CAREER & TECHNICAL EDUCA	4924 CHURCH STREET	MOSS POINT	39563	MS	(228) 474-1455	1966	95.63	30.41310200000	-88.55307500000	ELEMENTARY AND SECONDARY SCHOOLS
MS000154	EFS1	28059041600	MAGNOLIA MIDDLE SCHOOL	4630 MAGNOLIA ST.	MOSS POINT	39563	MS	(228) 475-1429	1970	6168.15	30.41490000000	-88.50029600000	ELEMENTARY AND SECONDARY SCHOOLS
MS001011	EFS1	28059041600	MOSS POINT ALTERNATIVE SCHOOL	3524 PRENTISS AVE.	MOSS POINT	39563	MS	(228) 475-3543	1970	35.86	30.41489400000	-88.49980100000	ELEMENTARY AND SECONDARY SCHOOLS
MS000144	EFS1	28059041700	MOSS POINT KREOLE PRIMARY SCHOOL	6312 MARTIN LUTHER KING DRIVE	MOSS POINT	39563	MS	(228) 475-3719	1972	5773.67	30.40158800000	-88.50438000000	ELEMENTARY AND SECONDARY SCHOOLS
MS000545	EFS1	28059041900	EXCEPTIONAL SCHOOL	4311 HOSPITAL ROAD	PASCAGOULA	39581	MS	(228) 762-1457	1976	95.63	30.37374400000	-88.53471400000	ELEMENTARY AND SECONDARY SCHOOLS
MS000730	EFS1	28059041900	LAKE ELEMENTARY SCHOOL	4503 WILLOW STREET	PASCAGOULA	39567	MS	(228) 938-6422	1976	1374.68	30.37856700000	-88.55433300000	ELEMENTARY AND SECONDARY SCHOOLS
MS000553	EFS1	28059042000	ARLINGTON HEIGHTS ELEM SCHOOL	3511 ARLINGTON STREET	PASCAGOULA	39581	MS	(228) 938-6552	1974	4877.14	30.37025200000	-88.51465000000	ELEMENTARY AND SECONDARY SCHOOLS
MS000520	EFS1	28059042100	WILLIAM M COLMER MIDDLE SCHOOL	3112 EDEN STREET	PASCAGOULA	39581	MS	(228) 938-6473	1968	7506.97	30.36412400000	-88.52922100000	ELEMENTARY AND SECONDARY SCHOOLS
MS000718	EFS1	28059042100	CHEROKEE ELEMENTARY SCHOOL	4102 SCOVEL RD	PASCAGOULA	39581	MS	(228) 938-6547	1968	3657.86	30.36119500000	-88.52072700000	ELEMENTARY AND SECONDARY SCHOOLS
MS000851	EFS1	28059042100	JACKSON ELEMENTARY SCHOOL	3203 LANIER STREET	PASCAGOULA	39581	MS	(228) 938-6554	1968	3944.75	30.36647600000	-88.52951700000	ELEMENTARY AND SECONDARY SCHOOLS
MS001112	EFS1	28059042100	BETHEL CHRISTIAN ACADEMY & DAYCARE	2105 MARTIN ST	PASCAGOULA	39581	MS	NOT AVAILABLE	1968	836.76	30.35693000000	-88.52422100000	ELEMENTARY AND SECONDARY SCHOOLS
MS000504	EFS1	28059042200	PASCAGOULA HIGH SCHOOL	1716 TUCKER STREET	PASCAGOULA	39567	MS	(228) 938-6443	1965	13878.34	30.36117000000	-88.54665700000	ELEMENTARY AND SECONDARY SCHOOLS
MS000798	EFS1	28059042200	EASTLAWN ELEMENTARY SCHOOL	2611 INGALLS AVE	PASCAGOULA	39567	MS	(228) 938-6431	1965	4195.78	30.35554500000	-88.53480500000	ELEMENTARY AND SECONDARY SCHOOLS
MS000321	EFS1	28059042500	BEACH ELEMENTARY SCHOOL	633 MARKET STREET	PASCAGOULA	39567	MS	(228) 938-6428	1963	1362.73	30.34511800000	-88.54882700000	ELEMENTARY AND SECONDARY SCHOOLS
MS001139	EFS1	28059042600	GATEWAY CHRISTIAN ACADEMY	2690 JEFFERSON STREET	PASCAGOULA	39653	MS	NOT AVAILABLE	1977	549.87	30.35453700000	-88.53732400000	ELEMENTARY AND SECONDARY SCHOOLS
MS001226	EFS1	28059042600	RESURRECTION CATHOLIC SCHOOL - ELEMEN...	3704 QUINN DR	PASCAGOULA	39581	MS	NOT AVAILABLE	1977	3466.60	30.35210900000	-88.52294300000	ELEMENTARY AND SECONDARY SCHOOLS
MS000298	EFS1	28059042900	COLLEGE & CAREER TECHNICAL INST.	2602 MARKET STREET	PASCAGOULA	39567	MS	(228) 938-6579	1953	191.26	30.36106600000	-88.54783200000	ELEMENTARY AND SECONDARY SCHOOLS
MS000536	EFS1	28059042900	TRENT LOTT ACADEMY	2234 PASCAGOULA	PASCAGOULA	39567	MS	(228) 938-6462	1953	7925.36	30.35795100000	-88.55405300000	ELEMENTARY AND SECONDARY SCHOOLS
MS000910	EFS1	28059042900	PASCAGOULA OPPORTUNITY CENTER	1520 TUCKER AVENUE	PASCAGOULA	39567	MS	(228) 938-6222	1953	83.68	30.36223900000	-88.54942100000	ELEMENTARY AND SECONDARY SCHOOLS
MS000933	EFS1	28059042900	CENTRAL ELEMENTARY SCHOOL	1100 DUPONT STREET	PASCAGOULA	39567	MS	(228) 938-6559	1953	3048.21	30.36093400000	-88.55375800000	ELEMENTARY AND SECONDARY SCHOOLS
MS001156	EFS1	28059042900	RESURRECTION CATHOLIC SCHOOL - HIGH S...	520 WATTS AVE	PASCAGOULA	39567	MS	NOT AVAILABLE	1953	3311.20	30.36609200000	-88.56022200000	ELEMENTARY AND SECONDARY SCHOOLS
MS001406	EFS2	28059042900	MISSISSIPPI GULF COAST COMMUNITY COLL...	2721 JERRY ST. P HWY	PASCAGOULA	39581	MS	(228) 497-7855	1953	7098.58	30.36161200000	-88.57199900000	JUNIOR COLLEGES
MS000290	EFPS	28059040400	JACKSON COUNTY SHERIFFS DEPARTMENT - ...	6904 NORTH WASHINGTON AVENUE, PUBLIC ...	OCEAN SPRINGS	39564	MS	(228) 875-6963	1987	2321.12	30.44273200000	-88.83744800000	POLICE PROTECTION
MS000298	EFPS	28059040500	OCEAN SPRINGS POLICE DEPARTMENT	503 DEWEY AVENUE	OCEAN SPRINGS	39564	MS	(228) 875-2211	1971	2321.12	30.41050400000	-88.82663800000	POLICE PROTECTION
MS000361	EFPS	28059040700	OCEAN SPRINGS CITY POLICE DEPARTMENT	3810 BIENVILLE BOULEVARD	OCEAN SPRINGS	39564	MS	NOT AVAILABLE	1989	2321.12	30.40913000000	-88.76510300000	POLICE PROTECTION
MS000198	EFPS	28059040800	GAUTIER POLICE DEPARTMENT	3330 UNITED STATES HIGHWAY 90	GAUTIER	39553	MS	(228) 497-8007	1993	2321.12	30.39476000000	-88.66432800000	POLICE PROTECTION
MS000200	EFPS	28059041500	MOSS POINT POLICE DEPARTMENT	4329 MCINNIS AVENUE	MOSS POINT	39563	MS	(228) 475-1711	1968	2321.12	30.41304000000	-88.53749000000	POLICE PROTECTION
MS000099	EFPS	28059042900	PASCAGOULA POLICE DEPARTMENT	611 LIVE OAK AVENUE	PASCAGOULA	39567	MS	(228) 762-2211	1953	2321.12	30.37015900000	-88.55748800000	POLICE PROTECTION
MS000395	EFPS	28059042900	JACKSON COUNTY SHERIFFS DEPARTMENT	3104 MAGNOLIA STREET, PO BOX 998	PASCAGOULA	39567	MS	(228) 769-3063	1953	2321.12	30.36567300000	-88.55891500000	POLICE PROTECTION
MS000872	EFFS	28059040101	THREE RIVERS VOLUNTEER FIRE DEPARTMEN...	24321 OLD AMERICUS ROAD	LUCEDALE	39452	MS	228-588-3306	1985	2321.12	30.69787200000	-88.58029600000	AMBULANCE AND FIRE SERVICE COMBINED
MS000875	EFFS	28059040101	EAST CENTRAL VOLUNTEER FIRE DEPARTMEN...	21701 STATE HIGHWAY 613	MOSS POINT	39562	MS	228-588-3800	1985	2321.12	30.65802100000	-88.49247100000	AMBULANCE AND FIRE SERVICE COMBINED
MS000876	EFFS	28059040101	THREE RIVERS VOLUNTEER FIRE DEPARTMEN...	14401 STATE HIGHWAY 63 SOUTH	MOSS POINT	39562	MS	228-588-3306	1985	2321.12	30.55133700000	-88.55975900000	AMBULANCE AND FIRE SERVICE COMBINED
MS000879	EFFS	28059040101	THREE RIVERS VOLUNTEER FIRE DEPARTMEN...	16933 STATE HIGHWAY 63	MOSS POINT	39562	MS	228-588-3306	1985	2321.12	30.58776400000	-88.56204100000	AMBULANCE AND FIRE SERVICE COMBINED
MS000873	EFFS	28059040102	EAST CENTRAL VOLUNTEER FIRE DEPARTMEN...	6303 TANNER WILLIAMS ROAD	LUCEDALE	39452	MS	228-588-3800	1986	2321.12	30.72277100000	-88.50379100000	AMBULANCE AND FIRE SERVICE COMBINED
MS000874	EFFS	28059040102	EAST CENTRAL VOLUNTEER FIRE DEPARTMEN...	7701 COMMUNITY HOUSE ROAD	MOSS POINT	39562	MS	228-588-3800	1986	2321.12	30.58524400000	-88.48035500000	AMBULANCE AND FIRE SERVICE COMBINED
MS000947	EFFS	28059040102	EAST CENTRAL VOLUNTEER FIRE DEPARTMEN...	8417 NUTBANK ROAD	MOSS POINT	39562	MS	228-588-3800	1986	2321.12	30.52486700000	-88.47119300000	AMBULANCE AND FIRE SERVICE COMBINED
MS000949	EFFS	28059040102	FORTS LAKE-FRANKLIN CREEK VOLUNTEER F...	10701 FORTS LAKE ROAD	MOSS POINT	39562	MS	228-474-2421	1986	2321.12	30.49653800000	-88.41553000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000960	EFFS	28059040102	EAST CENTRAL VOLUNTEER FIRE DEPARTMEN...	21728 STATE HIGHWAY 613	MOSS POINT	39562	MS	228-588-3800	1986	2321.12	30.65894100000	-88.49238800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000886	EFFS	28059040201	VANCLEAVE VOLUNTEER FIRE DEPARTMENT -...	13501 MOUNT PLEASANT ROAD	VANCLEAVE	39565	MS	228-826-4206	1991	2321.12	30.53882300000	-88.64818000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000887	EFFS	28059040201	VANCLEAVE VOLUNTEER FIRE DEPARTMENT -...	16410 OLD RIVER ROAD	VANCLEAVE	39565	MS	228-826-4206	1991	2321.12	30.57870200000	-88.65085800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000888	EFFS	28059040201	VANCLEAVE VOLUNTEER FIRE DEPARTMENT -...	5117 BALLPARK ROAD	VANCLEAVE	39565	MS	228-826-4206	1991	2321.12	30.52232800000	-88.69201400000	AMBULANCE AND FIRE SERVICE COMBINED
