There came on for consideration at a duly constituted meeting of the Mayor and Members of the City Council of the City of Gulfport, Mississippi, held on the _____ day of _____, 2014, the following Resolution:

A RESOLUTION BY THE GULFPORT CITY COUNCIL ADOPTING THE CITY OF GULFPORT HAZARD MITIGATION AND FLOOD PROTECTION PLAN

WHEREAS, the City of Gulfport, Mississippi, participated in the development of the City of Gulfport's Hazard Mitigation and Flood Protection Plan; and

WHEREAS, the City of Gulfport recognizes the threat that natural hazards pose to people and property form future hazard occurrences; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, an adopted Hazard Mitigation and Flood Protection Plan is required as a condition of future funding for mitigation projects under Federal Emergency Management Agency (FEMA) pre- and post-disaster mitigation grant programs; and

WHEREAS, numerous public, private, government and district stakeholders win and in the vicinity of the City of Gulfport participated in the mitigation planning process to prepare the Hazard Mitigation and Flood Protection Plan; and

WHEREAS, the Mississippi Emergency Management Agency (MEMA) and FEMA, Region IV, officials have reviewed the City of Gulfport's Hazard Mitigation and Flood Protection Plan and approved it contingent upon the official adoption of the plan by the Governing Authority of the City of Gulfport.

NOW THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COUNCIL OF THE CITY OF GULFPORT, MISSISSIPPI, AS FOLLOWS, TO WIT:

Section 1. That the matters, facts and things recited in the Preamble hereto are hereby adopted as the official findings of the Governing Authority.

Section 2. That the Governing Authority hereby adopts the City of Gulfport Hazard Mitigation and Flood Protection Plan as an official plan.

Section 3. That this Resolution be, and it is hereby ordered to be spread on the minutes of the governing Authority, and to be in full force and effect immediately upon its passage and enactment according to law and that a certified copy of this Resolution shall be submitted to MEMA and FEMA, Region IV, officials to enable final approval of the City of Gulfport's Hazard Mitigation and Flood Protection Plan.

The above and foregoing Resolution, after having been first reduced to writing and ready by the Clerk, was introduced by _____, seconded by _____, and was adopted by the following roll call vote:

AYES **NAYS** **ABSENT**

WHEREUPON, the President declared the motion carried and the Resolution adopted this the _____ day of _____, 2014.

(SEAL)

ATTEST: **ADOPTED:**

_____ _____

CLERK OF THE COUNCIL **PRESIDENT**

The above and foregoing Ordinance was submitted to and approved by the Mayor, this the _____ day of _____, 2014.

APPROVED:

_____

MAYOR

MEMORANDUM

To: Mayor Billy Hewes and
Gulfport City Council

From: Greg Pietrangelo
Urban Development Director

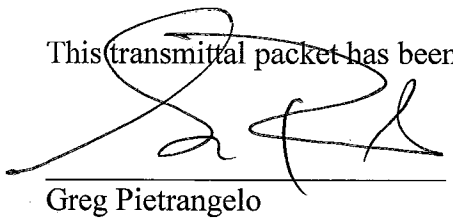
Date: January 10, 2014

Re: Adopting the City of Gulfport Hazard Mitigation and Flood Protection Plan.

Subject: The City of Gulfport requests a Resolution by the Gulfport City Council to adopting the City of Gulfport Hazard Mitigation and Flood Protection Plan. (In compliance with the Disaster Mitigation Act of 2000).

Please place the attached item on the Council agenda for **January 21, 2014.**

This transmittal packet has been reviewed and approved by:



_____ Director of Urban Development Department
Greg Pietrangelo

_____CAO or Mayor _____

U.S. Department of Homeland Security
FEMA Region IV
3003 Chamblee Tucker Road
Atlanta, GA 30341

FEMA

January 8, 2014

Ms. Jana Henderson
State Hazard Mitigation Officer
Mississippi Emergency Management
Office of Mitigation
Post Office Box 5644
Pearl, Mississippi 39208

Attention: Mr. Bill Patrick, Bureau Director, Mitigation Plans

Reference: City of Gulfport, Mississippi Hazard Mitigation Plan

Dear Ms. Henderson:

This is to confirm that we have completed a Federal/State review of the City of Gulfport, Mississippi Hazard Mitigation Plan Update for compliance with the federal hazard mitigation planning requirements contained in 44 CFR 201.6(b)-(d). We have determined that the City of Gulfport, Mississippi Hazard Mitigation Plan is compliant with federal requirements, subject to formal community adoption.

In order for our office to issue formal approval of the plan, the City of Gulfport, Mississippi must submit adoption documentation. Upon submittal of this item to our office; we will issue formal approval of the City of Gulfport, Mississippi Hazard Mitigation Plan. Please also have your staff submit a final, unmarked copy of the City of Gulfport, Mississippi Hazard Mitigation Plan.

For further information, please do not hesitate to contact Cathy Strickland, of the Hazard Mitigation Assistance Branch, at (770) 220-5328 or Linda L. Byers, of my staff, at (770) 220-5498.

Sincerely,

Robert E. Lowe, Chief
Risk Analysis Branch
Mitigation Division

Gulfport
MISSISSIPPI

Hazard Mitigation Flood Protection Plan 2013 - 2017

Developed by the
Gulfport Hazard Mitigation Committee

in association with
Neel-Schaffer, Inc

1 Introduction

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1.0 Introduction

Hazard Mitigation planning is the process of identifying risks and vulnerabilities associated with disasters. In addition, policies, activities, and tools for mitigation of the effects of disasters are developed. The process and subsequent plan are designed for accomplishment in a systematic and participatory manner using strategically scheduled events, with stakeholder and government involvement. Goals are to be realistic with achievable actions identified

The Federal Emergency Management Agency (FEMA) provides oversight and guidelines for hazard mitigation planning, plus helps with funding. Specific requirements are published, including a "crosswalk" review process, to guide plan developers in meeting FEMA requirements. In 2012, FEMA revised the crosswalk review process and developed a local mitigation plan review tool. The improved tool provides constructive recommendations from FEMA on areas that could be explored, with updates added to strengthen the community's plan for effective mitigation strategies.

The Mississippi Emergency Mitigation Agency (MEMA) requires jurisdictions to submit the completed local mitigation plan review tool with the draft plan, for state review. . The 2013 city of Gulfport Hazard Mitigation/Flood Prevention Plan was prepared using the updated review standard. The completed crosswalk is provided in Appendix 8.1-A.

1.1 Hazard Mitigation

Hazard mitigation can be defined as the use of short- and long-term strategies permanently reducing or alleviating the loss of injuries, life, and property resulting from hazardous events. A comprehensive mitigation approach addresses hazard vulnerabilities existing today and in the foreseeable future.

A key component in formulating 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 risks and further proposes specific mitigation actions to eliminate or reduce identified vulnerabilities.

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

Mitigation planning and activities provides jurisdictions with a number of benefits such as:

- Reduced loss of life, property, essential services, critical facilities and economic hardship
- Reduced short-term and long-term recovery and reconstruction costs
- Increased cooperation and communication within the community through the planning process
- Increased potential for state and federal funding for recovery and reconstruction projects

Figure 1.1 Understanding Risk

Figure 1.1 illustrates the concepts of risk reduction.

1.2 The Disaster Mitigation Act and the Flood Insurance Reform Act

In an effort to reduce mounting natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) amending the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of DMA 2000 emphasizes the need for state and local government entities to closely coordinate mitigation planning activities, making the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for federal mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation (PDM) program, both administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security.

The Flood Insurance Reform Act of 2004 (P.L. 108-264) created two grant programs, Severe Repetitive Loss (SRL) and Repetitive Flood Claim (RFC), and modified the existing Flood Mitigation Assistance (FMA) program. This act requires completion of a FEMA-approved Hazard Mitigation Plan in order for communities to be eligible for these programs. Communities with an adopted federally-approved hazard mitigation plan become pre-positioned to receive available mitigation funds before and after the next disaster strikes.

1.3 Hazard Mitigation Planning in Gulfport

The Gulfport City Council adopted the city of Gulfport, Mississippi Flood Hazard Mitigation Plan in April 2000. This plan was a policy guide for decision makers, directing resources to mitigate hazards within the city. The adoption of the Disaster Mitigation Act (DMA) of 2000 necessitated the development of a multi-hazard mitigation plan and is updated every five years. The city of Gulfport Hazard Mitigation and Flood Protection Plan of 2007 was developed and adopted in accordance with 44 CFR 201 and 206, addressing all natural hazards that could affect the city

of Gulfport. The 2007 update also complied with requirements of the NFIP Community Rating System Program for the development of a Flood Protection Plan. The 2013 plan is considered an update to the 2007 plan using the currently required standards.

1.4 Purpose of Plan

The 2013 Gulfport Hazard Mitigation/Flood Protection Plan is a cooperative and collaborative effort between the city of Gulfport; Harrison County Emergency Management; local, state, federal agencies; citizens and private entities to eliminate or reduce the long-term risk to human life and property from potential hazards. The Plan goes beyond the minimum DMA 2000 requirements of assessing natural hazards, to further identify and discuss mitigation strategies for various technological and civil hazards posing a threat to the city. Included in the plan are efforts to develop measures reducing the cost of preparedness, response and recovery time from hazard events.

The Gulfport Hazard Mitigation/Flood Protection Plan was developed specifically to achieve the following objectives:

- Protect life and property
- Reduce damage to homes and businesses
- Reduce damage to public infrastructure such as roads, water, sewer, bridges and public buildings
- Increase public safety
- Avoid/minimize economic disruption and losses
- Reduce human suffering
- Protect the environment
- Save taxpayer dollars
- Flood insurance cost reduction
- Maintain the city of Gulfport's eligibility for the following:
    - National Flood Insurance Program
    - FEMA and MEMA Planning Grants
    - Federal/State Funding for Repetitive Loss Buyout Program
    - Retain eligibility for other Federal/State funding

1.5 Priorities

Requirement 201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five years in order to continue to be eligible for mitigation project grant funding.

Even before Hurricane Katrina in 2005, the city of Gulfport was aware of their need to set realistic priorities to protect the lives and properties located within its jurisdiction. Through the leadership of the Mayor, City Council and Department Directors, proactive measures were implemented to communicate preparedness, response and recovery efforts to residents and business owners.

Through the rebuilding process following Katrina, Gulfport integrated mitigation strategies in plans and regulations/ordinances that promote sustainability. The city actively communicates with the public to encourage participation in preparedness initiatives and provide information about state and federal programs that will protect property and lives. Reduction of vulnerabilities, articulated throughout this plan update, remains a high priority for the city. The hazard identification, risk assessment, mitigation strategies, and plan maintenance chapters provide specific information to identify areas of concern and procedures to implement continued commitment to reduce or eliminate those vulnerabilities.

1.6 Authority and Adoption

Requirement §201.6(c)(5): [The plan shall include…] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan.

Authority

The city of Gulfport Council initiated development of this Hazard Mitigation/Flood Protection Plan. The city received a grant through the Hazard Mitigation Grant Program (HMGP) to prepare an update to the 2007 Hazard Mitigation/Flood Protection Plan. The HMGP is sponsored by the Federal Emergency Management Agency (FEMA) and administered by the Mississippi Emergency Management Agency (MEMA). A copy of the grant approval letter is provided in Appendix 8.1-B.