MS000968	EFFS	28059040201	VANCLEAVE VOLUNTEER FIRE DEPARTMENT -...	17400 STATE HIGHWAY 57	VANCLEAVE	39565	MS	228-826-4206	1991	2321.12	30.59566900000	-88.72019000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000969	EFFS	28059040201	VANCLEAVE VOLUNTEER FIRE DEPARTMENT -...	23300 STATE HIGHWAY 57	VANCLEAVE	39565	MS	228-826-4206	1991	2321.12	30.68033600000	-88.73598600000	AMBULANCE AND FIRE SERVICE COMBINED
MS000967	EFFS	28059040203	LATIMER VOLUNTEER FIRE COMPANY STATIO...	12302 JIM RAMSEY ROAD	VANCLEAVE	39565	MS	228-392-8260	1993	2321.12	30.54499400000	-88.81441800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000884	EFFS	28059040204	LATIMER VOLUNTEER FIRE COMPANY STATION 7	10904 TUCKER ROAD	OCEAN SPRINGS	39565	MS	228-396-2082	1994	2321.12	30.50006000000	-88.86359500000	AMBULANCE AND FIRE SERVICE COMBINED
MS000871	EFFS	28059040300	FORT BAYOU VOLUNTEER FIRE DEPARTMENT ...	14506 LEMOYNE BOULEVARD	BILOXI	39532	MS	228-875-5131	1983	2321.12	30.44346700000	-88.85214700000	AMBULANCE AND FIRE SERVICE COMBINED
MS000941	EFFS	28059040300	WEST JACKSON COUNTY VOLUNTEER FIRE DE...	15324 BIG RIDGE ROAD	BILOXI	39532	MS	228-392-9040	1983	2321.12	30.45000100000	-88.86626900000	AMBULANCE AND FIRE SERVICE COMBINED
MS000942	EFFS	28059040300	WEST JACKSON COUNTY VOLUNTEER FIRE DE...	SAINT MARTIN ROAD	BILOXI	39532	MS	228-392-9040	1983	2321.12	30.43222300000	-88.87821500000	AMBULANCE AND FIRE SERVICE COMBINED
MS000962	EFFS	28059040400	FORT BAYOU VOLUNTEER FIRE DEPARTMENT ...	11401 YELLOW JACKET ROAD	OCEAN SPRINGS	39564	MS	228-875-5131	1987	2321.12	30.44010600000	-88.79854700000	AMBULANCE AND FIRE SERVICE COMBINED
MS001007	EFFS	28059040400	FORT BAYOU VOLUNTEER FIRE DEPARTMENT ...	13209 SEYMOUR LANE	OCEAN SPRINGS	39564	MS	228-875-5131	1987	2321.12	30.43164000000	-88.83024200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000881	EFFS	28059040500	OCEAN SPRINGS FIRE DEPARTMENT - JAMES...	1226 BIENVILLE BOULEVARD	OCEAN SPRINGS	39564	MS	228-875-4063	1971	2321.12	30.41571800000	-88.82377400000	AMBULANCE AND FIRE SERVICE COMBINED
MS001006	EFFS	28059040600	OCEAN SPRINGS FIRE DEPARTMENT - BERNA...	2850 GOVERNMENT STREET	OCEAN SPRINGS	39564	MS	228-875-5057	1974	2321.12	30.41064600000	-88.78903600000	AMBULANCE AND FIRE SERVICE COMBINED
MS001008	EFFS	28059040700	OCEAN SPRINGS FIRE DEPARTMENT - JC GA...	1491 DEENA DRIVE	OCEAN SPRINGS	39564	MS	228-875-2482	1989	2321.12	30.41597700000	-88.76413600000	AMBULANCE AND FIRE SERVICE COMBINED
MS000945	EFFS	28059040800	GAUTIER FIRE DEPARTMENT - NORTH STATION	7510 MARTIN BLUFF ROAD	GAUTIER	39553	MS	228-497-5910	1993	2321.12	30.45126500000	-88.63194900000	AMBULANCE AND FIRE SERVICE COMBINED
MS001010	EFFS	28059040800	GULF COAST NATIONAL WILDLIFE REFUGE C...	7200 CRANE LANE	GAUTIER	39553	MS	228-497-5780	1993	2321.12	30.44823200000	-88.65985000000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000882	EFFS	28059040900	GULF PARK ESTATES VOLUNTEER FIRE DEPA...	2306 EAST SIMMONS BAYOU DRIVE	OCEAN SPRINGS	39564	MS	228-872-5955	1999	2321.12	30.37329500000	-88.75112500000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000883	EFFS	28059040900	FOUNTAINBLEAU VOLUNTEER FIRE DEPARTME...	3901 STATE HIGHWAY 57 SOUTH	OCEAN SPRINGS	39564	MS	228-875-0620	1999	2321.12	30.39756800000	-88.72206800000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000899	EFFS	28059040900	FONTAINEBLEAU VOLUNTEER FIRE DEPARTME...	4920 BEACH BOULEVARD	OCEAN SPRINGS	39564	MS	228-875-0620	1999	2321.12	30.35587400000	-88.69187400000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000963	EFFS	28059040900	GULF PARK ESTATES VOLUNTEER FIRE DEPA...	1401 ELM STREET	OCEAN SPRINGS	39564	MS	228-872-5341	1999	2321.12	30.36137500000	-88.71990600000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000944	EFFS	28059041000	GAUTIER FIRE DEPARTMENT - CENTRAL STA...	2502 COLLEGE CIRCLE	GAUTIER	39553	MS	228-497-1656	1979	2321.12	30.39387400000	-88.65088400000	AMBULANCE AND FIRE SERVICE COMBINED
MS000943	EFFS	28059041100	GAUTIER FIRE DEPARTMENT - SOUTH STATION	1905 LADNIER DRIVE	GAUTIER	39553	MS	228-497-9975	1986	2321.12	30.36955800000	-88.64683500000	AMBULANCE AND FIRE SERVICE COMBINED
MS000948	EFFS	28059041300	ESCATAWPA FIRE DEPARTMENT STATION 1	3801 SENTINEL DRIVE	MOSS POINT	39562	MS	228-475-2912	1977	2321.12	30.47716000000	-88.54785200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000950	EFFS	28059041300	CITY OF MOSS POINT FIRE DEPARTMENT - ...	4223 OLD SARACENNIA ROAD	MOSS POINT	39563	MS	228-474-2402	1977	2321.12	30.45415400000	-88.53974700000	AMBULANCE AND FIRE SERVICE COMBINED
MS000959	EFFS	28059041300	ESCATAWPA FIRE DEPARTMENT STATION 2	6431 CODA ROAD	MOSS POINT	39562	MS	228-475-2912	1977	2321.12	30.48267700000	-88.50167700000	AMBULANCE AND FIRE SERVICE COMBINED
MS000880	EFFS	28059041500	CITY OF MOSS POINT FIRE DEPARTMENT - ...	4323 MCINNIS AVENUE	MOSS POINT	39563	MS	228-475-8848	1968	2321.12	30.41335900000	-88.53841200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000951	EFFS	28059041600	CITY OF MOSS POINT FIRE DEPARTMENT - ...	4225 KREOLE STREET	MOSS POINT	39563	MS	228-475-5655	1970	2321.12	30.40271700000	-88.49485000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000952	EFFS	28059041800	CITY OF MOSS POINT FIRE DEPARTMENT - ...	5206 MARTIN LUTHER KING JUNIOR BOULEVARD	MOSS POINT	39563	MS	228-475-7778	1964	2321.12	30.40215200000	-88.52364500000	AMBULANCE AND FIRE SERVICE COMBINED
MS000885	EFFS	28059041900	PASCAGOULA FIRE DEPARTMENT - LAKE AVE...	1411 LAKE AVENUE	PASCAGOULA	39567	MS	228-762-1441	1976	2321.12	30.37794400000	-88.54910200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000966	EFFS	28059042100	PASCAGOULA FIRE DEPARTMENT - BAYOU CA...	3616 SCOVEL AVENUE	PASCAGOULA	39581	MS	228-762-5661	1968	2321.12	30.36184900000	-88.52430000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000964	EFFS	28059042200	PASCAGOULA FIRE DEPARTMENT - CENTRAL ...	1707 JACKSON AVENUE	PASCAGOULA	39567	MS	228-762-0751	1965	2321.12	30.36527100000	-88.54673000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000961	EFFS	28059042700	FORTS LAKE-FRANKLIN CREEK VOLUNTEER F...	5625 ORANGE GROVE ROAD	MOSS POINT	39562	MS	228-474-2421	1969	2321.12	30.41654500000	-88.45938200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000006	EFEO	28059042900	JACKSON COUNTY EMERGENCY MANAGEMENT	600 CONVENT AVENUE	PASCAGOULA	39567	MS	228-769-3111	1953	2321.12	30.36512900000	-88.55903900000	EMERGENCY PLANNING AND MANAGEMENT OFF...
MS000048	EFHM	28059040700	OCEAN SPRINGS HOSPITAL	3109 BIENVILLE BOULEVARD	OCEAN SPRINGS	39564	MS	(228) 818-1111	1989	0.00	30.41413500000	-88.78071400000	GENERAL MEDICAL AND SURGICAL HOSPITALS
MS000013	EFHL	28059041900	SINGING RIVER HOSPITAL	2809 DENNY AVENUE	PASCAGOULA	39581	MS	(228) 809-5000	1976	0.00	30.37639400000	-88.53344400000	GENERAL MEDICAL AND SURGICAL HOSPITALS

Pearl River County Facilities

ID	EfClass	Tract	Name	Address	City	Zipcode	Statea	PhoneNumbe	YearBu	Cost	Latitude	Longitude	Comment
MS000008	EFS1	28109950300	POPLARVILLE UPPER ELEMENTARY SCH	ONE TODD CIRCLE	POPLARVILLE	39470	MS	(601) 795-8303	1977	5233.74	30.84688300000	-89.52646300000	ELEMENTARY AND SECONDARY SCHOOLS
MS000505	EFS1	28109950300	POPLARVILLE LOWER ELEMENTARY SCHOOL	804 SOUTH JULIA STREET SUITE A	POPLARVILLE	39470	MS	(601) 795-4736	1977	5449.92	30.83905600000	-89.53635200000	ELEMENTARY AND SECONDARY SCHOOLS
MS000704	EFS1	28109950300	POPLARVILLE JR SR HIGH SCHOOL	#1 HORNET DRIVE	POPLARVILLE	39470	MS	(601) 795-8424	1977	7099.68	30.83279700000	-89.52672200000	ELEMENTARY AND SECONDARY SCHOOLS
MS000864	EFS1	28109950300	POPLARVILLE CAREER DEVELOPMENT CTR	9 CAREER CENTER CIRCLE	POPLARVILLE	39470	MS	(601) 795-8343	1977	68.27	30.83130200000	-89.52525300000	ELEMENTARY AND SECONDARY SCHOOLS
MS000876	EFS1	28109950300	MIDDLE SCHOOL OF POPLARVILLE	6 SPIRIT STREET	POPLARVILLE	39470	MS	(601) 795-1350	1977	5711.60	30.82939300000	-89.52402400000	ELEMENTARY AND SECONDARY SCHOOLS
MS001325	EFS2	28109950300	PEARL RIVER COMMUNITY COLLEGE	101 HWY 11 N	POPLARVILLE	39470	MS	(601) 403-1000	1977	60211.46	30.84549600000	-89.54419100000	JUNIOR COLLEGES
MS000088	EFS1	28109950402	PEARL RIVER CENTRAL LOWER ELEMENTAR	116 ALPHABET AVE.	CARRIERE	39426	MS	(601) 799-4519	1991	8066.79	30.66326800000	-89.64199600000	ELEMENTARY AND SECONDARY SCHOOLS
MS000094	EFS1	28109950402	PEARL RIVER CENTRAL UPPER ELEMENTAR	1592 HENLEYFIELD MCNEILL ROAD	CARRIERE	39426	MS	(601) 798-2864	1991	8760.82	30.66495600000	-89.64173900000	ELEMENTARY AND SECONDARY SCHOOLS
MS000466	EFS1	28109950402	PEARL RIVER CENTRAL JUNIOR HIGH	7391 HWY 11	CARRIERE	39426	MS	(601) 798-5654	1991	8908.73	30.62631700000	-89.65429700000	ELEMENTARY AND SECONDARY SCHOOLS
MS000767	EFS1	28109950402	PEARL RIVER CENTRAL HIGH SCHOOL	7407 HIGHWAY 11	CARRIERE	39426	MS	(601) 798-1986	1991	10615.39	30.62500500000	-89.65399400000	ELEMENTARY AND SECONDARY SCHOOLS
MS001044	EFS1	28109950402	CENTER FOR ALTERNATIVE EDUCATION	461 BURGETOWN RD.	CARRIERE	39426	MS	(601) 798-6852	1991	0.00	30.60260900000	-89.68379200000	ELEMENTARY AND SECONDARY SCHOOLS
MS001269	EFS1	28109950501	UNION BAPTIST ACADEMY	1628 W UNION RD	PICAYUNE	39466	MS	NOT AVAILABLE	1989	1274.30	30.57573900000	-89.57552000000	ELEMENTARY AND SECONDARY SCHOOLS
MS000056	EFS1	28109950600	WEST SIDE ELEMENTARY SCHOOL	111 KIRKWOOD STREET	PICAYUNE	39466	MS	(601) 798-3625	1966	5154.10	30.52886100000	-89.69019500000	ELEMENTARY AND SECONDARY SCHOOLS
MS000423	EFS1	28109950600	PMHS CAREER & TECHNOLOGY CENTER	600 GOODYEAR BLVD.	PICAYUNE	39466	MS	(601) 798-7601	1966	91.02	30.52995200000	-89.68548500000	ELEMENTARY AND SECONDARY SCHOOLS
MS000523	EFS1	28109950600	PICAYUNE JUNIOR HIGH SCHOOL	702 GOODYEAR BLVD.	PICAYUNE	39466	MS	(601) 798-5449	1966	6803.86	30.53072800000	-89.68737300000	ELEMENTARY AND SECONDARY SCHOOLS
MS000872	EFS1	28109950600	PICAYUNE MEMORIAL HIGH SCHOOL	800 FIFTH AVENUE	PICAYUNE	39466	MS	(601) 798-1380	1966	10865.70	30.53218800000	-89.68751000000	ELEMENTARY AND SECONDARY SCHOOLS
MS000934	EFS1	28109950600	CENTER FOR ALTERNATIVE EDUCATION	900 EAST THIRD STREET	PICAYUNE	39466	MS	(601) 799-0684	1966	113.78	30.52946000000	-89.67632700000	ELEMENTARY AND SECONDARY SCHOOLS
MS000937	EFS1	28109950600	ROSELAND PARK ELEMENTARY SCHOOL	1610 GILCREASE STREET	PICAYUNE	39466	MS	(601) 798-6824	1966	6417.02	30.53847400000	-89.66781400000	ELEMENTARY AND SECONDARY SCHOOLS
MS001116	EFS1	28109950600	HERITAGE CHRISTIAN ACADEMY	401 GOODYEAR BLVD	PICAYUNE	39466	MS	NOT AVAILABLE	1966	648.53	30.52806000000	-89.68364400000	ELEMENTARY AND SECONDARY SCHOOLS
MS001119	EFS1	28109950600	ST CHARLES BORROMEO CATHOLIC SCHOOL	1006 GOODYEAR BLVD	PICAYUNE	39466	MS	NOT AVAILABLE	1966	1149.15	30.53171000000	-89.68958100000	ELEMENTARY AND SECONDARY SCHOOLS
MS001268	EFS1	28109950600	ROSELAND PARK BAPTIST CHURCH ACADEMY	2132 HIGHWAY 11 N	PICAYUNE	39466	MS	NOT AVAILABLE	1966	1262.92	30.54386500000	-89.66931800000	ELEMENTARY AND SECONDARY SCHOOLS
MS000085	EFS1	28109950700	EARLY HEAD START ROSA STREET	1620 ROSA STREET	PICAYUNE	39466	MS	(601) 799-4702	1977	2309.67	30.52176000000	-89.69840000000	ELEMENTARY AND SECONDARY SCHOOLS
MS000552	EFS1	28109950700	NICHOLSON ELEMENTARY SCHOOL	1887 HWY 11 SOUTH	PICAYUNE	39466	MS	(601) 798-6309	1977	4983.43	30.47975900000	-89.69130700000	ELEMENTARY AND SECONDARY SCHOOLS
MS000708	EFS1	28109950700	SOUTH SIDE ELEMENTARY SCHOOL	1500 ROSA STREET	PICAYUNE	39466	MS	(601) 798-1105	1977	3504.33	30.52189100000	-89.69555900000	ELEMENTARY AND SECONDARY SCHOOLS
MS000734	EFS1	28109950700	EARLY HEAD START NICHOLSON	1865 HWY 11 SOUTH	PICAYUNE	39466	MS	(601) 798-7808	1977	1444.97	30.47989900000	-89.69124700000	ELEMENTARY AND SECONDARY SCHOOLS
MS000837	EFS1	28109950700	SOUTH SIDE LOWER ELEMENTARY SCHOOL	400 SOUTH BEECH STREET	PICAYUNE	39466	MS	(601) 799-0683	1977	3026.47	30.52218100000	-89.69726000000	ELEMENTARY AND SECONDARY SCHOOLS
MS001231	EFS1	28109950700	ANNIE'S KINDERGARTEN AND DAY CARE	716 DAVIS ST	PICAYUNE	39466	MS	NOT AVAILABLE	1977	125.15	30.51920200000	-89.68974600000	ELEMENTARY AND SECONDARY SCHOOLS
MS000068	EFPS	28109950200	PEARL RIVER COUNTY SHERIFFS DEPARTMEN...	171 SAVANNAH MILLARD ROAD	POPLARVILLE	39470	MS	(601) 403-2300	1986	2209.26	30.72343800000	-89.58046800000	POLICE PROTECTION
MS000136	EFPS	28109950300	POPLARVILLE POLICE DEPARTMENT	200 STATE HIGHWAY 26 EAST	POPLARVILLE	39470	MS	(601) 795-4447	1977	2209.26	30.83820300000	-89.52608400000	POLICE PROTECTION
MS000280	EFPS	28109950300	PEARL RIVER COMMUNITY COLLEGE CAMPUS ...	101 UNITED STATES HIGHWAY 11 NC	POPLARVILLE	39470	MS	(601) 403-1300	1977	2209.26	30.84559900000	-89.54378300000	POLICE PROTECTION
MS000121	EFPS	28109950700	PICAYUNE POLICE DEPARTMENT	328 SOUTH MAIN STREET	PICAYUNE	39466	MS	(601) 798-7411	1977	2209.26	30.52443500000	-89.68262900000	POLICE PROTECTION
MS000878	EFFS	28109950100	MISSISSIPPI FORESTRY COMMISSION - PEA...	3969 STATE HIGHWAY 53	POPLARVILLE	39470	MS	601-795-4912	1987	2209.26	30.76716000000	-89.49716700000	FIREFIGHTING, FOREST
MS000902	EFFS	28109950100	STEEPHOLLOW VOLUNTEER FIRE DEPARTMENT...	4277 STATE HIGHWAY 53 SOUTH	POPLARVILLE	39470	MS	601-403-2300	1987	2209.26	30.78901400000	-89.50306700000	AMBULANCE AND FIRE SERVICE COMBINED
MS000903	EFFS	28109950100	STEEPHOLLOW VOLUNTEER FIRE DEPARTMENT...	15 BARTH ROAD	POPLARVILLE	39470	MS	601-403-2300	1987	2209.26	30.66612500000	-89.42825600000	AMBULANCE AND FIRE SERVICE COMBINED
MS000915	EFFS	28109950100	NORTHEAST VOLUNTEER FIRE DEPARTMENT S...	2700 STATE HIGHWAY 13	LUMBERTON	39455	MS	601-403-2300	1987	2209.26	30.99715800000	-89.39376300000	AMBULANCE AND FIRE SERVICE COMBINED
MS000916	EFFS	28109950100	NORTHEAST VOLUNTEER FIRE DEPARTMENT S...	462 HILLSDALE GUMPOND ROAD	LUMBERTON	39455	MS	601-403-2300	1987	2209.26	30.91099900000	-89.42421400000	AMBULANCE AND FIRE SERVICE COMBINED
MS000919	EFFS	28109950100	NORTH CENTRAL VOLUNTEER FIRE DEPARTME...	227 OTIS JONES ROAD	LUMBERTON	39455	MS	601-403-2300	1987	2209.26	30.99078700000	-89.49943100000	AMBULANCE AND FIRE SERVICE COMBINED
MS000932	EFFS	28109950100	STEEPHOLLOW VOLUNTEER FIRE DEPARTMENT...	1748 SILVER RUN ROAD	POPLARVILLE	39470	MS	601-403-2300	1987	2209.26	30.79579600000	-89.38622700000	AMBULANCE AND FIRE SERVICE COMBINED
MS000877	EFFS	28109950200	AMACKERTOWN VOLUNTEER FIRE DEPARTMENT	8160 STATE HIGHWAY 43 NORTH	POPLARVILLE	39470	MS	601-798-5528	1986	2209.26	30.83454400000	-89.75295200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000900	EFFS	28109950200	AMACKERTOWN VOLUNTEER FIRE DEPARTMENT	9655 STATE HIGHWAY 43 NORTH	POPLARVILLE	39470	MS	601-798-5528	1986	2209.26	30.90505000000	-89.72549500000	AMBULANCE AND FIRE SERVICE COMBINED
MS000904	EFFS	28109950200	DERBY-WHITESAND VOLUNTEER FIRE DEPART...	28 ROBERT JAMES ROAD	POPLARVILLE	39470	MS	601-798-5528	1986	2209.26	30.84285800000	-89.58995700000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000934	EFFS	28109950200	NORTH CENTRAL VOLUNTEER FIRE DEPARTME...	1089 SPRING HILL ROAD	POPLARVILLE	39470	MS	601-798-5528	1986	2209.26	30.93656900000	-89.55275100000	AMBULANCE AND FIRE SERVICE COMBINED
MS000935	EFFS	28109950200	DERBY-WHITESAND VOLUNTEER FIRE DEPART...	672 DERBY WHITE SAND ROAD	POPLARVILLE	39470	MS	601-798-5528	1986	2209.26	30.75903400000	-89.58610100000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000901	EFFS	28109950300	CITY OF POPLARVILLE FIRE DEPARTMENT	101 INDUSTRIAL DRIVE	POPLARVILLE	39470	MS	601-795-2200	1977	2209.26	30.82789900000	-89.52591900000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000913	EFFS	28109950401	HENLEYFIELD VOLUNTEER FIRE DEPARTMENT	5583 STATE HIGHWAY 43 NORTH	CARRIERE	39426	MS	601-799-3941	1988	2209.26	30.69357100000	-89.76325400000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000921	EFFS	28109950401	PICAYUNE FIRE DEPARTMENT STATION 3	1700 PALESTINE ROAD	PICAYUNE	39466	MS	601-798-4811	1988	2209.26	30.52740000000	-89.69892000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000930	EFFS	28109950401	PINE GROVE VOLUNTEER FIRE DEPARTMENT ...	86 PINE GROVE ROAD	PICAYUNE	39466	MS	601-749-8810	1988	2209.26	30.57972800000	-89.76375800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000933	EFFS	28109950401	CROSSROADS VOLUNTEER FIRE DEPARTMENT	6868 STATE HIGHWAY 43 NORTH	POPLARVILLE	39470	MS	601-798-5528	1988	2209.26	30.78233900000	-89.77484500000	AMBULANCE AND FIRE SERVICE COMBINED
MS000911	EFFS	28109950402	MCNEILL VOLUNTEER FIRE DEPARTMENT	106 LIBRARY STREET	CARRIERE	39426	MS	601-798-7065	1991	2209.26	30.66647900000	-89.63821500000	AMBULANCE AND FIRE SERVICE COMBINED
MS000912	EFFS	28109950402	CARRIERE VOLUNTEER FIRE DEPARTMENT ST...	7414 UNITED STATES HIGHWAY 11 N	CARRIERE	39426	MS	601-799-2345	1991	2209.26	30.62527200000	-89.65222400000	AMBULANCE AND FIRE SERVICE COMBINED
MS000923	EFFS	28109950402	PINE GROVE VOLUNTEER FIRE DEPARTMENT ...	262 LIBERTY ROAD	PICAYUNE	39466	MS	601-798-5528	1991	2209.26	30.57581300000	-89.70758000000	AMBULANCE AND FIRE SERVICE COMBINED
MS000909	EFFS	28109950501	CARRIERE VOLUNTEER FIRE DEPARTMENT ST...	483 SYCAMORE ROAD	CARRIERE	39426	MS	601-798-5528	1989	2209.26	30.55926500000	-89.61782700000	AMBULANCE AND FIRE SERVICE COMBINED
MS000914	EFFS	28109950501	SOUTHEAST VOLUNTEER FIRE DEPARTMENT S...	311 MOUNT CARMEL ROAD	CARRIERE	39426	MS	601-798-5528	1989	2209.26	30.60467300000	-89.57394600000	AMBULANCE AND FIRE SERVICE COMBINED
MS000931	EFFS	28109950501	SOUTHEAST VOLUNTEER FIRE DEPARTMENT S...	298 SALEM ROAD	PICAYUNE	39466	MS	601-798-5528	1989	2209.26	30.52372200000	-89.59800400000	AMBULANCE AND FIRE SERVICE COMBINED
MS000910	EFFS	28109950502	CARRIERE VOLUNTEER FIRE DEPARTMENT ST...	4 WEST LAKESHORE DRIVE	CARRIERE	39426	MS	601-798-5528	1991	2209.26	30.56281200000	-89.65610600000	AMBULANCE AND FIRE SERVICE COMBINED
MS000922	EFFS	28109950600	PICAYUNE FIRE DEPARTMENT STATION 1 - ...	2233 ADCOX ROAD	PICAYUNE	39466	MS	601-798-7862	1966	2209.26	30.54665600000	-89.66683200000	AMBULANCE AND FIRE SERVICE COMBINED
MS000920	EFFS	28109950700	PICAYUNE FIRE DEPARTMENT STATION 2	220 SOUTH HAUGH AVENUE	PICAYUNE	39466	MS	601-799-0614	1977	2209.26	30.52338000000	-89.67844700000	AMBULANCE AND FIRE SERVICE COMBINED
MS000924	EFFS	28109950700	NICHOLSON VOLUNTEER FIRE DEPARTMENT	1981 UNITED STATES HIGHWAY 11 S	PICAYUNE	39466	MS	601-799-1010	1977	2209.26	30.47309800000	-89.69007800000	AMBULANCE AND FIRE SERVICE COMBINED
MS000008	EFEO	28109950300	PEARL RIVER COUNTY EMERGENCY OPERATIO...	530 STATE HIGHWAY 26 EAST	POPLARVILLE	39470	MS	601-795-3058	1977	2209.26	30.84286600000	-89.51259600000	EMERGENCY PLANNING AND MANAGEMENT OFF
MS000055	EFHS	28109950300	PEARL RIVER COUNTY HOSPITAL	305 WEST MOODY STREET	POPLARVILLE	39470	MS	(601) 795-4543	1977	0.00	30.85654000000	-89.54201100000	GENERAL MEDICAL AND SURGICAL HOSPITALS
MS000053	EFHM	28109950502	HIGHLAND COMMUNITY HOSPITAL	130 HIGHLANDS PARKWAY	PICAYUNE	39466	MS	(601) 358-9400	1991	0.00	30.55006300000	-89.66513200000	GENERAL MEDICAL AND SURGICAL HOSPITALS