Plan Adoption

A public meeting was held on August 10, 2013 for citizens to formally review and accept this Plan prior to sending to MEMA and FEMA for state and federal approval. This plan meets the requirements of Section 201.6(c)(5) and was approved by FEMA on January 8, 2014. The City Council adopted this Plan on January 21, 2014 and the executed Resolution, meeting agenda and FEMA approval letter are provided in Appendix 8.1-C.

1.7 Summary of Contents

The Table of Contents was modified slightly from the 2007 plan to improve the flow of data and the coordination of the 2012 FEMA Crosswalk. Below is a summary of the contents presented in chapters 2 through 7.

Chapter 2: **Community Profile** provides demographic, geographic, and economic characteristics. This information sets the stage for defining the special characteristics useful in understanding the unique vulnerabilities within the city of Gulfport.

Chapter 3: **Planning Process** is a complete account of the planning committees and public meetings held during the planning process including individuals attending This section also includes a summary of changes made between the 2007 and 2013 plans.

Chapter 4: **Hazard Mitigation and Risk Assessment** contains five areas of study for each participating jurisdiction: **Risk Assessment, Hazard Identification, Vulnerability Assessment, Estimating Potential Losses,** and **Analyzing Development Trends.** Historical data is used to identify and prioritize appropriate mitigation actions to reduce/eliminate losses from potential hazards.

Chapter 5: **Mitigation Strategy** includes the goals and objectives developed to provide a strong foundation for implementing hazard mitigation strategies. Individual **Actions** were identified by goal and objective and include a mitigation group and priority. An **implementation** process is also defined including how **priorities** were established. **Funding Sources** and Hazard Mitigation Assistance eligibility criteria are included.

Chapter 6: **Capability Assessment** on the ability of the city to implement strategies and **incorporate mitigation principles into other planning initiatives**. The capabilities of private/public entities and state and federal agencies are also provided.

Chapter 7: **Plan Maintenance** presents the process the Gulfport Hazard Mitigation Committee and other identified departments will use to ensure the Plan is integrated with all other planning documents, regulations, and ordinances and ensure the public is engaged in any and all updates. Procedures are also defined in evaluating the effectiveness of mitigation actions and the status of pending/in process projects.

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2.0 The Planning Process

Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval; (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process.

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

According to the Federal Emergency Management Agency (FEMA), any successful planning activity, such as the development of a comprehensive mitigation plan, involves bringing together a cross-section of stakeholders to reach a consensus in achieving a desired outcome or resolve a community problem.

The City of Gulfport supports this initiative through daily interaction with residents, officials and business leaders in local and surrounding communities and participates in various planning initiatives including this hazard mitigation/floodplain management plan. By fostering these relationships, mitigation planning will move closer to achieving its objective of saving lives and reducing future losses resulting from natural disasters.

2.1 Planning Team and Committees

The City of Gulfport solicited qualified Consultants to serve as the Planning Team for updating the 2007 plan with new requirements enacted by FEMA's revised Local Mitigation Plan Review effective October 1, 2012. Neel-Schaffer, Inc. was selected through the competitive bid process and approved by the City Council as provided in the resolution included in Appendix 8.2-A. The plan update was prepared under the supervision and direction of Neel-Schaffer staff members Rebecca Boone and Alane Young, R.P.G.

The Planning Team was also supported throughout the planning process with technical staff members, Billy Patrick, CFM, Loretta Robinson, MBA and Darla Jourdan, from the Mississippi Emergency Management Agency (MEMA). The Advisory Team provided guidance throughout the planning process ensuring the Gulfport plan met the objectives of the CFR Requirements and the State's mitigation initiatives.

The Hazard Mitigation Committee members identified in Table 2.1 was given the responsibility to guide the decision-making process throughout the planning process, assist with the identification of data and needs for inclusion in the plan, and approves the draft plan prior to submittal to MEMA and FEMA for state and federal review. This Committee will also present the approved plan to the City Council for formal adoption; and, on behalf of the City, assist with integration of the goals and plan maintenance procedures set forth in this plan with other planning initiatives and actions. Two original members of the committee, David Nichols and Chief Alan Weatherford, were replaced following the first meeting due to their departure from the City of Gulfport. Gary Anderson assumed the chairman position from Mr. Nichols and Chief Papania replaced Chief Weatherford. The email notification sent to the approved Hazard Mitigation Committee members is provided in Appendix 8-2.B.

Table 2.1
City of Gulfport Hazard Mitigation Committee

Gary Anderson, CFM, Deputy Building Official and Chairman of Committee	Kris Riemann, Director Engineering
Mike Saucier, Gulfport Police Department and City Emergency Manager	Rupert Lacy, Harrison County Emergency Management
Neil Stachura (proxy for Mike Saucier)	Chief Mike Beyerstedt - Gulfport Fire Department
Karen McCarty, Community Development Coordinator	Wayne Miller, Director Public Works
Chief Leonard Papania, Gulfport Police Chief	Mike Miller, Senior Analyst
Gregory Holmes, Deputy Planning Administrator	Gary Joffrion, Building Code Official

2.2 Plan Development Meetings

The Hazard Mitigation Committee met four times during the planning process to systematically review data, prioritize and rank hazards and mitigation actions, and identify changes for inclusion in the plan update. Provided below is an agenda of each meetings objective, dates held, times, location, and a brief summary of the results obtained from each meeting. Additional information collected and distributed during the meetings, plus full meeting summaries, is provided in the appendix sections referenced by meeting.

Meeting 1

Wednesday, December 19, 2012
1:30 p.m. – 4:00 p.m.
City Hall – Council Chambers

Introduction

Plan Update Overview

Hazard Identification and Risk Assessment

Mitigation Strategies:

Schedule

Questions and Dismissal

Meeting Summary

The main objective accomplished during this initial meeting was to provide an overview of what a mitigation plan entails and how the plan update process will include the revised FEMA Local Plan Review Crosswalk requirements.

As a result of the hazard review, the committee elected to continue with the hazards that were profiled in the 2007 and added dam/levee failure, drought, and storm surge. It was also determined that some of the natural hazards should be grouped together due to their association of multiple hazards, such as hurricane/coastal storm will include storm surge and severe storms will include tornado, thunderstorm, hail, high wind, and lightning. Following the hazard identification, the Committee reviewed the State's recently adopted methodology to rank hazards based on several criteria to determine the overall risk factor. This methodology was accepted by the committee and they proceeded to complete the ranking exercise. Details regard the hazards selected and ranking process are also discussed in Chapter 4.

A brief overview of the mitigation goals was discussed and copies of the goals and actions were provided to the committee members to take back to their departments to review. It was recommended that we consolidate the 12 goals into 3 or 4 broad-based goals and develop objectives to insure the goals are attainable. The committee approved the planning team to develop new goals and present at the next meeting for approval. Appendix 8.2-C contains a full meeting summary, agenda, PowerPoint, and sign in sheet.

The planning team will utilize the city's GIS mapping data of their facilities and infrastructure in applicable sections of this plan update. These facilities will be classified according to their criticality level (1 to 5) to reflect the potential impacts that could be encountered with future events.

Meeting 2

Tuesday, February 26, 2013
2:00 – 4:00 p.m.
City Hall – Council Chambers

Public Outreach
Mitigation Strategies
Questions and Dismissal

Meeting Summary

The planning team presented options for engaging the public to obtain their input on hazards prone to the area and what mitigation actions they feel the city should consider in this plan update. A recommendation was made to provide a 10-question online survey on the city's web page and have a tent at the Harbor Fest/Easter Egg Hunt to solicit input into the planning process. The Committee approved both of these methods. A draft survey was presented to the committee with a couple of changes being requested.

As a follow up to the first meeting, the revised mitigation goals and new objectives were presented. The existing goals were cross walked to the new goal and the existing actions were categorized under the new objectives for each new goal. The Committee approved this change in structuring the mitigation strategies section. A thorough review of the existing actions was also discussed and notations were made on those that are no longer applicable or have been completed. The group also identified new actions which will be built out and presented to the committee for approval. The committee members were asked to continue to review the mitigation actions and have discussions within their respective departments to determine what other needs should be identified and included in the plan update. The agenda, PowerPoint and sign in sheet are provided in Appendix 8.2-D.

Meeting 3

June 26, 2013
2:00 – 4:00 p.m.
Central Fire Station

Review Hazard Data and Rankings

Rank Mitigation Actions

Questions and Dismissal

Meeting Summary

The planning team presented a summary of the completed risk assessments followed by a review of the hazard rankings. It was determined that the drought hazard should be downgraded from a moderate to low hazard threat due to the lack of data of past events.

The Committee reviewed and prioritized each mitigation action identified for inclusion in the 2013 plan update. Six factors were identified and measured with a value of 1 for low and 5 for high on the following elements:

- Risk to people
- Risk to facilities, infrastructure, natural systems (loss of function)
- Level of need and severity of problem
- Benefit(s) from completion of the project
- East of implementation
- Availability of resources to complete the project

Appendix 8.2-E contains a full meeting summary, agenda, PowerPoint, and sign in sheet.

Meeting 4

Online Plan Review

Review Draft Plan

Meeting Summary

The draft plan was sent electronically to members of the Hazard Mitigation Committee allowing time to review the plan within their departments and provide approval/comments prior to the public meeting scheduled for July 23, 2013. The Committee provided comments to the planning team which were incorporated into the draft before submitting to the public for their review.