Stone County Facilities

ID	EfClass	Tract	Name	Address	City	Zipcode	Statea	PhoneNumbe	YearBu	Cost	Latitude	Longitude	Comment
MS000142	EFS1	28131020100	STONE HIGH SCHOOL	400 EAST BORDER AVE.	WIGGINS	39577	MS	(601) 928-5492	1974	10088.99	30.85476000000	-89.13482100000	ELEMENTARY AND SECONDARY SCHOOLS
MS000796	EFS1	28131020100	STONE MIDDLE SCHOOL	532 E CENTRAL AVE.	WIGGINS	39577	MS	(601) 928-4876	1974	7734.10	30.85085700000	-89.13120000000	ELEMENTARY AND SECONDARY SCHOOLS
MS000337	EFS1	28131020201	STONE ELEMENTARY SCHOOL	1652 EAST CENTRAL AVE	WIGGINS	39577	MS	(601) 928-5473	1995	8881.66	30.84349800000	-89.11089000000	ELEMENTARY AND SECONDARY SCHOOLS
MS000650	EFS1	28131020202	PERKINSTON ELEMENTARY SCHOOL	40 SECOND STREET	PERKINSTON	39573	MS	(601) 928-3380	1988	6945.15	30.78451900000	-89.14086800000	ELEMENTARY AND SECONDARY SCHOOLS
MS001240	EFS1	28131020202	VARDAMAN STREET CHRISTIAN ACADEMY	908 FRONTAGE DR W	WIGGINS	39577	MS	NOT AVAILABLE	1988	920.44	30.84722800000	-89.15368500000	ELEMENTARY AND SECONDARY SCHOOLS
MS001355	EFS2	28131020202	MISSISSIPPI GULF COAST COMMUNITY COLLEGE	51 MAIN STREET	PERKINSTON	39573	MS	(866) 735-1122	1988	116404.80	30.77934900000	-89.14433900000	JUNIOR COLLEGES
MS000002	EFEO	28131020100	STONE COUNTY EMERGENCY OPERATIONS CENTI	119 NORTH VARDAMAN ST	WIGGINS	39577	MS	601-928-3077	1974	2321.12	30.85954800000	-89.13902700000	EMERGENCY PLANNING AND MANAGEMENT OFF
MS000067	EFHS	28131020201	STONE COUNTY HOSPITAL	1434 EAST CENTRAL AVENU	WIGGINS	39577	MS	(601) 928-6600	1995	0.00	30.84486800000	-89.11577100000	GENERAL MEDICAL AND SURGICAL HOSPITALS
MS000929	EFFS	28131020100	WIGGINS FIRE DEPARTMENT	140 NORTH MAGNOLIA DR	WIGGINS	39577	MS	601-928-5446	1974	2321.12	30.85981900000	-89.13892700000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000918	EFFS	28131020201	BIG LEVEL VOLUNTEER FIRE DEPARTMENT	1414 KING BEE ROAD	PERKINSTON	39573	MS	601-928-2800	1995	2321.12	30.80355000000	-89.02369200000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000926	EFFS	28131020201	MCHENRY VOLUNTEER FIRE DEPARTMENT SUB...	447 WIRE ROAD EAST	PERKINSTON	39573	MS	601-528-9444	1995	2321.12	30.74283000000	-89.09929700000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000917	EFFS	28131020202	MCHENRY VOLUNTEER FIRE DEPARTMENT	95 MCHENRY AVENUE	MCHENRY	39561	MS	601-528-9444	1988	2321.12	30.70898300000	-89.13905400000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000925	EFFS	28131020202	PERKINSTON VOLUNTEER FIRE DEPARTMENT	2441 PERKINSTON-SILVER I	PERKINSTON	39573	MS	601-928-6231	1988	2321.12	30.77451600000	-89.14431600000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000927	EFFS	28131020202	SILVER RUN VOLUNTEER FIRE DEPARTMENT	1071 RIDGE ROAD	PERKINSTON	39573	MS	601-528-4024	1988	2321.12	30.71702700000	-89.32075000000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000928	EFFS	28131020202	MAGNOLIA VOLUNTEER FIRE DEPARTMENT	350 MAGNOLIA ROAD	PERKINSTON	39573	MS	601-928-9434	1988	2321.12	30.81789000000	-89.30310400000	FIRE DEPARTMENTS (E.G., GOVERNMENT, V...
MS000348	EFPS	28131020100	WIGGINS POLICE DEPARTMENT	303 FIRST STREET SOUTH	WIGGINS	39577	MS	(601) 928-5444	1974	2321.12	30.85628500000	-89.13763600000	POLICE PROTECTION
MS000366	EFPS	28131020100	STONE COUNTY SHERIFFS OFFICE / STONE ...	1420 INDUSTRIAL PARK RO	WIGGINS	39577	MS	(601) 928-7251	1974	2321.12	30.83609600000	-89.13456200000	POLICE PROTECTION
MS000046	EFPS	28131020202	MISSISSIPPI GULF COAST COMMUNITY COLL...	51 MAIN STREET, PERKINST	PERKINSTON	39573	MS	(601) 928-5211	1988	2321.12	30.78021200000	-89.14435600000	POLICE PROTECTION

APPENDIX E
Flood Appendix

For additional information related to flood **extent**, each participating jurisdiction's floodplain manager was contacted via email to ensure local knowledge was incorporated into the flood appendix of the regional hazard mitigation plan update. Where available flood depths were provided for the hazard under the subsequent **Flood Extent**.

George County Municipal Flood Maps:

George County Flood Extent:

Based on recorded historical events George county has experienced rain events ranging up to 8 to 12'' of rainfall from a single event. Heavy rainfall associated with Hurricane Ida from August 2021, the county experienced heavy rainfall area wide resulting in 3 deaths and 7 injuries. During the event high water lines were reported 3 to 4.5 feet within the county. Additional damages frm such an event range from a few inches to several feet of water in low lying areas.

George County Floodplain Management:

Flood Insurance Rate Map: Effective September 19, 2012

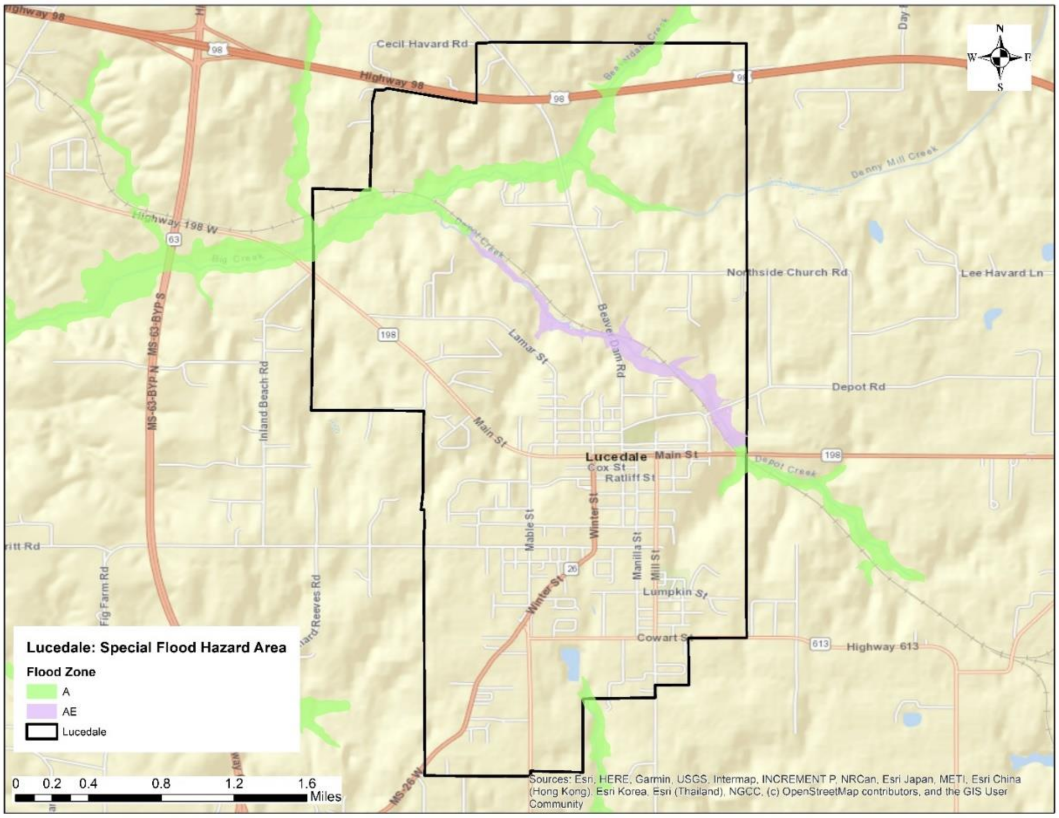
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted George County Flood Damage Prevention Ordinance by George County Code Administration. Which is brought before the George County Board of Supervisors for adoption.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by George County Floodplain Administrator through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: George County Floodplain Administrator

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: A 10-year tracking process occurs and if a residence exceeds 50% of the value of the structure in improvements or damages the current effective flood regulations would apply. Substantial Improvement/Substantial Damage is treated as new construction, all regulations pertaining to new construction would apply.

Lucedale Special Flood Hazard Area



Municipal flood extent: Based on historic data provided via NCEI records, Lucedale can experience heavy rain/flash flood events ranging from 8-12'' of rain in a given event with up to 2'' per hour rainfall rate. Records provided indicate that the heavy rains associated with Hurricane Ida, in August 2021, eight to twelve inches of rain fell across George County which resulted in significant flash flooding. A portion of Highway 26 collapsed just west of Lucedale, killing three people and injuring seven others. Eleven other roads were significantly flooded and had some form of washout or damage flood lines were measured at 3 to 4.5' within the planning area.

Flood Insurance Rate Map: Effective September 19, 2012

NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted Lucedale Flood Damage Prevention Ordinance by Lucedale Code Enforcement Office.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by Lucedale Code Enforcement Office. through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: Lucedale Code Enforcement Office.

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: A 10-year tracking process occurs and if a residence exceeds 50% of the value of the structure in improvements or damages the current effective flood regulations would apply. Substantial Improvement/Substantial Damage is treated as new construction, all regulations pertaining to new construction would apply.

Hancock County Municipal Flood Maps:

Hancock County Floodplain Management:

Flood Insurance Rate Map: Effective and adopted September 27, 2019

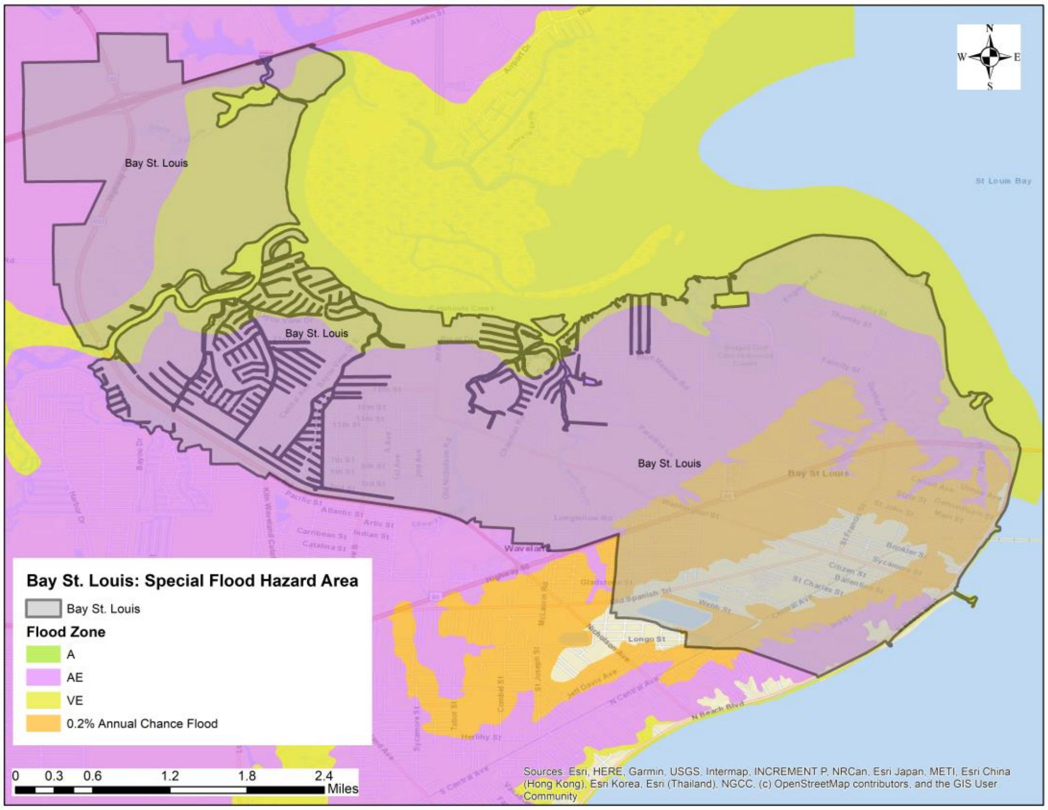
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted Hancock County Flood Damage Prevention Ordinance by Hancock County Planning and Zoning Department.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by Hancock County Planning and Zoning Department through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: Hancock County Planning and Zoning Department

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: A 10-year tracking process occurs and if a residence exceeds 50% of the value of the structure in improvements or damages the current effective flood regulations would apply. Substantial Improvement/Substantial Damage is treated as new construction, all regulations pertaining to new construction would apply.

Bay St. Louis Special Flood Hazard Area



Municipal flood extent: With several reported events in NCEI records the primary extent of most heavy rain/flash flood events causes street and ditch flooding along areas of Highway 90 as well as reported events for areas around Washington Street and Jordan River Rd. The event recorded in NCEI related to remnants of Tropical Storm Allison in June 2001, produced 5-10'' of rainfall throughout the entire area, with reports of additional street flooding throughout Hancock County and Bay St. Louis, water depths range from a few inches to several feet within low lying areas throughout the planning area.

<u>Bay St Louis Floodplain Management:</u>

Flood Insurance Rate Map: Effective and adopted September 27, 2019

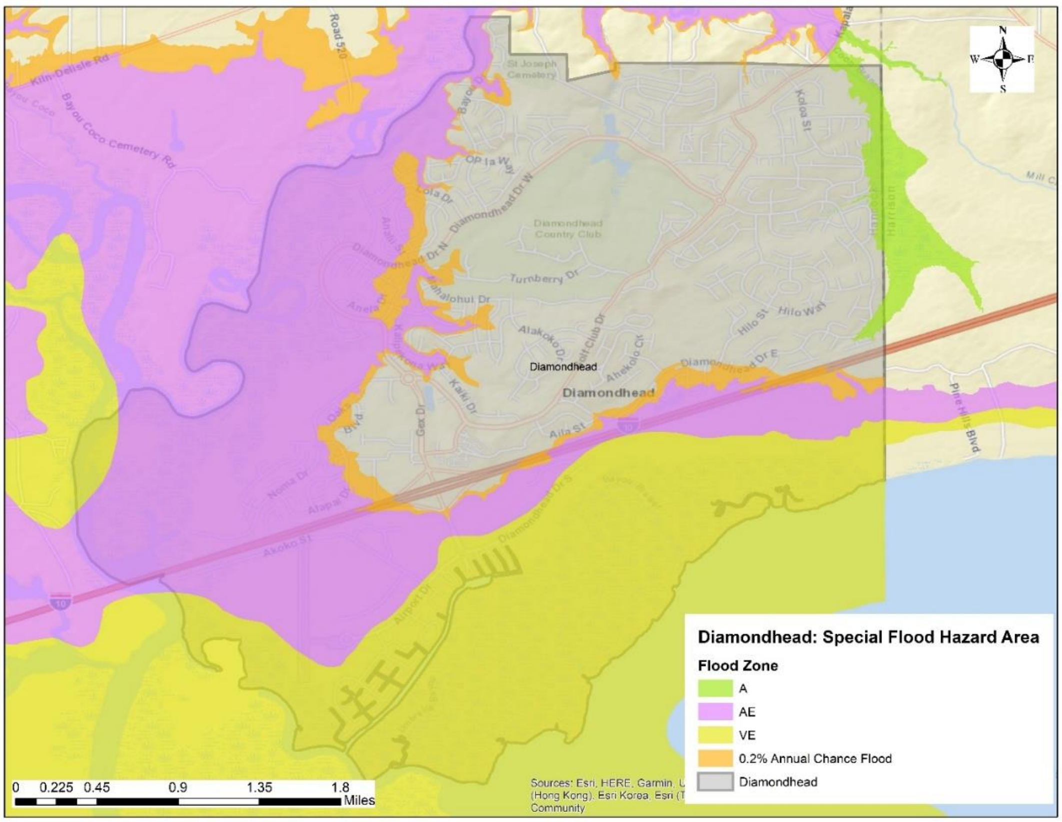
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted Bay St Louis Flood Damage Prevention Ordinance. Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities; (2)Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction; (3)Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters; (4)Controlling filling, grading, dredging, and other development which may increase flood damage; and (5)Preventing or regulating the construction of flood barriers that will unnaturally divert floodwaters or may increase flood hazards in other areas.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by Bay St Louis Floodplain Administrator through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: Bay St Louis Floodplain Administrator

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: A 10-year tracking process occurs and if a residence exceeds 50% of the value of the structure in improvements or damages the current effective flood regulations would apply. Substantial Improvement/Substantial Damage is treated as new construction, all regulations pertaining to new construction would apply.