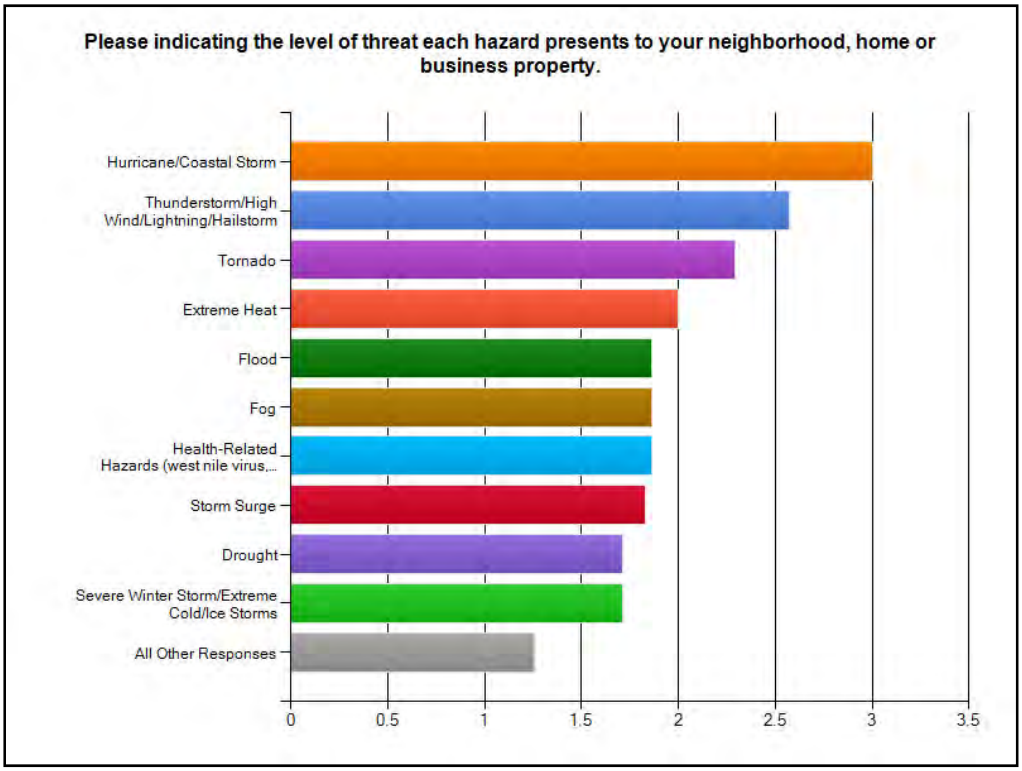
2.3 Public Involvement

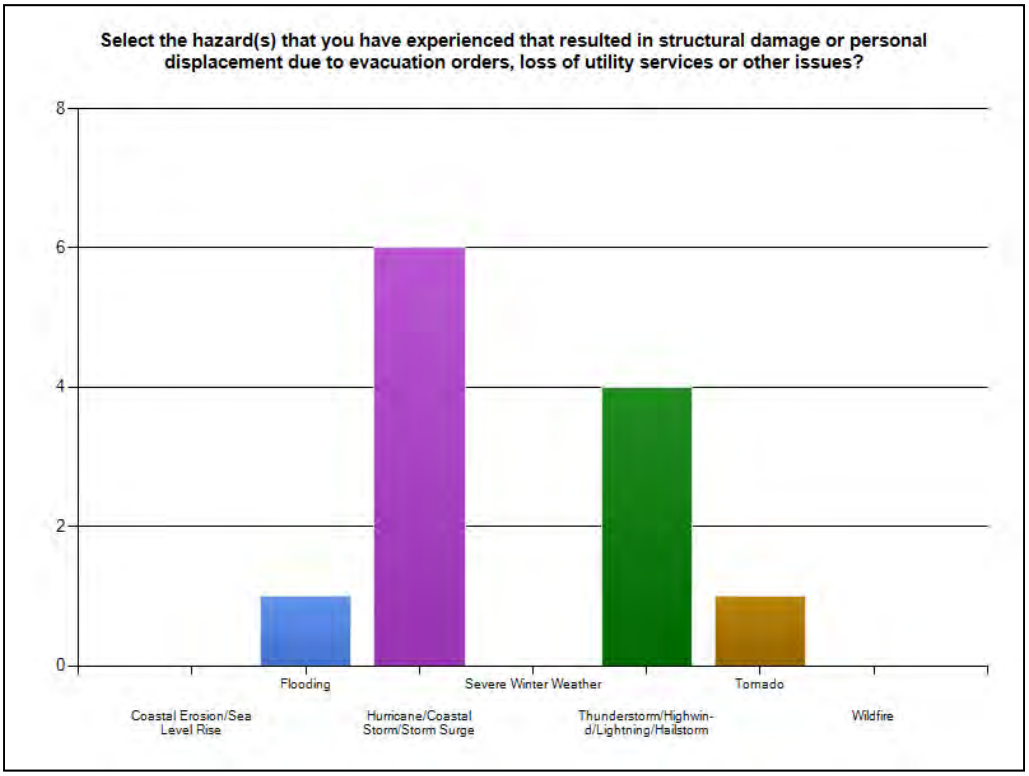
The public engagement process provided an opportunity for persons most affected by hazards to voice their opinions, make suggestions about future mitigation actions, and gain a better understanding of the hazard mitigation challenges and actions. An engaged public is often a key component in building support for the use of financial, technical, and human resources dedicated to preparedness and actions. A variety of public meeting formats were provided - from participation during a City Festival to a come and go format. For those residents who had scheduling conflicts and preferred to communicate electronically, an online questionnaire was used allowing public input on the City's Plan.

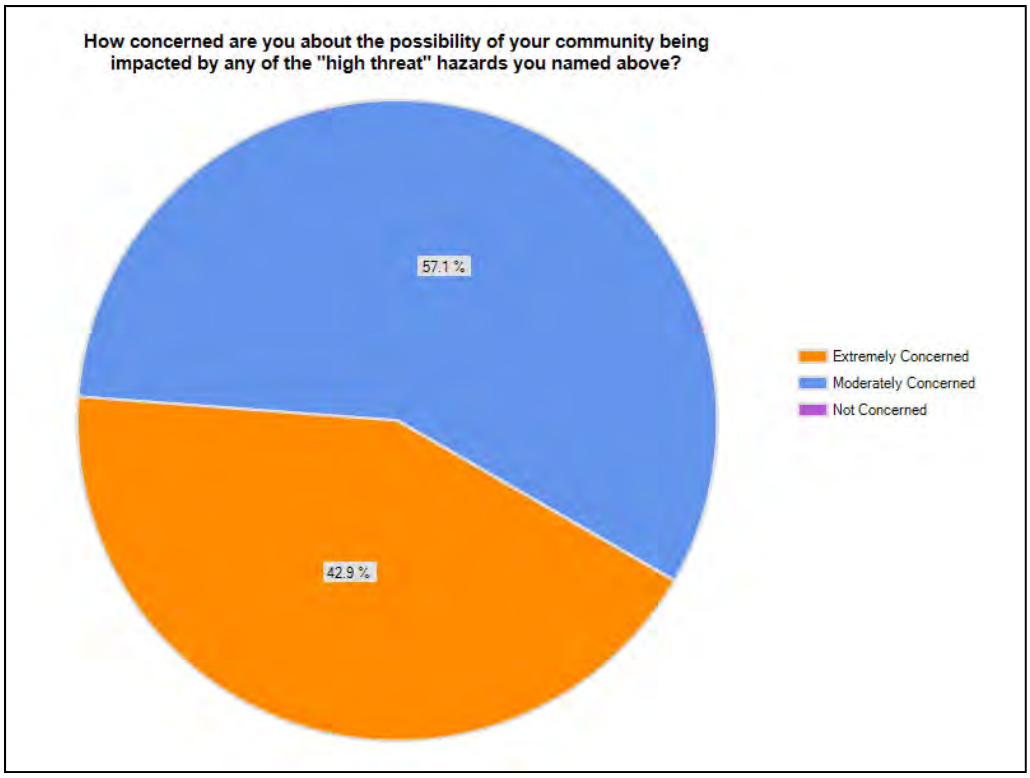
Online Hazard Mitigation Survey

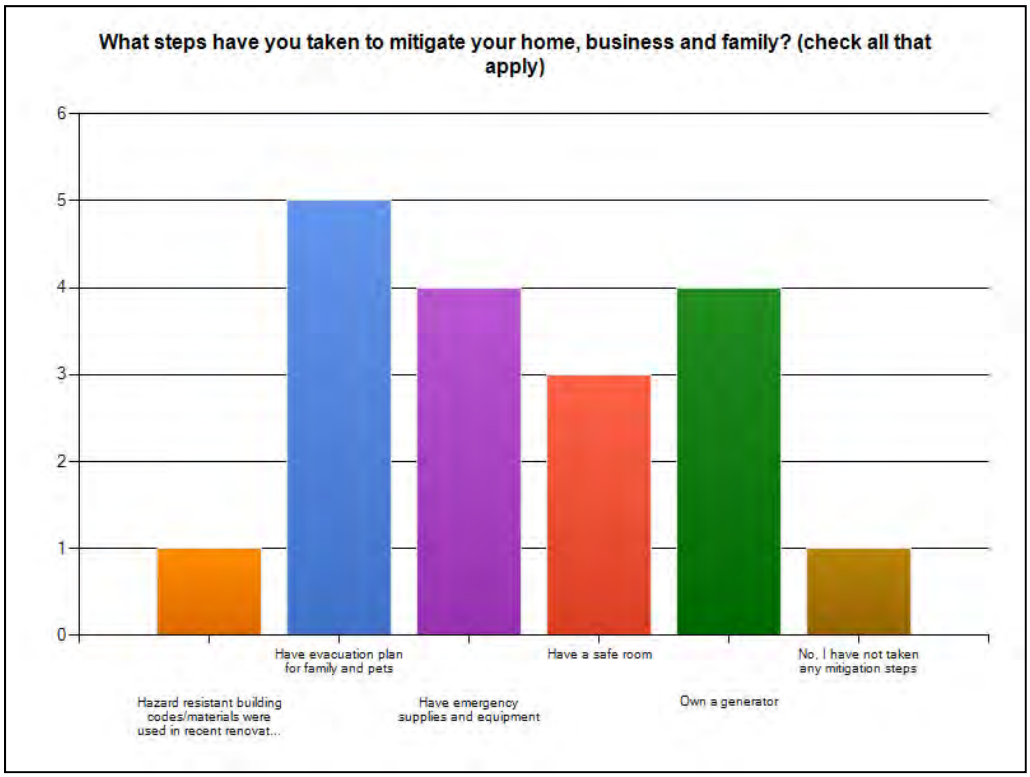
The City of Gulfport Hazard Mitigation Planning Survey was developed through Survey Monkey and linked to the City's web page. The survey provided multi-choice and open-ended questions. The questionnaire consisted of ten questions designed to solicit information about respondent's concerns and experience in dealing with hazards. A copy of the questions and the responses received is provided in Appendix 8.2-F.

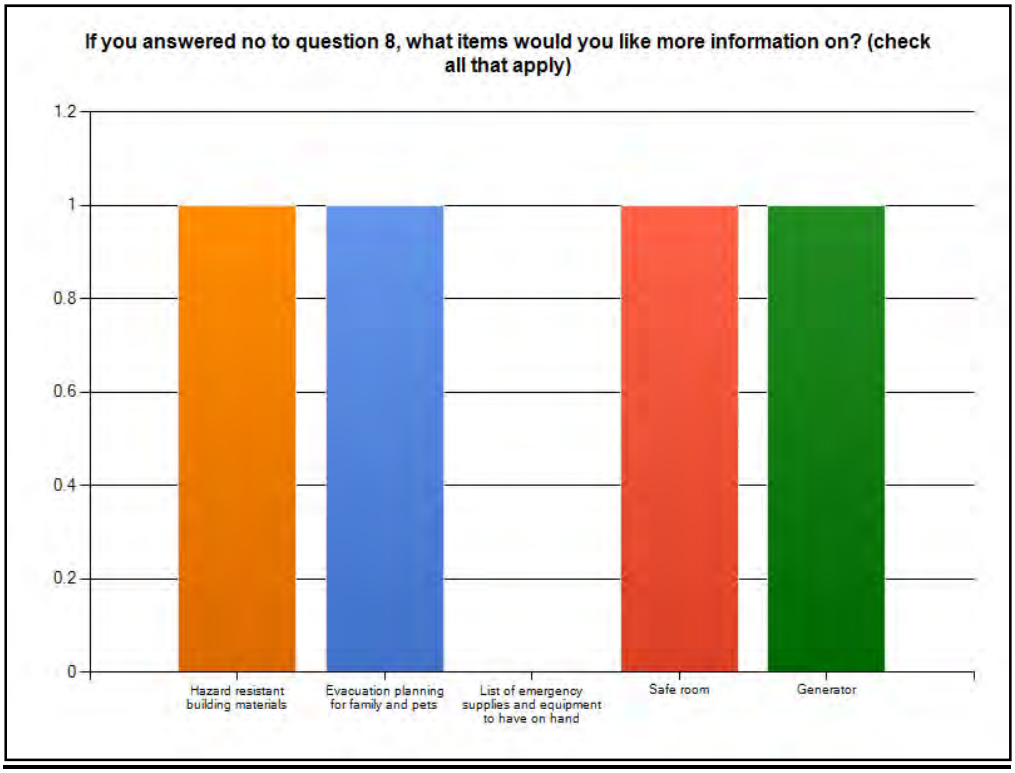
The survey was launched on March 8th and concluded on April 12th. During this time a total of seven residents completed the survey. Of that, six were residents of Gulfport and one was from Harrison County. Six respondents feel Gulfport is prepared for natural disasters and one did not. Charts are provided on the subsequent pages to reflect a sample of the responses received from the survey.