Diamondhead Special Flood Hazard Area



Municipal flood extent: In March 2012 A slow moving cold front provided a focus for several waves of thunderstorms and heavy rain over a 3 day period. Several reports of tornadoes and flash flooding were received during the period. Widespread street flooding reported in Diamondhead. Some severe street flooding occurred with an estimated two and a half feet depth at its deepest points. Additional reports provided by NCEI include the 5-10'' event total rainfall amounts produced by Tropical Storm Allison in June 2001 that encompassed all of Hancock County including the Diamondhead area.

Flood Insurance Rate Map: Effective and adopted September 27, 2019

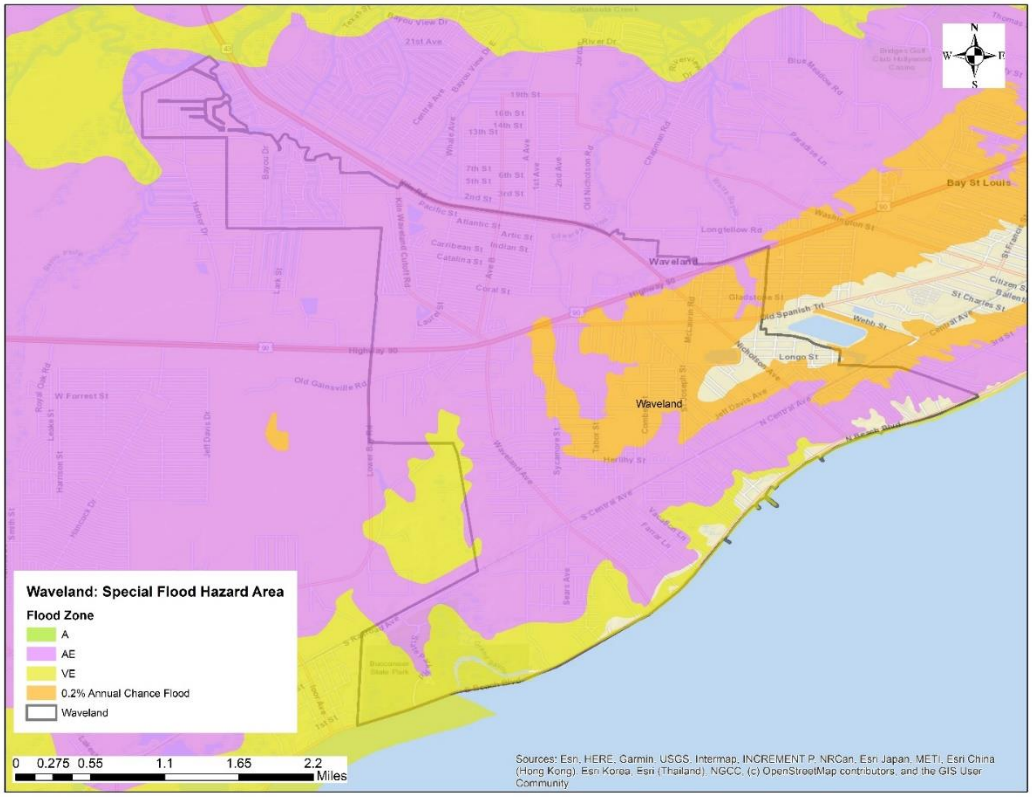
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted Diamondhead Flood Damage Prevention Ordinance. Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities; (2)Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction; (3)Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters; (4)Controlling filling, grading, dredging, and other development which may increase flood damage; and (5)Preventing or regulating the construction of flood barriers that will unnaturally divert floodwaters or may increase flood hazards in other areas.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by Diamondhead Floodplain Administrator through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: Diamondhead Floodplain Administrator

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: A 10-year tracking process occurs and if a residence exceeds 50% of the value of the structure in improvements or damages the current effective flood regulations would apply. Substantial Improvement/Substantial Damage is treated as new construction, all regulations pertaining to new construction would apply.

Waveland Special Flood Hazard Area



Municipal flood extent: With reports provided via NCEI data areas along Chapman Rd and Harrison Avenue experience street flooding from heavy rainfall events as well as undefined locations throughout the Waveland area have reported widespread and significant street flooding that often leads to road closures due to flooding events, official water depths for reported events are not available for the Waveland area outside of the recorded rainfall totals that can range upwards of 5-10'' in a single event. The resulting water levels range from a few inches to several feet in low lying areas within the planning area.

Flood Insurance Rate Map: Effective and adopted September 27, 2019

NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted Waveland Flood Damage Prevention Ordinance.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by Waveland Floodplain Administrator through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, and plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: Waveland Floodplain Administrator

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: A 10-year tracking process occurs and if a residence exceeds 50% of the value of the structure in improvements or damages the current effective flood regulations would apply. Substantial Improvement/Substantial Damage is treated as new construction, all regulations pertaining to new construction would apply.

Harrison County Municipal Flood Maps:

Harrison County Floodplain Management:

Flood Insurance Rate Map: Effective and adopted December 21, 2017

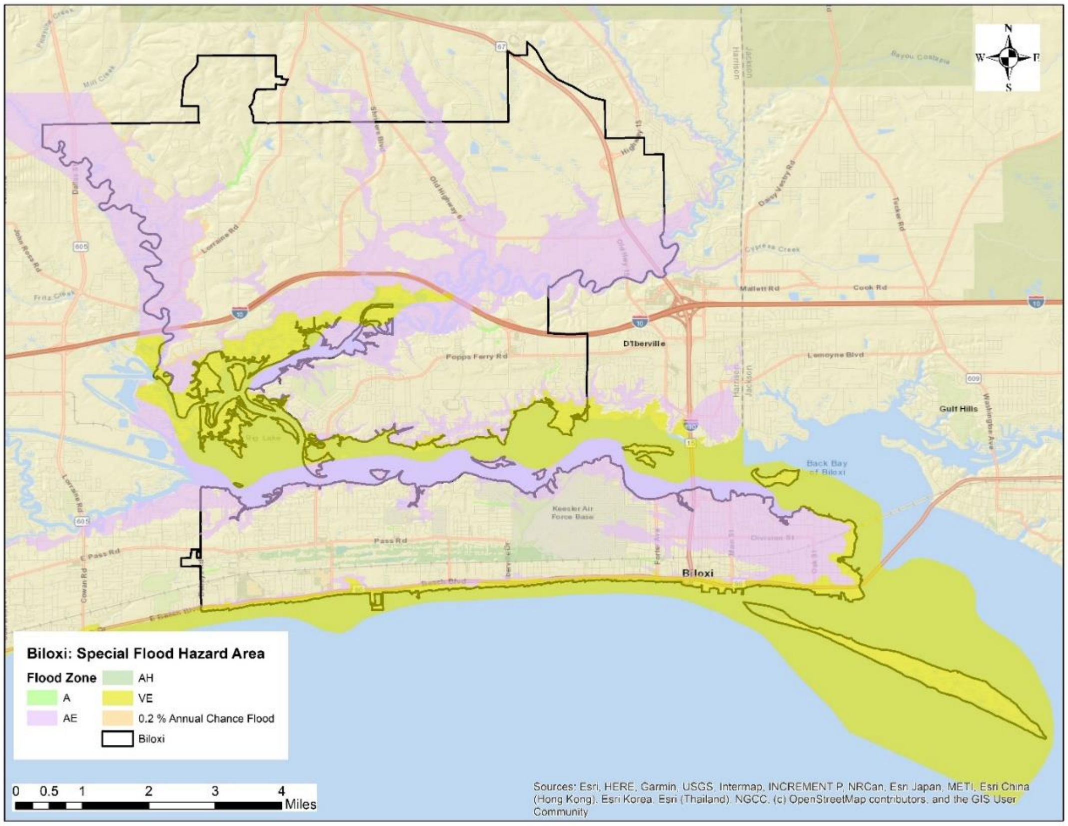
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted Harrison County Flood Damage Prevention Ordinance by Harrison County Code Administration. Which is brought before the Harrison County Board of Supervisors for adoption.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by Harrison County Code Administration through identifying property in the special flood hazard area on the DFIRM maps. Through the permitting process required elevation verification with an elevation certificate, plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: Harrison County Code Administration

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The Harrison County Code Administration CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process in order to proceed with repairs if damage is less than 50%. They are also notified of Harrison County's adopted 5 year cumulative regulation

Biloxi Special Flood Hazard Area



Municipal flood extent: According to NCEI records, in August 2013, Very heavy rainfall of 5 to 7 inches occurred over several hour time period in southern Harrison County. In Biloxi, the main flooding was along US Highway 90 from the Interstate 110 Loop to Biloxi Bay Bridge. At least 10 cars were stranded along Highway 90. Emergency management reported 15 to 20 houses had minor flooding. The only reported depth of water from a flash flood event occurred in March 2009 where homes reported flooding of less than 12 inches of water in the structures. Records indicate that rainfall in the amount of 5-10'' could occur in a single event causing significant roadway flooding along with structural flooding throughout the city.

Flood Insurance Rate Map: Effective June 16, 2009

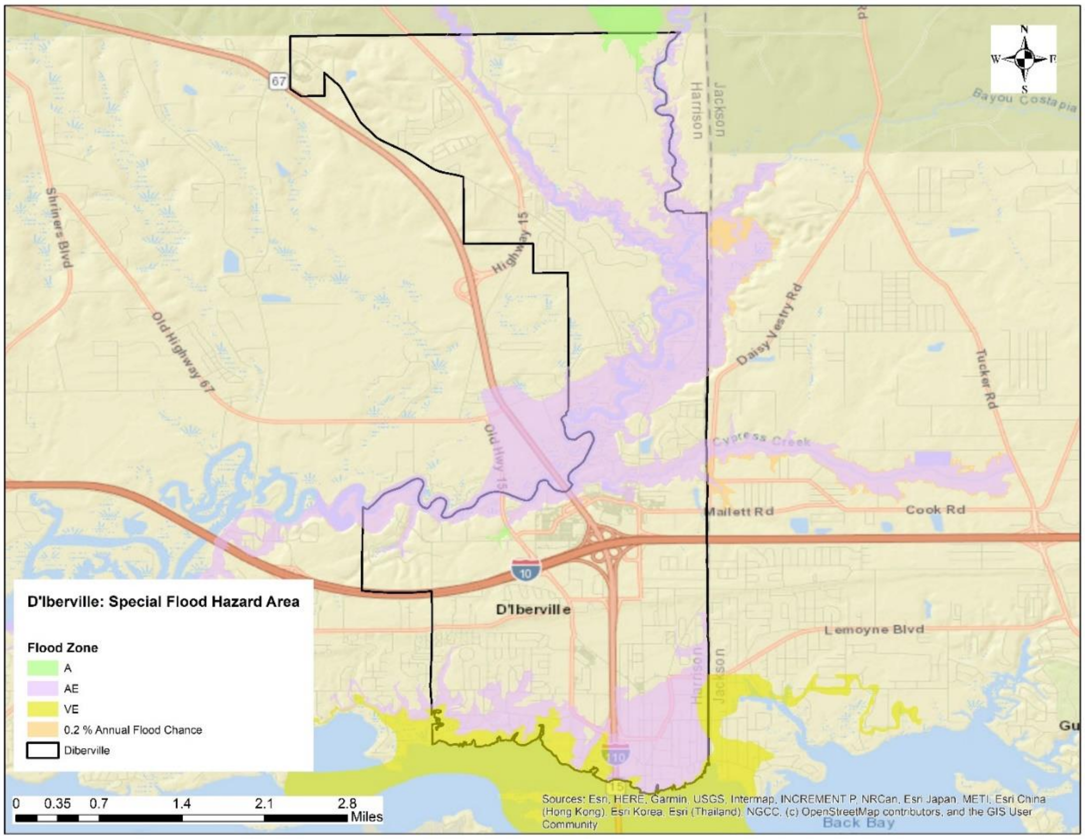
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Biloxi Flood Damage Prevention Ordinance by City of Biloxi Floodplain Administrator through the office of Community Development.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of Biloxi Floodplain Administrator through the Community Development Office through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: City of Biloxi Floodplain Administrator through the Community Development Office.

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The City of Biloxi CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process in order to proceed with repairs if damage is less than 50%.

D’Iberville Special Flood Hazard Area



Municipal flood extent: In July 2013, D'Iberville police department reported several road closures in Forest Cove subdivision. Several public reports of flooding were received, including water in at least one home in D'Iberville, due to flooding from a nearly stationary low pressure system along the Louisiana coast aided the development of thunderstorms over the coastal waters on three consecutive days. Several of these storms moved over the Mississippi coastal counties on the morning of the 6th, producing flash flooding. According to NCEI records, the Biloxi are can experience upwards of 7-10’’ of rainfall from a single event as the area did in June 2017 associated with Tropical Storm Cindy. Although official flood depths for heavy rain/flash flood events are not available for the City of Biloxi, reports confirm that the area has and can experience structural flooding as well as moderate to severe street flooding from these events. The only reported depth of water from a flash flood event occurred in March 2009 where homes reported flooding of less than 12 inches of water in the structures.