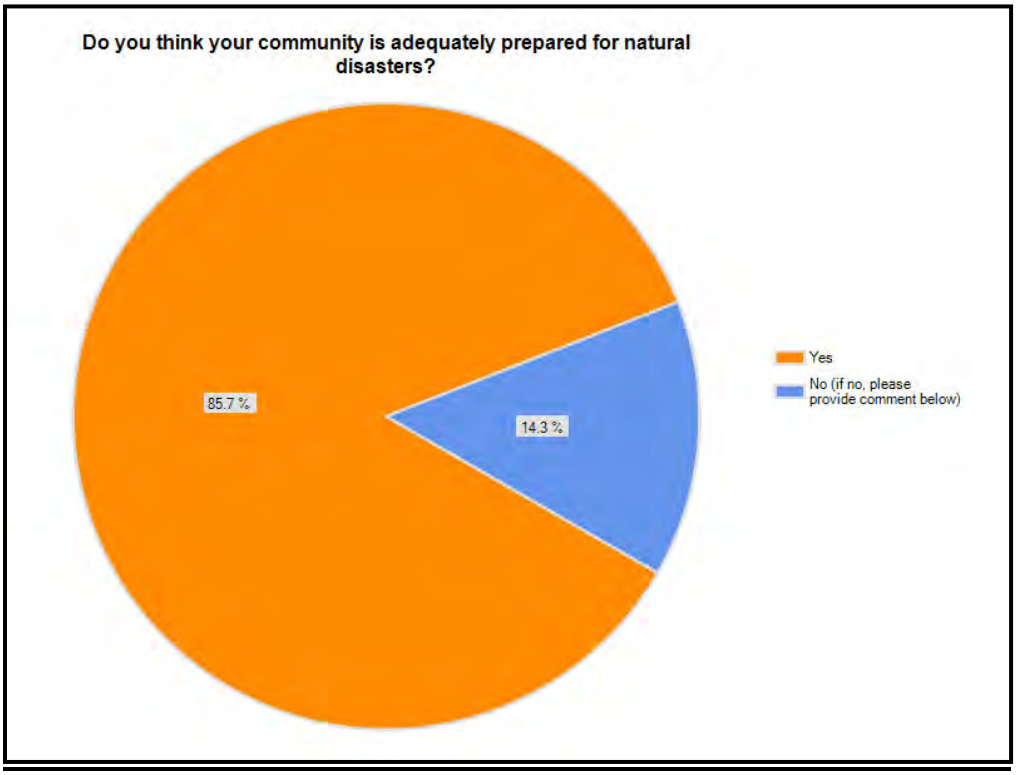

Please indicating the level of threat each hazard presents to your neighborhood, home or business property.
Hurricane/Coastal Storm
Thunderstorm/High Wind/Lightning/Hailstorm
Tornado
Extreme Heat
Flood
Fog
Health-Related Hazards (west nile virus,...
Storm Surge
Drought
Severe Winter Storm/Extreme Cold/Ice Storms
All Other Responses
0
0.5
1
1.5
2
2.5
3
3.5


Select the hazard(s) that you have experienced that resulted in structural damage or personal displacement due to evacuation orders, loss of utility services or other issues?
8
6
4
2
0
Flooding
Severe Winter Weather
Tornado
Coastal Erosion/Sea Level Rise
Hurricane/Coastal Storm/Storm Surge
Thunderstorm/Highwin-d/Lightning/Hailstorm
Wildfire


How concerned are you about the possibility of your community being impacted by any of the "high threat" hazards you named above?
57.1 %
42.9 %
Extremely Concerned
Moderately Concerned
Not Concerned


What steps have you taken to mitigate your home, business and family? (check all that apply)
6
5
4
3
2
1
0
Hazard resistant building codes/materials were used in recent renovat...
Have evacuation plan for family and pets
Have emergency supplies and equipment
Have a safe room
Own a generator
No, I have not taken any mitigation steps


If you answered no to question 8, what items would you like more information on? (check all that apply)
1.2
1
0.8
0.6
0.4
0.2
0
Hazard resistant building materials
Evacuation planning for family and pets
List of emergency supplies and equipment to have on hand
Safe room
Generator


Do you think your community is adequately prepared for natural disasters?
85.7 %
14.3 %
Yes
No (if no, please provide comment below)

First Public Meeting, March 16, 2013

The first public meeting was held during the City's *Harbor Fest/Easter Egg Hunt* at Jones Park in Gulfport from 9:00 a.m. to noon on Saturday, March 16th. The event was advertised through a variety of methods including a newspaper advertisement, flyers posted on bulletin boards in public buildings and on the City's web page. Letters and e-mails were also sent to all Committee members and Stakeholders. (See Appendix 8.2-G for the event flier, email notifications, newspaper advertisement, bulletin board locations and sign in sheets.)

A Hazard Mitigation Tent was set up and manned by the Neel-Schaffer planning team to capture the public's opinion on natural disasters and gather information on mitigation actions that they feel are needed within the city. The event was very well attended by residents of Gulfport and the neighboring communities of Pass Christian, Long Beach and Biloxi.

The Mitigation tent included two activities designed to engage visitors. The first activity helped identify hazards for which the public feels more education is needed (i.e., how to prepare for, respond to, and recover from). The second activity helped identify mitigation actions that citizens feel the city should implement when funding becomes available. This activity included the identification of specific information regarding flooding, road improvements and other projects/actions that should be considered. A brief summary of the results is presented below:

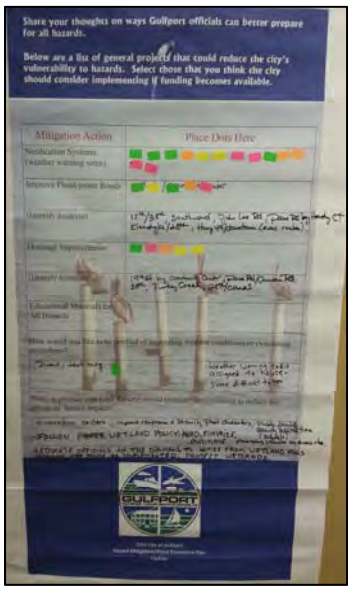
Children visiting the Hazard Mitigation Tent received FEMA developed age-appropriate activity books about natural disasters

Notification Systems: All visitors agreed that the city would benefit greatly by installing outdoor warning sirens.

Roadway improvements (flooding): 15th/38th, southward, John Lee Rd, Pass Rd near Hardy Ct, Klondyke/28th St, and Hwy 49 (downtown area).

Drainage improvements: 19th St by the community center, Pass Rd/Cowan Rd, 38th St, Turkey Creek area and 28th St/Canal Rd.

How would you like to be notified of impending weather conditions or evacuation procedures? Text messaging and sirens were identified. A comment was also received for the city to look into weather messaging systems, such as Alert FM, as implemented by Lauderdale County. Most participates indicated that they have weather applications on their cell phones to receive alerts for the Gulf Coast area.



Activities available for the public to weigh in opinions of natural hazard threats and needed mitigation actions.

Additional projects/information: General comments received included the following: improve evacuation procedures (communication and activate orders earlier); improve response and security throughout the city post disaster; have more security at public facilities (including schools) all the time; follow proper wetland policy - avoid, minimize and mitigate; educate officials on the damage to homes from wetland fills and follow NFIP policies to protect the wetlands.

In general, the participants all felt adequately educated regarding natural disasters prone to the Gulf Coast area. The main comment received was that information should be disseminated regularly through various media channels such as the city's web page, news, and newspaper. We also polled many students who attend the event, and several indicated that they had learned about weather at school and find it very interesting how the weatherman on their local stations tracks weather events.

Literature was available for visitors to take home and share with family and friends. The publications were designed for adults and children. The following guides were provided:

- Hurricane Tracking Map – Mississippi Emergency Management Agency
- Children's Activity Books – Federal Emergency Management Agency
- What is Mitigation Planning? – Federal Emergency Management Agency
- Wild/Urban Fire Education Materials – Mississippi Forestry Commission
- City of Gulfport's Online Hazard Mitigation Survey Announcement

The entire event was well received by the public. The Hazard Mitigation tent had 47 visitors who signed the registration list with well over 100 visitors stopping by to hear about the city's mitigation plan.

Public/Stakeholder Draft Plan Review Prior to State/Federal Approval

<u>Second Public Meeting, August 10, 2013</u>

Opportunity to review the draft plan was provided during the city's *Back to School Health and Wellness Fair* at Jones Park from 9:00 a.m. to 1:00 p.m. on Saturday, August 10. The event was advertised through a variety of methods including the newspaper, flyers posted on public bulletin boards and the stakeholders.

To tie in with the back-to-school-theme, the Neel-Schaffer planning team set up an interactive booth designed to engage children in a simple emergency preparedness exercise. The kids were invited to draw or write ways in which they prepare for tornados, hurricanes or floods. While children colored, the planning team held conversations with parents regarding the contents and purpose of the draft plan. Parents were invited to review the plan, ask any questions and provide thoughts or feedback for city officials. Additionally, kids were able to gain an understanding that we must plan to reduce the damages associated with disaster.

Results of the effort were good. A total of 49 visitors signed registration sheets for the booth and an estimated 100 individuals were able to learn about the draft plan and encouraged to visit the city's web site should they wish to learn more.

Parents review Gulfport's draft Hazard Mitigation and Flood Protection Plan during a Back to School Fair in Jones Park.

Individuals who wished to review the plan in a more leisurely manner were provided with information that directed them to the city's web site where a copy of the draft plan was available for public review and comment.