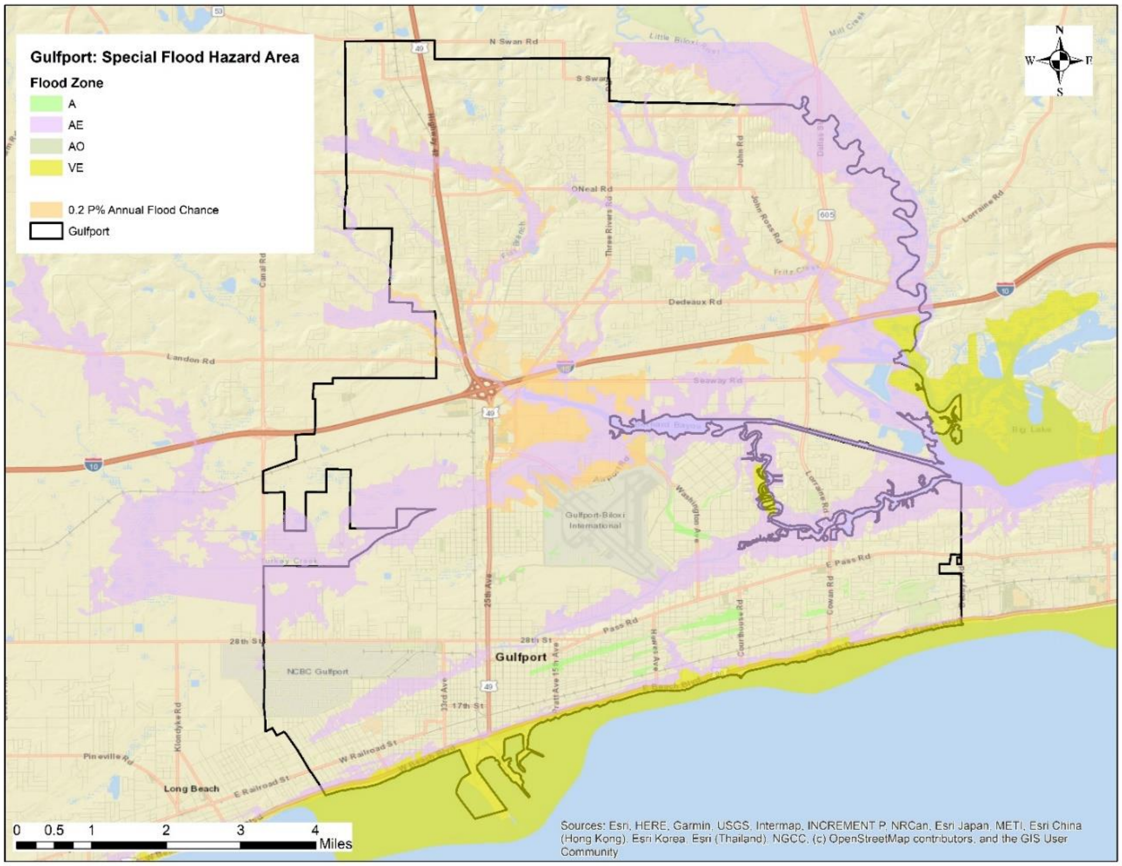
Flood Insurance Rate Map: Effective December 21, 2017

NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Biloxi Flood Damage Prevention Ordinance by City of D’Iberville Floodplain Administrator through the City Building Department.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of D’Iberville Floodplain Administrator through the City Building Department Office through

identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, and plans review.
Designee or agency to implement the addressed commitments and requirements of the NFIP: City of D'Iberville Floodplain Administrator through the City Building Department.
Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The City of D'Iberville CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process in order to proceed with repairs if damage is less than 50%.

Gulfport Special Flood Hazard Area



Municipal flood extent: According to records provided via NCEI, In April 2008, Isolated strong thunderstorms that developed in a moist and unstable airmass in the vicinity of a cold front that pushed south across the area produced locally heavy rainfall, causing flooding to a gas station with a few feet of water near Beatline Road and Interstate 10, and additional event from March 2009 shows the area had homes that flooded with less than 12 inches of water in them, these are the only reported instance of flood water depths in the Gulfport area associated with Heavy Rain/Flash Flooding events. The entire county including the city of Gulfport has reported events ranging up to 5-10'' of total rainfall in a given event.

Flood Insurance Rate Map: Effective December 21, 2017

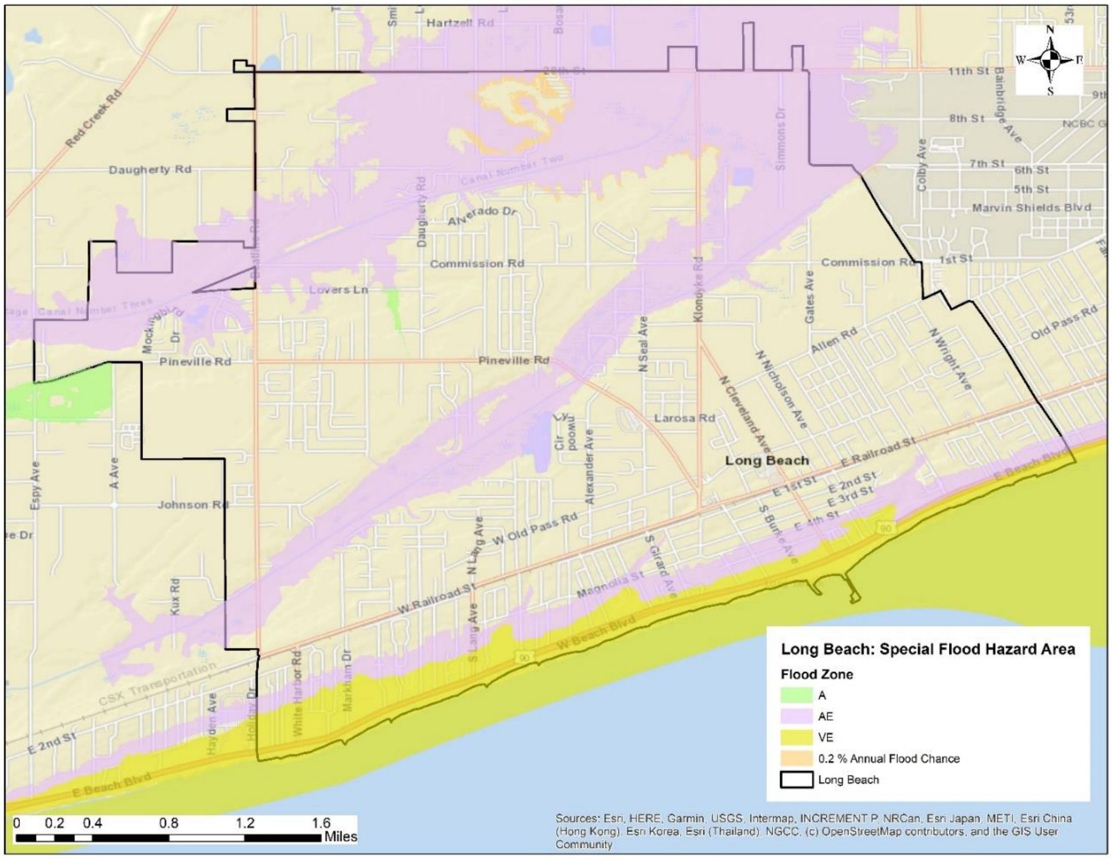
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Biloxi Flood Damage Prevention Ordinance by City of Gulfport Floodplain Administrator through the City Building Department.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of Gulfport Floodplain Administrator through the City Building Department Office through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, and plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: City of Gulfport Floodplain Administrator through the City Building Department.

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The City of Gulfport CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process to proceed with repairs if damage is less than 50%.

Long Beach Special Flood Hazard Area



Municipal flood extent: In March of 2009, Major flooding occurred due to heavy rain affected portions of Harrison County. The cities which experienced the worst flooding were Gulfport, Biloxi, D'Iberville, and Long Beach. At least 100 roads were impacted by flooding with numerous cars under water near the entrance to Interstate 10 off of the Interstate 110 loop. Around 200 homes flooded with most having 12 inches or less of water in them. A 36 year old man drowned in D'Iberville when he drove into a flooded drainage ditch. Additional events for Long Beach reported numerous road closures due to flash flooding events throughout the city.

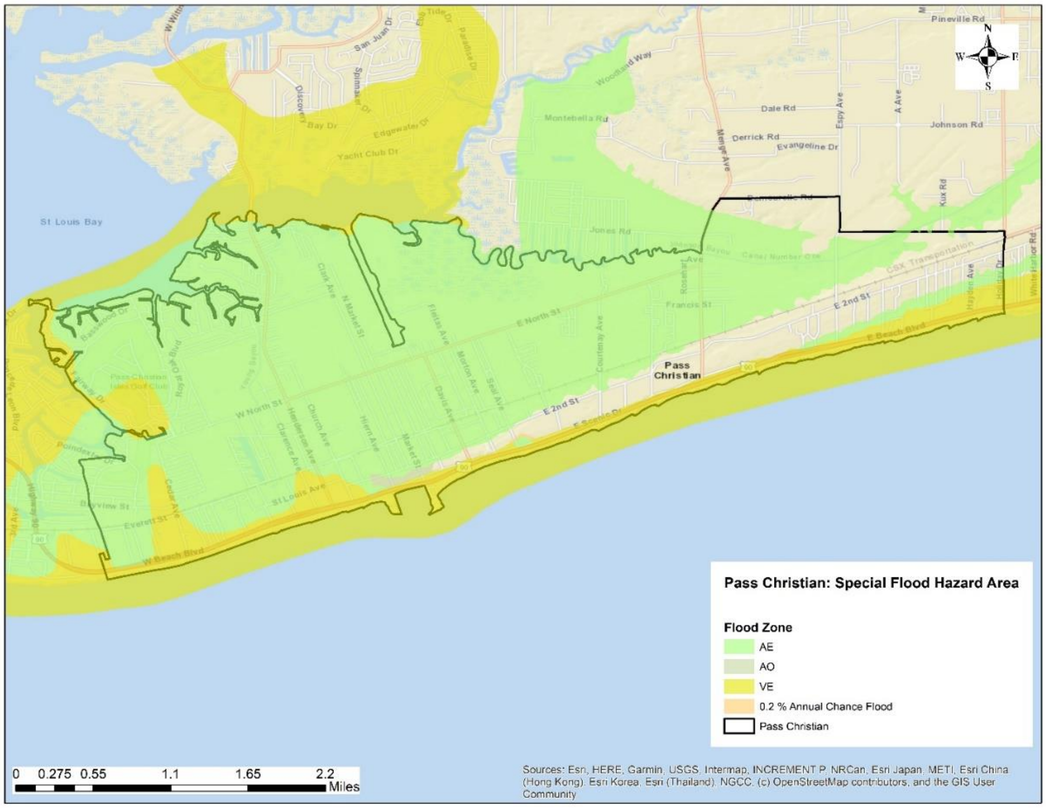
Flood Insurance Rate Map: Effective December 21, 2017

NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Long Beach Flood Damage Prevention Ordinance by City of Long Beach Floodplain Administrator through the City Building Department.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of Long Beach Floodplain Administrator through the City Building Department Office through identifying property in the special flood hazard area on the DFIRM maps. The

permitting process required elevation verification with an elevation certificate, and plans review.
Designee or agency to implement the addressed commitments and requirements of the NFIP: City of Long Beach Floodplain Administrator through the City Building Department.
Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The City of Long Beach CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process in order to proceed with repairs if damage is less than 50%.

Pass Christian Special Flood Hazard Area



Municipal flood extent: According to NCEI records flood events for Pass Christian include Major Street flooding on Highway 90 near Pass Christian. Major street flooding also reported north-northwest of Long Beach along 28th Street from Beatline Road to Klondyke Road, and south of Lyman on Canal Road south of Robinson Road from an event that occurred in March 2012. Other reported events impacted the Pass Chrisitan area without specifically identifying flood depths for the City. Based on the recorded data, Pass Christian along with the entire planning area of Harrison County has experienced rainfall events ranging from 5-10'' in a single event which inevitably leads to significant street flooding through the city and surrounding areas along with street flooding low lying areas can expect a few inches to several feet of water in low lying areas throughout the City..

Flood Insurance Rate Map: Effective December 21, 2017

NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Pass Christian Flood Damage Prevention Ordinance by City of Pass Christian Floodplain Administrator through the City Building Department.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of Pass Christian Floodplain Administrator through the City Building Department Office through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, and plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: City of Pass Christian Floodplain Administrator through the City Building Department.

Implementing the substantial improvements/substantial damage provisions of the floodplain

management regulations after an event: The City of Pass Christian CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process to proceed with repairs if damage is less than 50%.

Jackson County Municipal Flood Maps:

<u>Jackson County Floodplain Management:</u>

Flood Insurance Rate Map: Effective and adopted December 17, 2021

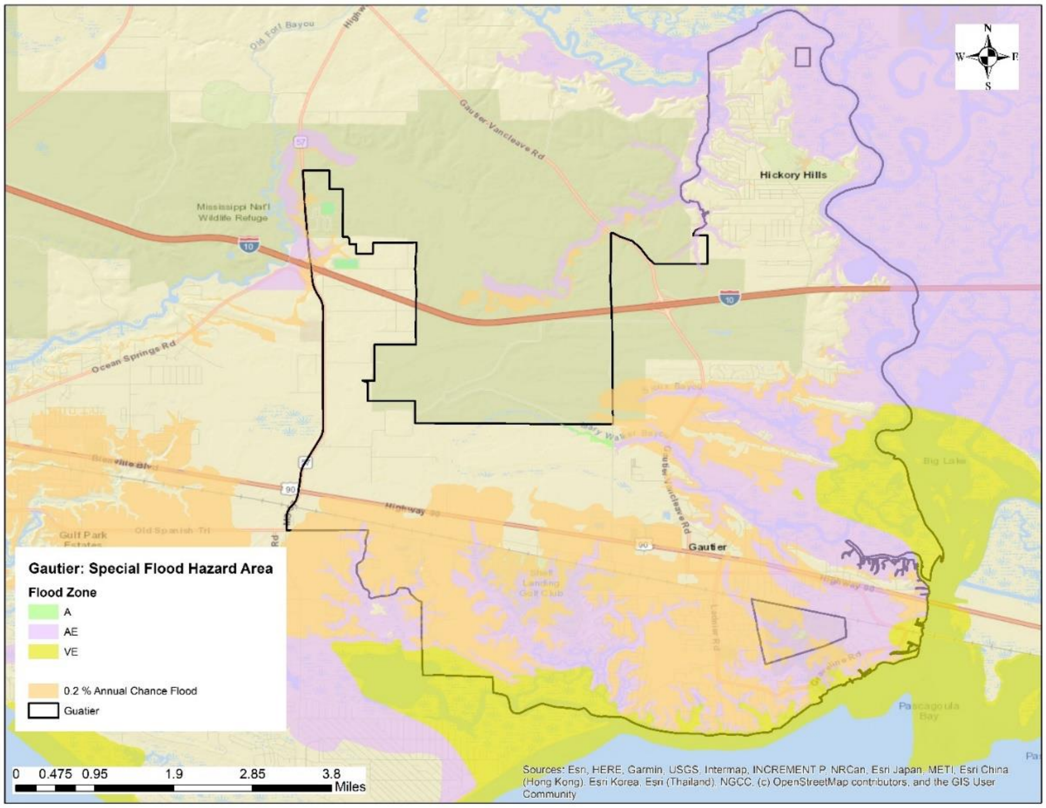
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted Jackson County Flood Damage Prevention Ordinance by Jackson County Code Administration. Which is brought before the Jackson County Board of Supervisors for adoption.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by Harrison County Code Administration through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: Jackson County Code Administration Planning Department

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: A 10-year tracking process occurs and if a residence exceeds 50% of the value of the structure in improvements or damages the current effective flood regulations would apply. Substantial Improvement/Substantial Damage is treated as new construction, all regulations pertaining to new construction would apply.

Gautier Special Flood Hazard Area



Municipal flood extent: According to NCEI records outside of street flooding being reported throughout Jackson County, no specific data is available for Gautier related to heavy rain/flash flood events. NCEI records indicate that the entire County can experience up to 7-12'' of rainfall in a single event based on historic records which includes Gautier. An event to this magnitude would likely lead to numerous structures being flooded along with road closures due to water depths ranging from a few inches to a few feet in some areas.

Flood Insurance Rate Map: Effective December 21, 2017

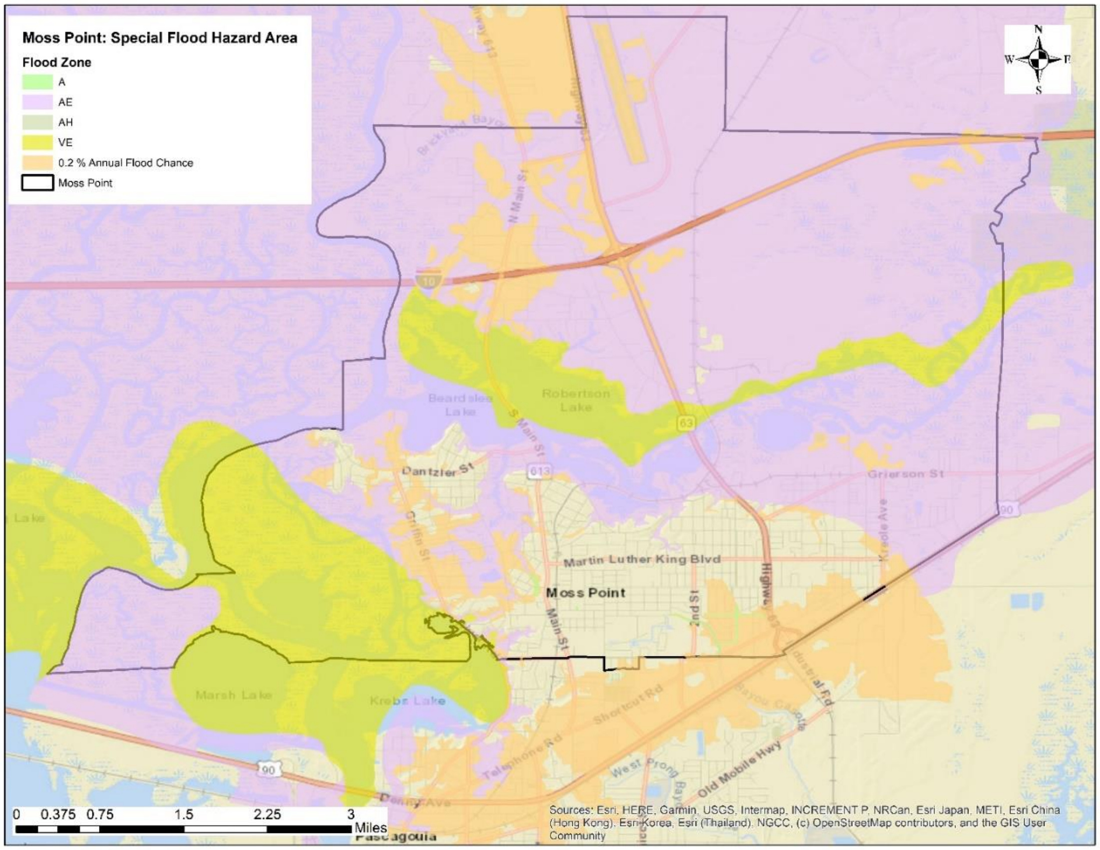
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Gautier Flood Damage Prevention Ordinance by City of Gautier Floodplain Administrator through the City Building Department.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of Gautier Floodplain Administrator through the City Building Department Office through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, and plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: City of Gautier Floodplain Administrator through the City Building Department.

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The City of Gautier CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process in order to proceed with repairs if damage is less than 50%.

Moss Point Special Flood Hazard Area



Municipal flood extent: According to NCEI records a flood event in August 2002 led to, Flood waters entering 15 to 20 houses, several autos were flooded, and widespread flooding of streets and roadways occurred throughout the Moss Point area. No additional flood depth data is available for the City of Moss Point; however, based on historic records indicating a single rain event can produce upwards of 7-12'' of rainfall it is anticipated that the city could experience flash flood water to reach a few inches up to feet of water over roadways and potential in structures due to these type events.

Flood Insurance Rate Map: Effective December 21, 2017

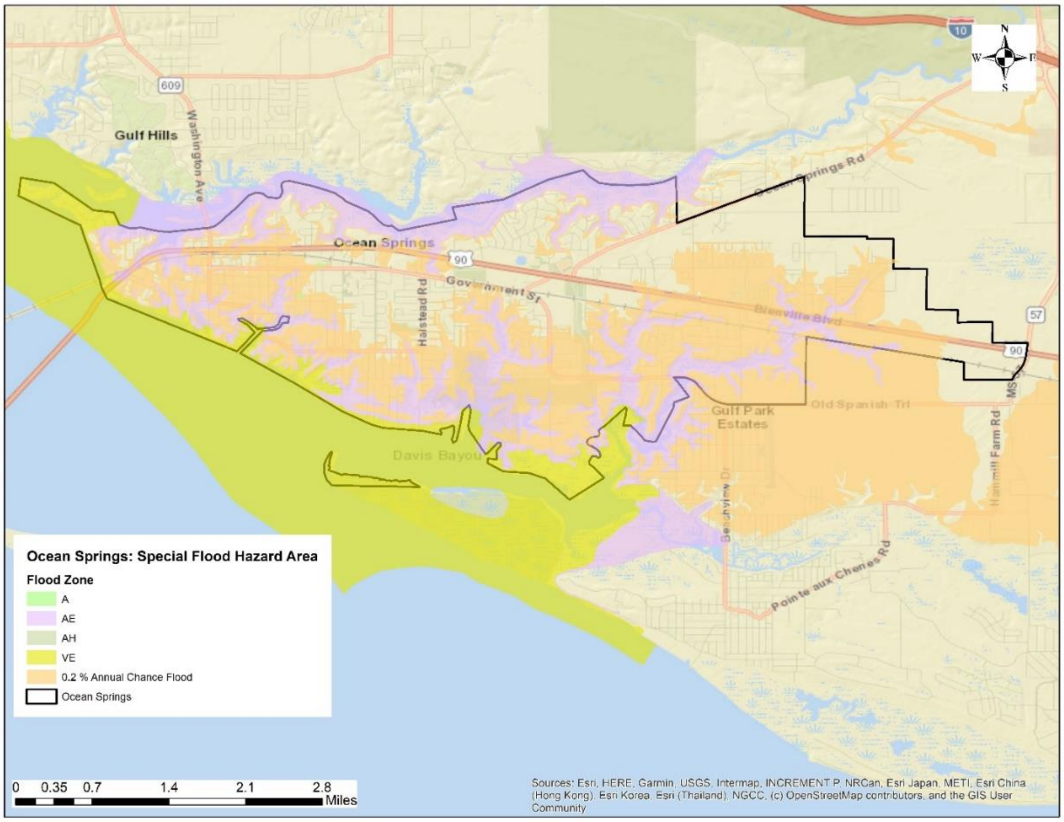
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Moss Point Flood Damage Prevention Ordinance by City of Moss Point Floodplain Administrator through the City Building Department.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of Moss Point Floodplain Administrator through the City Building Department Office through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, and plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP:

City of Moss Point Floodplain Administrator through the City Building Department.
Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The City of Moss Point CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process to proceed with repairs if damage is less than 50%.

Ocean Springs Special Flood Hazard Area



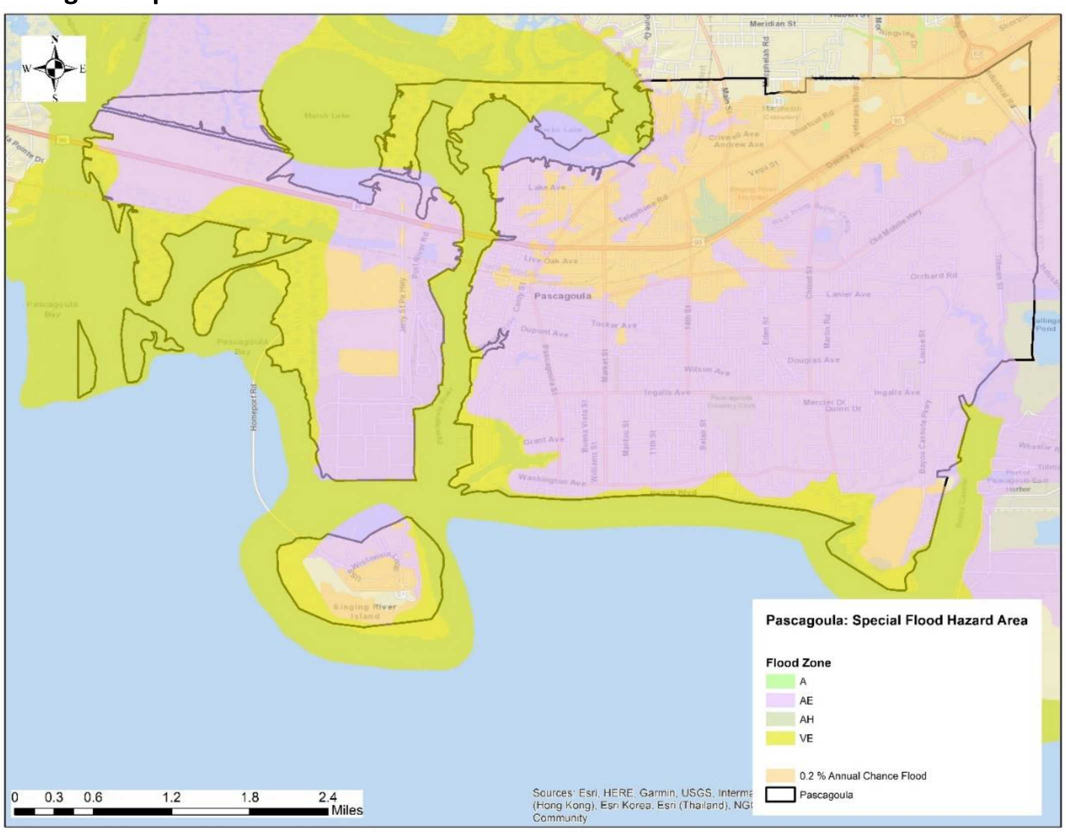
Municipal flood extent: According to NCEI records the Ocean Springs area has numerous heavy rain/flash flood reports. Outside of significant street flooding and one report of a street in the Gulf Park Estates being washed out associated with Tropical Storm Cyndy in June 2017, no additional flood depth data is provided for the area; however with events recorded in the area ranging from 5-10'' of rainfall from a single event significant street flooding can be expected with such events as well as structural flooding in low lying areas with a few inches with potentially several feet of water.
Flood Insurance Rate Map: Effective December 21, 2017
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Ocean Springs Flood Damage Prevention Ordinance by City of Ocean Springs Floodplain Administrator through the City Building Department.
implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of Ocean Springs Floodplain Administrator through the City Building Department Office

through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, and plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: City of Ocean Springs Floodplain Administrator through the City Building Department.

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The City of Ocean Springs CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process to proceed with repairs if damage is less than 50%.

Pascagoula Special Flood Hazard Area



Municipal flood extent: According to NCEI records, in September 2015 Jackson County Emergency Management personnel reported 21 homes with minor flooding, at least seven businesses were flooded, and 14 families were being sheltered after flash flooding in the Pascagoula and Moss Point areas following 5-8'' of rainfall in 2-3 hours. In July 2019 additional reports were received of street flooding in downtown Pascagoula at Live Oak Avenue and Frederic Street, and on Market Street. Although no official flood depth information was provided for the City of Pascagoula with recorded events ranging u to 5-10'' of rainfall, significant flooding can be expected throughout the city potentially ranging from a few inches of flooding to a few feet in some low lying areas.

Flood Insurance Rate Map: Effective December 21, 2017

NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Pascagoula Flood Damage Prevention Ordinance by City of Pascagoula Floodplain Administrator through the City Building Department.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of Pascagoula Floodplain Administrator through the City Building Department Office through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, and plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: City of Pascagoula Floodplain Administrator through the City Building Department.