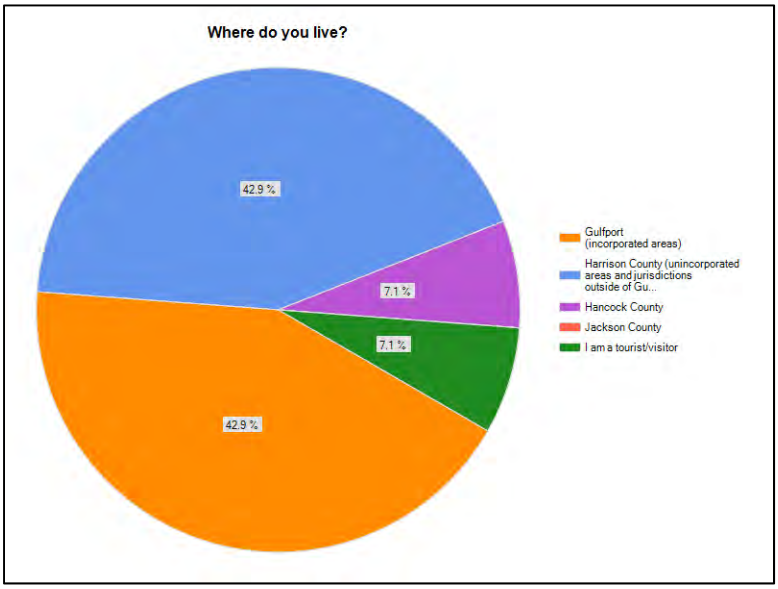
An additional benefit realized during the public engagement activity was the opportunity to discuss safety predaredness measures with children.

Online Hazard Mitigation Survey

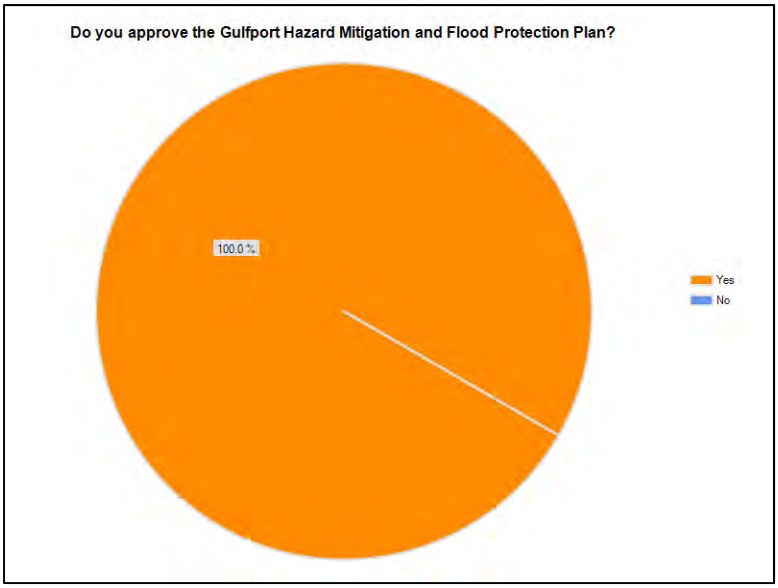
Increased circulation of the draft plan to residents, business owners and other stakeholders was provided through a hazard mitigation link on the city's web page. The link directed interested individuals to an electronic copy of the draft plan. This information, along with a comment survey, was available from July 26 to August 16, 2013.

Using Survey Monkey, citizens were provided multi-choice and open-ended questions designed to help communicate their level of acceptance or non-acceptance and to catalog places where changes or corrections should be made. Below is a summary of the responses received from the online review:

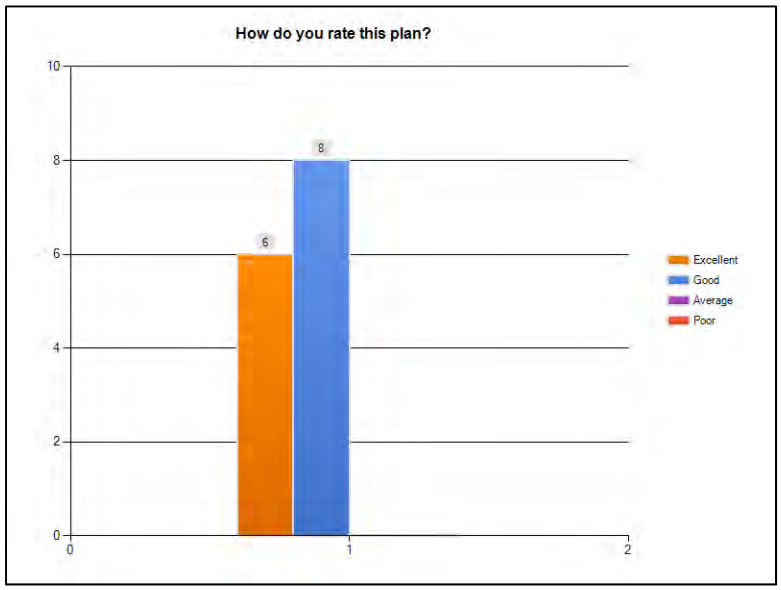
Fourteen individuals completed the survey. Of that, 42.9 percent reside in Gulfport's incorporated areas and 42.9 percent within the unincorporated areas as noted in the graphic below.



Fully 100 percent of respondents approve the draft plan and indicated no areas in which changes or corrections should be made.



When asked, 42.9 percent gave the draft plan a rating of “excellent” with the majority, 57.1 percent giving it a rating of “good” giving this plan an overall acceptance of good to excellent from 100 percent of responders.



The public, members of the Committees, City officials and stakeholder groups (Table 2.5) were notified of the meeting and provided a link for an electronic copy of the plan through various communication methods including Email, US Mail, the city’s web page, and public buildings.

(See Appendix 8.2-H for a copy of the meeting flier, email notification, advertisement, sign-in sheet, presentations, survey questions and comments).

2.4 Coordination with Other Agencies

In an effort to engage key stakeholders during the planning process and participation in public meetings, the following agencies and local businesses were identified as stakeholder members and advised through Email and US mail of public meetings to be held. Additional interviews were conducted with some of these groups, gathering specific information on the capabilities they provide to the City and identification of any mitigation concerns. The city also sent public meeting notifications to their email distribution list.

Table 2.5
Stakeholders

American Medical Response	LIFE
American Red Cross	Long Beach City Officials
Asian Americans for Change	Mississippi Department of Archives and History
Biloxi City Officials	Mississippi Department of Environmental Quality
Biloxi Regional Medical Center	Mississippi Department of Marine Resources
Center for Environmental and Economic Justice	Mississippi Department of Transportation
CenterPoint Energy	Mississippi Gaming Commission
Chamber of Commerce	Mississippi Highway Patrol
Coastal Transit Authority	Mississippi Insurance Department
CSX Railroad	Mississippi National Guard
Gulfport City Officials	Mississippi Power Company
Gulfport Memorial Hospital	Mississippi State Department of Health
Gulf Regional Planning Commission	Naval Construction Battalion Center
Hancock County Emergency Management Agency	North Gulfport Community Land Trust
Harrison County Officials	Northrup Development, LLC
Harrison County Emergency Management Agency	Pass Christian City Officials
Harrison County School District	Sierra Club
Harrison County Health Department	STEPS Coalition
Harrison County Sherriff's Department	Southern Miss Planning & Development District
Jackson County Emergency Management Agency	Turkey Creek Community Initiative
Keesler Air Force Base	U.S. Coast Guard
Land Trust for the MS Coastal Plain	VA Gulf Coast

2.5 Summary of Changes

The Planning Team and Hazard Mitigation Committee reviewed each section of the 2007 plan determining the best approach for updating the plan to meet current and future needs of the City. Some chapters were reorganized improving the flow of data. In general, the following changes/enhancements were made:

- Chapter 1 – Introduction was enhanced to include a description of the plan, purpose, authority, participation, adoption and summary of the plan contents by chapter.
- Chapter 2 – Planning Process was completely updated with current data to describe how the plan update was developed and who was involved.
- Chapter 3 – Community Profile was completed update and enhanced to include climate conditions, land use, housing, and transportation corridors. Statistical information presented in this chapter was updated using the 2010 Census, 2012 Harrison County Development Commission and the 2002 Comprehensive Plan data.
- Chapter 4 – HIRA was enhanced to include more detail on hazards and potential impacts, including support with maps and tables. The Development Trends section was also enhanced to address requirements in the revised Local Plan Review Tool. Non-natural hazards were grouped together in Section 4.7 to define the technological, man-made and health-related risks that could impact the city.
- Chapter 5 – Capability Assessment was expanded to include additional coordination of local, state and federal agencies plus existing plan/regulation/ordinance initiatives.
- Chapter 6 – Mitigation Strategy was updated to identify the progress made by the City since the previous plan, enhanced the NFIP program and status of mitigating RFC/SRL properties, restructured the mitigation goals and actions, identified new actions and those that are no longer relevant for the City, and added a section regarding grant sources.
- Chapter 7 – Plan Maintenance was enhanced to outline a process for the city to following over the next five years to assure that the plan is kept alive through annual meetings, incorporation into future planning initiatives, documenting procedures for future damages/impacts and continued public involvement. User-friendly forms and processes needed to evaluate, monitor and update the plan going forward are included in the appendix to assist with documentation required for the next plan update.

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3.0 Description of Study Area

Location and Size

The study area of Gulfport's Hazard Mitigation Plan includes the incorporated area of the city as shown in Figure 1. Geographically located in the center of Mississippi's Gulf Coast (See Figure 2), Gulfport is 173 miles southwest of Jackson, Mississippi, the state Capital, 80 miles east of New Orleans, Louisiana, and 75 miles west of Mobile, Alabama.

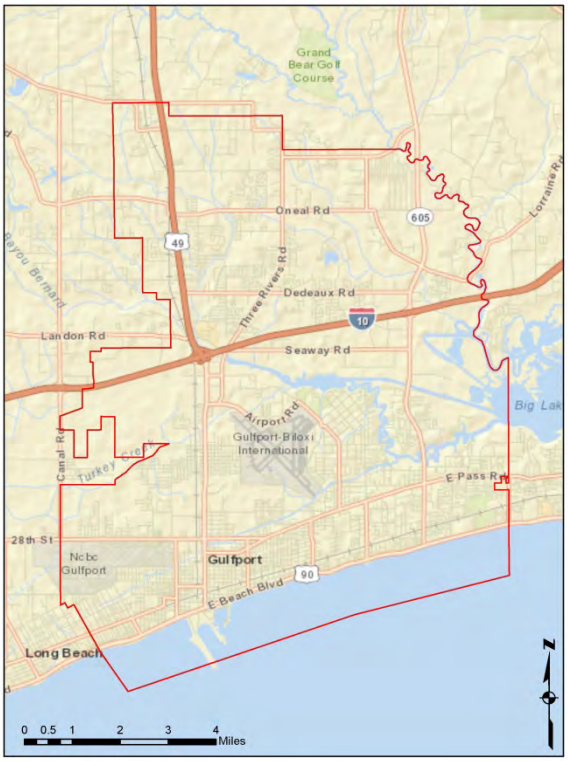


Figure 1

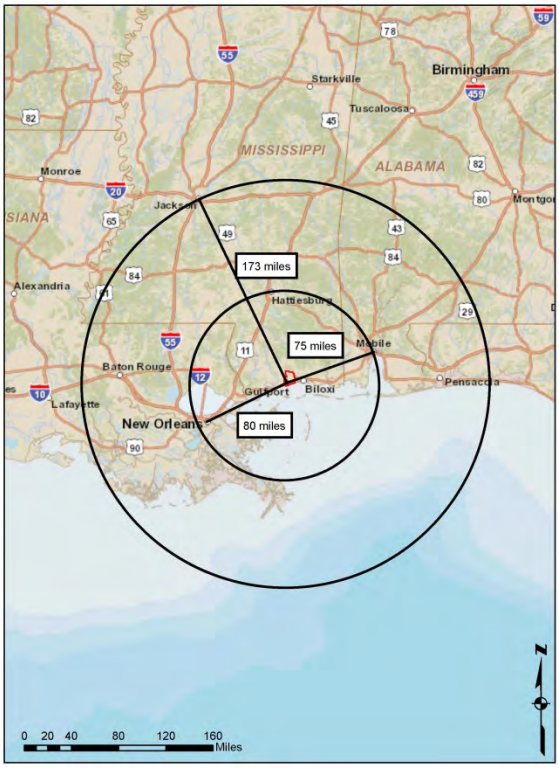


Figure 2

Gulfport is located in Harrison County one of three counties located on the Mississippi Sound. Harrison County is the most populous county of the three and Gulfport is the second largest city in Mississippi after Jackson, the state capitol. It is also the larger of the two principal cities of the Gulfport-Biloxi, Mississippi Metropolitan Statistical Area (MSA). Gulfport is co-county seat with Biloxi of Harrison County, Mississippi.