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The City of Pascagoula CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process to proceed with repairs if damage is less than 50%.

Pearl River County Municipal Flood Maps:

Pearl River County Flood Extent: According to NCEI records, a single event from March 2001 accounted for severe flooding of roadways. Law enforcement reported 13 to 14 roadways were severely flooded, Pearl River County. records indicate a single event has produced 8-12'' of rainfall for the entire county. An event of this magnitude can be assumed that several inches of flood waters to potentially a few feet in low lying areas could cause significant street flooding and potentially structure flooding as well.

Pearl River County Floodplain Management:

Flood Insurance Rate Map: Effective September 27, 2019

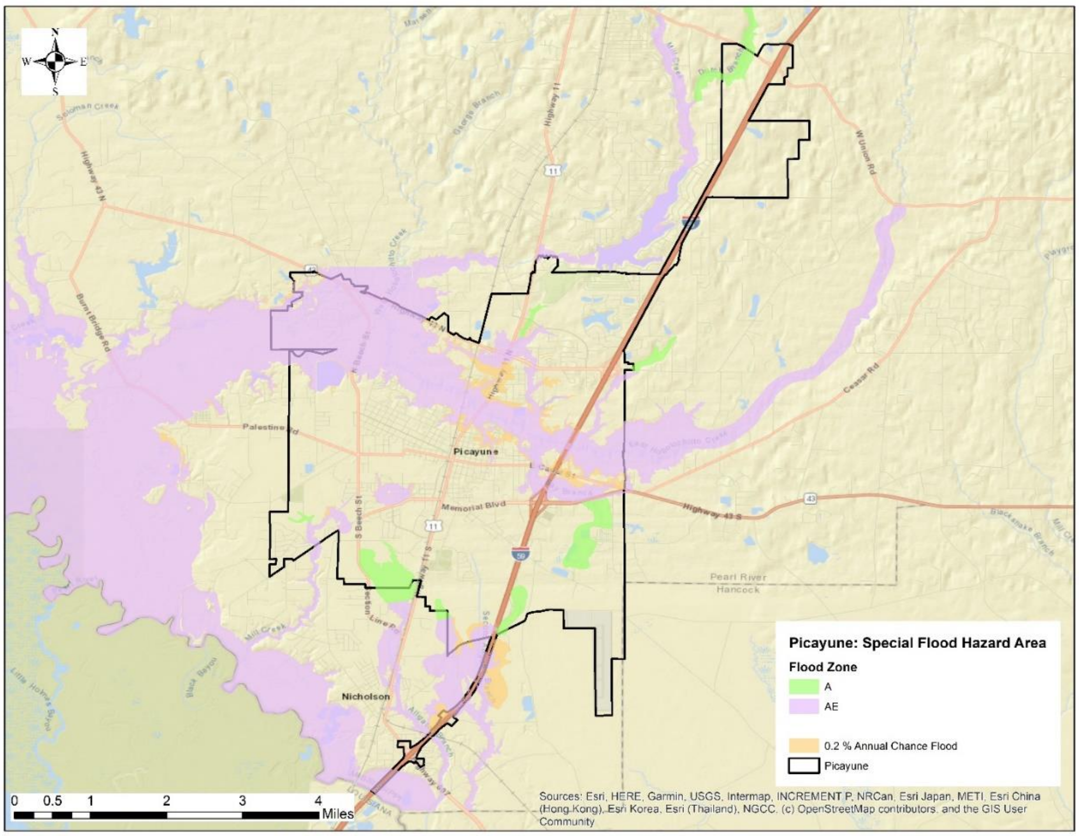
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted Pearl River County Flood Damage Prevention Ordinance by Pearl River County Office of Planning and Development. Which is brought before the Pearl River County Board of Supervisors for adoption.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by Pearl River County Office of Planning and Development through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP:

Pearl River County Office of Planning and Development
Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: A 10-year tracking process occurs and if a residence exceeds 50% of the value of the structure in improvements or damages the current effective flood regulations would apply. Substantial Improvement/Substantial Damage is treated as new construction, all regulations pertaining to new construction would apply.

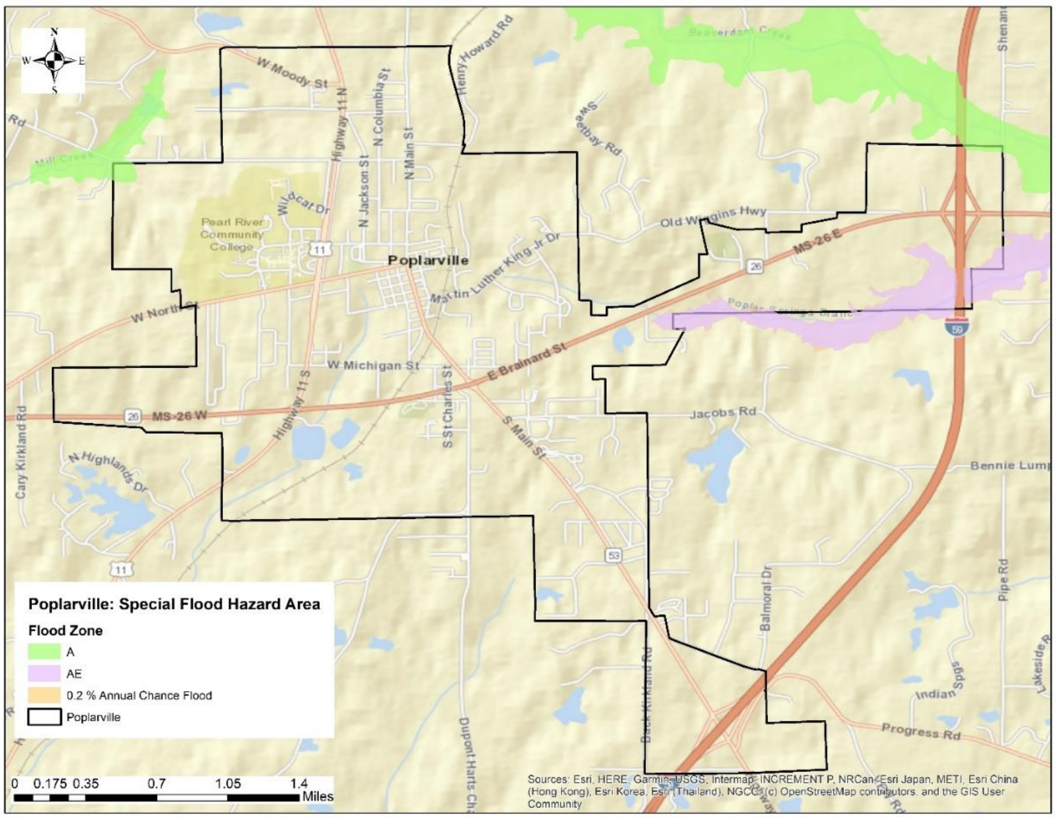
Picayune Special Flood Hazard Area



Municipal flood extent: According to NCEI records, a single event from March 2001 accounted for severe flooding of roadways. Law enforcement reported 13 to 14 roadways were severely flooded, mostly in the Picayune area. No official flood depth data was available for the Picayune area; however, records indicate a single event has produced 8-12'' of rainfall for the entire county. An event of this magnitude can be assumed that several inches of flood waters to potentially a few feet in low lying areas could cause significant street flooding and potentially structure flooding as well.
Flood Insurance Rate Map: Effective September 27, 2019
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Picayune Flood Damage Prevention Ordinance by City of Picayune Floodplain Administrator through the City Building Department.
implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of Picayune Floodplain Administrator through the City Building Department Office through

identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, and plans review.
Designee or agency to implement the addressed commitments and requirements of the NFIP: City of Picayune Floodplain Administrator through the City Building Department.
Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The City of Picayune CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process to proceed with repairs if damage is less than 50%.

Poplarville Special Flood Hazard Area



Municipal flood extent: According to NCEI data, in June 2019, Widespread heavy rain across northern Pearl River County of 6 to 10 inches with locally higher amounts during the early morning hours of May 11th caused run-off that moved downstream along the Wolf River and small tributaries resulting flooding of roads along that drainage. The downstream gage at Landon MS, Harrison County, reached its 2nd highest reading recorded of 29.80 feet. No additional flood depth data is available for the Poplarville area; records indicate a single event has produced 8-12'' of rainfall for the entire county. An event of this magnitude can be assumed that several inches of flood waters to potentially a few feet in low lying areas could cause significant street flooding and potentially structure flooding as well.
Flood Insurance Rate Map: Effective September 27, 2019
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Poplarville Flood Damage Prevention Ordinance by City of Poplarville Floodplain Administrator through the City Building Department.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of Poplarville Floodplain Administrator through the City Building Department Office through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, and plans review.
Designee or agency to implement the addressed commitments and requirements of the NFIP: City of Poplarville Floodplain Administrator through the City Building Department.
Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The City of Poplarville CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process to proceed with repairs if damage is less than 50%.

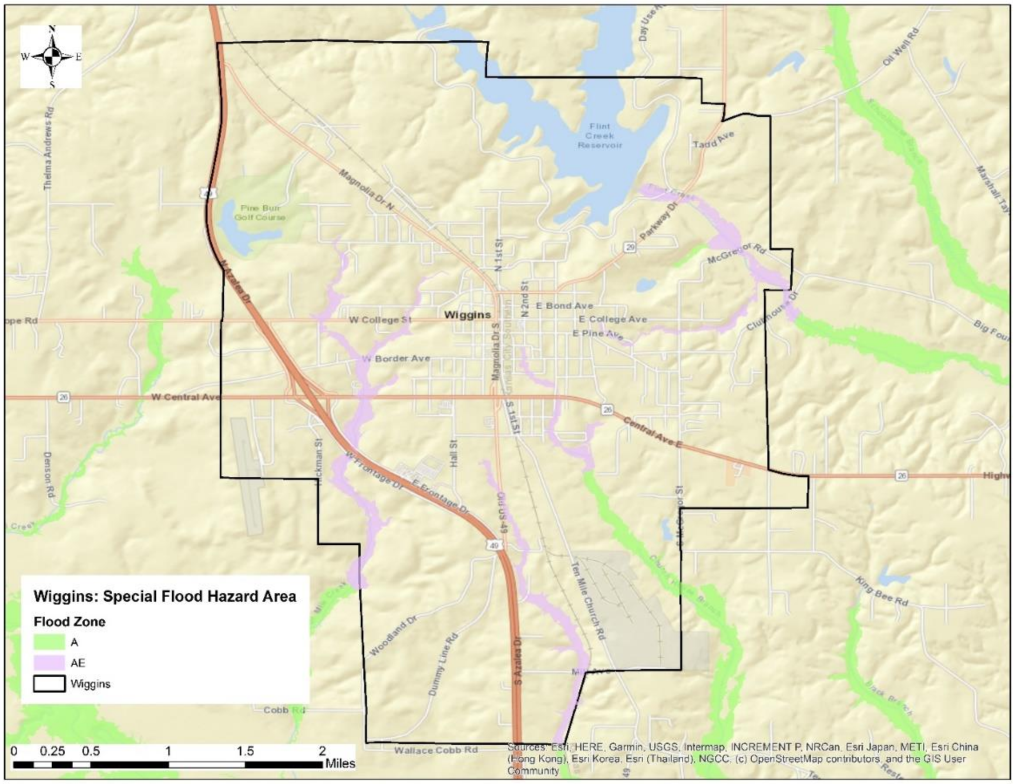
Stone County Municipal Flood Maps:

Stone County Flood Extent: According to NCEI records numerous storm reports are provided for Heavy rain/Flash Flooding for Stone County; however little data is provided for specific flooding conditions and damages. The reported damage information includes minor to major road flooding and closures ranging from a few minutes due to standing water to several hours due to high waters over roadways. It can be assumed based on recorded rainfall events of 8-12'' in a single event that significant flooding is likely to occur on roadways as well as low lying areas potentially resulting in as little as a few inches of flood water to several feet in the lowest areas.

Stone County Floodplain Management:

Flood Insurance Rate Map: Effective and adopted June 16, 2011
NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted Jackson County Flood Damage Prevention Ordinance by Stone County Planning and Building Department. Which is brought before the Stone County Board of Supervisors for adoption.
implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by Stone County Planning and Building Department through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, plans review.
Designee or agency to implement the addressed commitments and requirements of the NFIP: Stone County Planning and Building Department
Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: A 10-year tracking process occurs and if a residence exceeds 50% of the value of the structure in improvements or damages the current effective flood regulations would apply. Substantial Improvement/Substantial Damage is treated as new construction, all regulations pertaining to new construction would apply.

Wiggins Special Flood Hazard Area



Municipal flood extent: According to NCEI records numerous storm reports are provided for Heavy rain/Flash Flooding for the Wiggins area; however little data is provided for specific flooding conditions and damages. The reported damage information includes minor to major road flooding and closures ranging from a few minutes due to standing water to several hours due to high waters over roadways. No official flood depth data is available for the Wiggins area. It can be assumed based on recorded rainfall events of 8-12'' in a single event that significant flooding is likely to occur on roadways as well as low lying areas potentially resulting in as little as a few inches of flood water to several feet in the lowest areas.

Flood Insurance Rate Map: Effective and adopted June 16, 2011

NFIP minimum floodplain management criteria, local regulations and process: The minimum standards are enforced through the adopted City of Wiggins Flood Damage Prevention Ordinance by City of Wiggins Floodplain Administrator through the City Building Department.

implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs): The regulation is enforced by City of Wiggins Floodplain Administrator through the City Building Department Office through identifying property in the special flood hazard area on the DFIRM maps. The permitting process required elevation verification with an elevation certificate, and plans review.

Designee or agency to implement the addressed commitments and requirements of the NFIP: City of Wiggins Floodplain Administrator through the City Building Department.

Implementing the substantial improvements/substantial damage provisions of the floodplain management regulations after an event: The City of Wiggins CFM's/Inspectors perform site visits in special flood hazard areas to determine flood damage. Once damage has been identified they perform a damage assessment using the Substantial Damage Estimator, take pictures and enter data into the SDI system to determine % of damage. The owner is then notified by mail of the permitting process to proceed with repairs if damage is less than 50%.