The land area within the current city limits of Gulfport is 67.9 square miles. The city's western limit is the city of Long Beach and the eastern boundary abuts the city of Biloxi. The city's southern limit is the Mississippi Sound and its northern limit is unincorporated Harrison County. According to the 2010 Census, there were 69,220 people residing in the city. The population density was 1,191.4 people per square mile.

The most dominate surface water resource in Harrison County is the Mississippi Sound and forms the southern boundary of the county. The Biloxi River runs on the north eastern boundary of the city. Other significant bodies of water include Bayou Bernard, Brickyard Bayou, Flat Branch, Fritz Creek, and Turkey Creek.

History

The city of Gulfport was incorporated on July 28, 1898, and included 5,000 acres of land located on the Mississippi Sound. Gulfport was founded by two men: William H. Hardy who was president of the Gulf and Ship Island Railroad (G&SIRR) which connected inland lumber mills to the coast; and Joseph T. Jones who later took over the G&SIRR, dredged the harbor in Gulfport, and opened the shipping channel to the sea. In 1902, the harbor was completed and the Port of Gulfport became a working seaport and accounts for millions of dollars in annual sales and tax revenue for the state of Mississippi.

Years earlier, William Hardy planned the development of a port at Gulfport because it offered the shortest and most accessible route to deep water. In 1896 a rail line linking the Port of Gulfport and the city of Hattiesburg was completed. Soon after the rail line was extended to Jackson, the Port of Gulfport was expanded and the Harrison County seat was moved from Mississippi City to Gulfport. By 1907, the city of Gulfport was the leading exporter of southern pine. In 1942, the city was chosen for the development of the U.S. Navy Construction Battalion. During the next several decades the city continued to grow, annexing communities to the east and north of the city.

From its beginnings as a lumber port, Gulfport evolved into a diversified city. With about 6.7 miles (10.7 kilometers) of white sand beaches along the Gulf of Mexico, Gulfport has become a tourism destination, due in large part to Mississippi's Coast Casinos. Gulfport has served as host to popular cultural events such as the "World's Largest Fishing Rodeo," "Cruisin' the Coast" (a week of classic cars), and "Smokin' the Sound" (speedboat races). Gulfport is a thriving residential community with a strong mercantile center. There are historic neighborhoods and home sites, as well as diverse shopping opportunities and several motels scattered throughout to accommodate golfing, gambling, and water-sport tourism.

3.1 Geography and Environment

Soils

The city of Gulfport is located along a 7.6 mile segment of the shoreline of Mississippi Sound. The land mass is within the Gulf Coast Flatwoods and the Southern Lower Coastal Plain. According to the General Soil Map of Harrison County prepared by the USDA Soil Conservation Service, the city includes four distinct soil associations that correspond to physiographic characteristics of the natural landform as it extends from the shoreline northward. The southernmost portion of the city, lying in Mississippi Sound and Brickyard Bayou as it flows through the city into Big Lake, is made up of dominantly organic soils flooded by salt water.

Topography

The city of Gulfport and adjacent areas are typical of a coastal lowlands environment. The Gulf Coast Flatwoods is an irregular strip of land about five miles in width which runs along the Mississippi Sound in Harrison County. The Southern Lower Coastal Plain is located at or near Interstate 10. There is an increase in elevation in this area, as well as an increase in the existence of deep valleys cut by erosion (Burk-Kleinpeter-2000, p. 5). Within the Gulf Coast Flatlands, about ½ mile from the Mississippi Sound, is a shallow coastal ridge with elevations of20 to 25 feet National Geodetic Vertical Datum (NGVD).

The 2000 Flood Hazard Mitigation Plan indicates that north of this ridge, elevations drop to about 10 feet NGVD near Brickyard Bayou. However, north of Brickyard Bayou, elevation increases sharply as the Gulf Coast Flatwoods transition into the Southern Lower Coastal Plain. Elevations rise between 90 to 160 feet in the northern limits of the city of Gulfport.

Climate

The climate in the city of Gulfport is mild, with mean temperatures in the upper 60's. The average winter temperatures range from 52 to 60 degrees Fahrenheit with summer temperatures ranging from 75 to 80 degrees Fahrenheit. Rainfall averages approximately 62 inches annually with the majority of the accumulation from July through September. Winds in the area are generally from the southeast or southwest. Wind speeds usually remain under 10 miles per hour, but increase during storms. Thunderstorms occur between 70 and 80 days a year, with many accompanied by severe winds.

The coastal climate is conducive to strong weather events, especially tropical storms and thunderstorms. Coastal surge, flash flooding and river flooding are also a concern to low lying communities located close to major rivers or the Mississippi Sound.

3.2 Population

According to the 2010 Census, Gulfport experienced a population decrease of 4.92% between 2000 and 2010 with an actual decrease of 3,334 persons. The 2011 estimated population was 69,220 which is an increase of 1,427 residents since 2010. This negative growth pattern during the 2000 decade is typical for coastal counties and cities, but can also be attributed to the aftereffects of Hurricane Katrina.

It is significant that 7,837 persons or 11.6 % of the population in Gulfport were 65 years of age or older including 3,445 who were 75 and older. Householders who lived alone included 2,234 persons who were 65 years of age or older. Approximately 2.9% of the total population or 1,984 lived in group quarters. These population groups have the potential of being highly vulnerable to hazards, particularly those involving mass evacuations.

The racial composition of Gulfport in 2010 was 56.9% White (38,544), 39.1% Black or African-American (24,453) and 1.7% Asian (1,149).

Tables 3.1 to 3.4 indicate demographic characteristics of Gulfport, Harrison County and other municipalities in the county. (The Harrison County totals include the municipalities.)

Table No. 3.1
Population Growth, 1950-2010
Harrison County and Municipalities

Year	Harrison County (Total)	Biloxi	D'Iberville	Gulfport	Long Beach	Pass Christian
1950	-	37,425	-	22,659	2,703	3,383
1960	-	44,035	-	30,204	4,770	3,881
1970	134,582	48,486	-	40,791	6,170	4,525
1980	157,665	49,311	-	39,676	7,967	5,014
1990	163,365	46,319	6,566	40,755	15,804	5,557
2000	189,601	50,644	7,608	71,127	17,320	6,579
2010	187,105	44,054	9,486	67,793	14,792	4,613

Source: U.S. Census Bureau,2010

Table No. 3.2
Population by Age Groups, 2010
Harrison County and Municipalities

Age	Harrison County(Total)	Biloxi	Gulfport	D'Iberville	Long Beach	Pass Christian
0-59 years	155,453	36,617	56,599	6,608	11,866	3,409
60-64 years	9,700	2,100	3,357	343	832	348
65-74 years	12,707	2,841	4,392	427	1,207	482
75-84 years	6,993	1,837	2,598	185	696	269
85 years and over	2,252	659	847	45	191	105
Total Population	187,105	44,054	67,793	7,608	14,792	4,613
Median Age	35.3	33.5	34.3	33.5	39.3	45.9

Source: U.S. Census Bureau, 2010

Table No. 3.3
Racial Composition, 2010
Harrison County and Municipalities

	Total Population	White	% of Total	Black	% of Total	Asian	% of Total
Harrison County (Total)	187,105	130,366	69.7%	41,393	22.1%	5,322	28.0%
Biloxi	44,054	30,129	68.4%	8,632	19.6%	1,951	44.0%
Gulfport	67,793	40,115	59.2%	24,544	36.1%	1149	1.70%
D'Iberville	7,608	5,950	78.2%	867	11.4%	535	7.00%
Long Beach	14,792	12,642	85.5%	1,224	8.30%	382	2.60%
Pass Christian	4,613	2,964	64.30%	1,285	27.90%	182	3.90%

Source: U. S. Census Bureau , 2010

Table No. 3.4
Land Area and Population Density, 2010
Harrison County and Municipalities

Area	Total Population	Land Area in Square Miles	Persons per square mile
Harrison County (Total)	187,105	573.99	326
Biloxi	44,054	46.5	947.4
D'Iberville	7,803	7.07	1,342.7
Gulfport	67,793	55.59	1,219.5
Long Beach	14,792	10.0	1,478.8
Pass Christian	4,613	15.3	301.50

Source: U. S. Census Bureau, 2010

3.3 Land Use

An existing land use study was completed for the 2002 city of Gulfport Comprehensive Plan adopted March, 2004. The Existing Land Use study and map was completed using the 2000 Harrison County tax maps as a base map, with verification by aerial maps and field studies. The effective date of the study is the year 2000. At that time, residential land uses represented the largest percentage or 41.6% of developed land. This is typical of most urban areas. Other categories of developed land use include commercial 7.7%; industrial 16.1%; public and semi-public uses 10.6%; and streets and rights-of-way 14.3%. Areas not improved and uncommitted to their present use, such as water areas, sand beach and resource production (mining) amounted to 38.5% of total land use area.

3.4 Housing

At the time of the 2010 Census, 31,602 housing units were located within the city limits of Gulfport. This is an increase of 2,009 units from the 2000 census count of 29,593. Only Gulfport and D'Iberville experienced an increase in housing units during this decade. Most of the decrease in housing units in Mississippi coastal areas is attributed to structures being destroyed or severely damaged by the effects of Hurricane Katrina.

Table No. 3.6 provides a breakdown of housing units in all jurisdictions in the county, as well as the percentage of units that are single-family detached, single-family attached, two units, three or more units, and mobile homes.

Table No. 3.5
Housing Units, 2010
Harrison County and Municipalities

Area	HU 2000	Census 2010						Net Chg 2000 to 2010	% Chg 2000 to 2010
		# HU 2010	% 1- Unit Detached	% 1-Unit Attached	% 2-Units	% 3 or More Units	% Mobile Homes		
Harrison County	79,636	80,275	64.6	3.1	2.0	20.1	11.8	639	0.80
Biloxi	22,115	21,278	55.6	4.8	2.4	28.4	8.6	-837	-3.93
D'Iberville	3,008	3,548	60.6	1.5	0.0	21.2	16.7	540	15.22
Gulfport	29,593	31,602	66.2	3.7	2.5	21.5	5.7	2,009	6.36
Long Beach	7,203	6,504	77.6	1.2	2.5	15.3	2.7	-699	-10.75
Pass Christian	3,351	2,299	78.1	2.6	0.0	15.7	2.7	-1,052	-45.76

Source: U.S. Census Bureau, 2010

3.5 Economic Data

Gulfport's economy is an integral part of the Mississippi Gulf Coast economy. The city's beginnings as a major economic port on the Mississippi Gulf Coast were diversified as the employment base and economic power within the region expanded. Its employment base depends on medical, educational, casino gaming, tourism, and governmental entities. Service and retail also expanded as the city enlarged its boundaries and new housing development occurred.

The coastal region received a boost in 1992 when the city legalized dockside casino gaming. Located adjacent to the Mississippi Sound are the Island View Casino and Resort and the city's downtown area. The downtown area includes the headquarters and corporate offices for Hancock Bank and Mississippi Power. All other banks operating in Gulfport have major branch offices in the downtown area. The Bayou Bernard Business District is located inland on Bayou

Bernard, a tidally influenced waterway. This industrial area includes numerous wholesale, manufacturing and similar employers.

Located near Interstate 10 are Crossroads Shopping Center, Garden Park Hospital, Prime Outlets Shopping Center, Wal-Mart and Home Depot. Located north of Interstate 10 are Keith Huber and Coast Electric Power Association. West Gulfport employers include the Naval Construction Battalion and Memorial Hospital. The Sun Herald Newspaper and Mississippi Gulf Coast Community College are located in East Gulfport.

Table No. 3.7 lists the employers within the city of Gulfport with the highest number of employees.

Table No. 3.7
Major Employers City of Gulfport, 2012

Employer	No. of Employees	Product/Service
Memorial Hospital	2,661	Medical Facility
Island View Casino Resort	1,457	Gaming
Mississippi Power Company (regional)	1,299	Public Utility
Hancock Bank (regional)	1,213	Banking
Gulfport School System	916	Public Education
Naval Construction Battalion Center	900	Military Facility
Harrison County School District (City only)	835	Public Education
City of Gulfport	700	Municipal Governmental
Trinity Yachts LLC	650	Manufacturer
Walmart Gulfport	478	Retail
Garden Park Hospital	478	Medical
MGCC (full-time Gulfport only)	325	Educational

Source: City of Gulfport webpage 2013

Sales Tax Diversions

The state of Mississippi levies a general sales tax of 7% on most retail sales. Of this amount, each municipality receives 18.5% of the amount collected within its corporate borders.

According to the 2012 budget, sales tax is a major source of revenue for the city, typically representing 36% of total revenue collected, and is also an accurate measure of economic growth. The following table indicates sales tax revenues from fiscal year 2004 through fiscal year 2012. The city's fiscal year runs from October 1 through September 30. Projected sales tax revenues for the fiscal year ending September 2013 is $19,100,000 according to the 2013 budget.

Table No. 3.8
Sales Tax Revenue by Fiscal Year, 2004-2012

2004	$17,387,349
2005	$18,057,277
2006	$26,618,671
2007	$24,255,701
2008	$22,112,126
2009	$20,293,704
2010	$18,829,392
2011	$18,969,725
2012	$19,090,841
Source: City of Gulfport webpage 2013	

Gaming Revenues

The city of Gulfport receives a proportional share of revenues from gaming facilities located in Hancock and Harrison counties. Approximately six percent of the city's budget is generated from gaming revenues. In the aftermath of Hurricane Katrina, gaming revenues decreased significantly; however, as facilities are replaced or repaired, gaming revenues rebounded. Annual gaming revenues have not yet reached pre-Katrina levels.

Table No. 3.9
Gaming Revenue by Fiscal Year, 2004-2012

2004	$5,163,874
2005	$4,821,969
2006	$289,678
2007	$3,077,579
2008	$3,772,359
2009	$3,523,169
2010	$3,424,674
2011	$3,413,443
2012	$3,346,487
Source: City of Gulfport webpage 2013	

Property Taxes

The second largest amount of revenue for the city is generated from the collection of real property taxes. Property taxes constitute approximately 33% of annual budged revenue. The city's budget for the fiscal year ending September 2013 estimates that $23,410,000 will be generated through the collection of property taxes during this fiscal year.

3.6 Transportation

The city of Gulfport has several major vehicular transportation routes as well as an international airport, commercial railroad service, and small craft sea access to the Mississippi Sound and other local waterways. Local and regional thoroughfares accessible to Gulfport and available for evacuation events are described below:

East/West Corridors

- Interstate 10 (I-10) is the fourth longest interstate in the United States covering 2,460 miles from Los Angeles, California, to Jacksonville, Florida. A segment of this highway transverses Gulfport.

- U. S. Highway 90 runs from Van Horn Texas, to Jacksonville Beach, Florida, and runs adjacent to the beach. For many years this was the primary east-west highway along the coast and continues to serve as a major artery connecting the coastal communities.

- Pass Road, south of I-10, is a major commercial thoroughfare beginning at Highway 49 in Gulfport and terminating at Rodenberg Avenue at the entrance to Keesler Air Force Base.

North/South Corridors

- U. S. Highway 49 runs from Highway 90 to Highway 82 in Indianola, Mississippi. It is a major highway connecting the gulf coast area with the state capital.

- Mississippi Highway 605—Lorraine/Cowan Road (Major Arterial) runs from Highway 90 to Highway 97.

Table No. 3.8 lists major transportation facilities in Gulfport and a map identifying their location is on subsequent pages.

Table No. 3.8
Major Transportation Facilities

Direction/Type of Service or User	Name and Type/Location
Ground Transportation	
East/West	Interstate Highway 10 (I-10) U. S. Highway 90 Pass Road (Major Arterial) Airport Road (Major Arterial) 34th Street (Major Arterial) 28th Street (Minor Arterial) Dedeaux Road (Minor Arterial) Three Rivers Road O'Neal Road
North/South	U. S. Highway 49 Mississippi Highway 605—Lorraine/Cowan Road (Major Arterial)
East/West North/South	CSX Rail Road KCS Rail Road
Air Transportation	
Public	Gulfport-Biloxi International Airport
Waterways and Ports	
Recreational	Mississippi Sound

4.0 Overview of the Risk Assessment Process

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

Risk assessment requires the collection and analysis of hazard-related data enabling participating jurisdictions to identify and prioritize appropriate mitigation actions to reduce/eliminate losses from potential hazards. The information presented in this section is based on best available data. Information developed in the 2007 plan was incorporated by adding relevant data from 2008 to 2012.

FEMA's Local Mitigation Plan Review Tool (October 2011) provides the following summary of intent for each required element in this section.

- *To understand the potential and chronic hazards affecting the planning area and identify the most significant hazard risks and most adversely affected locations. To understand potential impacts to the community based on past hazard events and the likelihood they will reoccur.*
- *To consider the community as a whole, analyze potential impacts of future hazard events, and the reduction of vulnerabilities through hazard mitigation actions.*
- *To inform hazard mitigation actions for properties suffering repetitive damage due to flooding, particularly problem areas that may not be apparent on the floodplain maps.*

4.1 Hazard Identification and Risk Assessment

Requirement CFR §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.

4.1.1 Hazard Identification

Hazard identification is recognizing risk-related events threatening a community. Events are described as natural or human-caused hazards inflicting harm on people or property, or interfering with commerce or human activities. Such events would include, but are not limited to, hurricanes, floods, severe storms, and other incidents affecting populated or built areas.

The Hazard Mitigation Committee considered all hazards prone to the Mississippi Gulf Coast in accordance with 44 CFR 201.6 (c) (2) (i). Information from the 2007 Gulfport Hazard Mitigation

and Flood Protection Plan, National Climatic Data Center (NCDC), the United States Geologic Service (USGS) and other sources were reviewed to determine the type, location, and extent of natural hazards that may affect Gulfport. The following section details the threats of hazards unlikely to impact the community and defines those hazards likely to affect the city of Gulfport.

Hazards Not Likely to Occur within the city of Gulfport

The 2007 plan included a list of eight hazards unlikely to occur within Gulfport. These were avalanches, dam failure, drought, excessive heat, excessive cold, expansive soil, land subsidence, landslide, and volcano. The 2013 Plan Committee determined most of these are still not likely to impact the incorporated areas of the city; however, they elected to incorporate drought as a hazard that could have moderate impact.

In addition to the unlikelihood of occurrence, avalanche and volcano are not relevant to the Mississippi Gulf Coast, not required by FEMA to be considered, and therefore omitted from the hazard list.

The following hazards are considered a potential occurrence on the Mississippi Gulf Coast, but not deemed a threat to the incorporated areas of Gulfport.

Expansive Soils – Soils that expand or swell when moist. Usually the soils contain clay, which attract and absorb water. According to generalized soil surveys from USGS, there are clay soils with swelling potential in southern Mississippi; however, no specific occurrences were identified in Gulfport.

Dam Failure - The Mississippi Department of Environmental Quality (MDEQ) – Dam Safety Division identified nine low hazard dams located within Harrison County, represented in the graphic to the right. Since these dams are not located inside the corporate limits of Gulfport, the planning committee decided not to include this hazard in the 2013 plan update.

Low hazard dams in Harrison County

Extreme Heat - A review of data and information from the NCDC, as well as Presidential Declarations, indicates extreme heat is not an identified occurrence in Gulfport. Further, a review of the State Hazard Mitigation Plan indicates Mississippi does not identify extreme heat as a likely impact to communities within the state.

Land Subsidence - The lowering of land-surface elevation taking place underground. Common causes of subsidence include groundwater pumping, as well as pumping oil and gas from underground. Other causes can include the collapse of limestone aquifers and underground mines. Currently no sinkholes are identified from groundwater pumping in Gulfport. Oil and gas pumping operations are not occurring within the city.

Hazards Prone to the City of Gulfport

The Hazard Mitigation Planning Committee conducted a review of natural hazards prone to Mississippi by comparing the hazards identified in the city's 2007 plan to the 2008 Harrison County and 2010 State of Mississippi plans. Table 4.1 reflects the crosswalk of hazards identified in these plans and includes the revised list of hazards to be presented in the 2013 Gulfport Plan.

Table 4.1
Natural Hazard Identification

Natural Hazards	2007 Gulfport Plan	2008 Harrison County	2010 State Plan	2013 Plan Update
Coastal Erosion	X	X		X
Coastal Storm	X	X		X
Dam/Levee Failure			X	
Drought			X	X
Earthquake	X		X	X
Expansive Soils				
Extreme Heat				
Flood	X	X	X	X
Fog				
Hailstorm	X	X		X
High-Wind	X	X		X
Hurricane	X	X	X	X
Land Subsidence				
Lightning	X	X		X
Salt Water Intrusion				
Sea Level Rise				X
Severe Winter Storm	X		X	X
Sink Holes/Landslide				
Storm Surge		X	X	X
Thunderstorm	X	X		X
Tornado	X	X	X	X
Tsunami	X			X
Wildfire	X	X	X	X

4.1.2 Hazard Ranking Process

The Mitigation Planning Committee reviewed the methodology used in the 2007 plan and the risk characteristic methodology recently adopted by the State of Mississippi Hazard Mitigation Council. It was determined the Gulfport plan update should utilize the same ranking methodology as the state allowing a more cohesive roll up process. This ranking methodology was also used by over 57% of local jurisdictions who approved mitigation plans. The six risk characteristics and future occurrence factors examined to determine the city's overall vulnerability level are in Table 4.2

Table 4.2
Natural Hazard Identification

Risk Characteristic (Vulnerability)		Score
Area Impacted (The % of the city at risk to an impact from each hazard)	No area in the city directly impacted	0
	Less than 25% of the city impacted	1
	Less than 50% of the city impacted	2
	Less than 75% of the city impacted	3
	Over 75% of the city impacted	4
Health And Safety Consequences (The health and safety consequences that can occur)	No health and safety impact	0
	Few injuries or illnesses	1
	Few fatalities but many injuries or illnesses	3
	Numerous fatalities	4
Property Damage (The amount of property damage that can occur)	No property damage	0
	Few properties destroyed or damaged	1
	Few destroyed but many damaged	2
	Few damaged and many destroyed	3
	Many properties destroyed and damaged	4
Environmental Damage (The environmental damage that can occur)	Little or no environmental damage	0
	Resources damaged with short term recovery	1
	Resources damaged with long term recovery	2
	Resources destroyed beyond recovery	3
Economic Disruption (The economic disruption that can occur)	No economic impact	0
	Low direct and/or indirect costs	1
	High direct and low indirect costs	2
	Low direct and high indirect costs	2
	High direct and high indirect costs	3
Future Occurrence		
Probability Of Future Occurrence (The probability of a future occurrence)	Unknown but anticipate rare occurrence	1
	1 - 4 documented occurrences over last 10 years	2
	5 - 7 documented occurrences over last 10 years	3
	8 – 10 documented occurrences over last 10 years	4
	More than 10 occurrences over last 10 years	5

Risk Level	Total Rating Score
Low	0-15
A hazard with a LOW RISK RATING is expected to have little to no impact upon the city. The hazard poses minimal health and safety consequences to the state's residences and is expected to cause little to no property damage. *The occurrence of a hazard with a LOW RISK RATING is rare; however, due to other factors such as geographical location, it is still possible for such a hazard to occur and even cause significant damage based upon the magnitude of the event.*	
Medium	16-30
A hazard with a MEDIUM RISK RATING is expected to have a moderate impact upon the city. The hazard poses minor health and safety consequences with minor injuries expected and few to no fatalities. The hazard may cause some properties to be damaged or destroyed. *The occurrence of a hazard with a MEDIUM RISK RATING is likely at least once within the next 25 years.*	
High	31 or More
A hazard with a HIGH RISK RATING is expected to have a significant impact upon the city. The hazard poses high health and safety consequences with numerous injuries and fatalities possible. The hazard may even cause some properties to be damaged or destroyed. *A hazard with a HIGH RISK RATING is expected to occur at least once within a 12 month period, but can occur multiple times within a year.*	

The Hazard Mitigation Committee completed the ranking process of natural hazards selected for this plan update. Table 4.3 provides the results of this exercise. The formula used for this calculation is: Vulnerability X Probability of Occurrence = Risk

Table 4.3
Hazard Ranking and Probability Identification

Hazards Selected	Area Impacted	Health/Safety	Property Damage	Environmental Damage	Economic Disruption	Total	Future Occurrence	Overall Risk	Ranking
Coastal Erosion	1	0	2	1	1	5	3	15	Low
Coastal Storm (Hurricane, Tropical Storm, Storm Surge)	4	3	4	2	3	16	3	48	High
Drought	4	0	1	2	1	8	2	16	Med
Earthquake	1	0	1	1	0	3	1	3	Low
Fire (Wild/Urban)	1	3	2	0	2	8	5	40	High
Flood	2	1	2	1	2	8	4	32	High
Severe Storm (Hail, High Wind, Lightning, Thunderstorm)	2	1	1	0	1	5	5	25	Med
Sea Level Rise									
Tornado	2	1	4	2	2	11	2	22	Med
Tsunami									
Winter Storm									

A summary of the natural hazards selected by ranking level for inclusion in this plan update is provided below.

High
- Coastal Storms (Hurricanes, Tropical Storms, Storm Surge)
- Flood
- Fire (Wild/Urban)
- Tornado

Medium
- Drought
- Severe Thunderstorm Storm (Hail, High Wind, Lightning)

Low
- Coastal Erosion
- Earthquake
- Sea Level Rise
- Tsunami
- Winter Weather

Technological, Health-Related and Man-Made Hazards

The 2007 plan included non-natural hazards such as terrorism, West Nile, pandemic and hazardous spills. Section 4.7 is dedicated to recognizing these hazard events and is presented as information only. These events should be incorporated as appropriate into future planning initiatives to completely address the preparedness, response and recovery procedures.

4.1.3 Vulnerability Assessment

Requirement CFR §201.6(c)(2)(ii) [the risk assessment shall include a] description of the jurisdiction's *vulnerability to the hazards described and shall include an overall summary of each hazard and its impact on the community.*

Vulnerability is susceptibility to physical injury, harm, damage or economic loss and is dependent on location, construction, content, and function of a facility. Understanding vulnerability is essential in mitigation planning for the city of Gulfport because leads to understanding the types and costs of injury and damages resulting from a future hazard event.

Each natural hazard identified for inclusion in this plan update was categorized into a high, moderate or low classification and is included in Sections 4.2 to 4.4. A profile of each hazard is presented based on data found in the 2007 plan and best available data obtained throughout the planning process. Each hazard contains the following risk assessment elements:

- Hazard Description
- Location and Extent
- Previous Occurrences
- Probability of Future Occurrences
- *Vulnerability Assessment

**A description of the vulnerabilities identified to population, critical facilities and infrastructure, essential services, transportation systems and lifeline utilities are defined as appropriate with the best available data gathered during the analysis.*

Maps are included throughout this chapter further demonstrating the risks associated with population, facilities and infrastructure. Full scale maps are available through the city's GIS Department.

Loss Estimates for city owned facilities are provided in Section 4.5.

Development trends were considered and are described in Section 4.6.

4.1.4 Identifying Structures

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

The state of Mississippi's Hazard Mitigation Plan provides the following definitions for critical facilities and infrastructure, supported with components and examples for each term and provided in Appendix 8.4-A:

Critical Facility is defined as any structure that provides or houses critical services necessary to ensure the health and welfare of the population following a natural or man-made hazardous event, including any facilities designated by the local government in their Hazard Mitigation Plan.

Critical Infrastructure is defined as systems so vital to the State of Mississippi that the incapacity or destruction of those systems would have a debilitating impact on security, economics, public health, safety, or any combination of those factors, including any infrastructure designed by local government in their Hazard Mitigation Plan.

The Hazard Mitigation Committee agreed with the methodology used in the state plan to define critical assets and primarily followed the process used in the 2007 Plan of the city's list of critical facilities and infrastructure. Below is a brief definition of each type provided in the former plan followed by examples of the identified assets:

- Vulnerable population facilities such as hospitals, nursing homes, schools, day cares and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a flood or other emergency. (Table 4.4)
- Public safety facilities such as fire stations, police stations, vehicle and equipment storage facilities, city buildings and emergency operations centers needed for disaster response activities before, during and after flood or other emergency. (Table 4.5)
- Public and private utilities vital to maintaining or restoring normal services to areas before, during and after a flood or other disaster. (Table 4.6)
- Transportation systems, such as roads and bridges, are essential for safe evacuation and egress for emergency personnel and supplies before, during and after a disaster. (Chapter 3, Table 3.8)
- Structures or facilities that produce, use or store highly volatile, flammable, explosive toxic and/or water-reactive materials. (Appendix 8.4-B)
- Other facilities and agencies providing products, services, or support roles, such as medical supplies/prescriptions; food; fuel; building supplies; etc.; necessary to sustain the population before, during and after a disaster (Table 4.7)

Table 4.4
Vulnerable Populations

Hospitals	Schools	Childcare
Garden Park North	Turkey Creek School	Gulfport Academy Child Care
Gulfport Memorial Hospital	Gaston Point Elementary	Turkey Creek Head Start Program
Gulf Coast Medical Center	Bayou View Elementary	Harrison County Head Start
Nursing Homes	Westminster Academy School	Ovation Learning Center
Boyington Pro Care	Anniston Avenue Elementary	Sullivan Teresa
Alpha Personal Care	Bayou View Middle School	Kare-It Patch Day Care
Driftwood Nursing Home	Bel Aire Elementary School	Trinity United Methodist School
Jackson Personal Care Home	Central Elementary	Good Shepard Christian Academy
Lakeview Nursing Center	Christian Collegiate Academy	Westminster Academy School
Gulf Coast Medical Center	Gulfport Central Middle School	Wesley Academy
	Gulfport High School	Watch Me Grow Learning Center
Psychiatric Clinics	Gulfport Schools	Aunt Donna's Daycare & Learning
Crises Stabilization Unit	Gulfport Special Education	Aunt Donna's Day Care
Tate, Vivian - T & T Association LLC	Harrison Central 9th Grade	Lil-Tots Day Care Center
Gulfport Mental Health	Harrison Central Elem School	Three Rivers Academy
Seasons Senior Behavioral Health	Harrison Central High School	Nugent Child Development Center
Pine Grove Coastal Care Center	Harrison County Special Ed	Northwood Christian Academy
Smith, Kelly - Crossroads Counseling	Harrison County Alternative	Kids Connection
Memorial Behavioral Health	Harrison County Child Dev. Center	Temple Christian Academy
Simone & Association PLLC	Harrison County Magnet School	Kinder Care Learning Center
Memorial Behavioral Health	Harrison County School Supt	Christian Collegiate Academy
Renaissance Counseling Center	Harrison County Schools	Wee Ones Child Care Inc
Gulf Coast Mental Health Center	Harrison County Vo-Tech Center	Gulf Coast Missionary Baptist
Carey Jane	Learning Center	Happy Times Child Care Inc
Staley Teresa	Lyman Elementary	Divine Preschool Academy
Dickson Rishel Dorothy	North Gulfport 7th & 8th Grade	Kids First Child Development
Center-Prevention-Child Abuse	Northwood Christian Academy	All My Children
Gulf Coast Mental Health Center	Orange Grove Elementary	Kid Academy Preschool
Advanced Psychotherapy Association	Pass Road Elementary School	Twin Oaks Child Development
Colleges	St James School	Childhood Wonders
MGCCC	St John Catholic Schools	Wee Ones Daycare & Preschool
USM Gulf Coast Campus	Temple Christian Academy	
Blue Cliff College	Three Rivers Elementary School	
MGCCC Jefferson Davis Campus	Twenty-Eighth Street Elementary	
	West Elementary School	

Table 4.5
Public Safety Facilities

Fire Stations	City Facilities
Central Fire Station	City Hall
Fire Station 2	Carnegie Library
Fire Station 3	William H Hardy Building
Fire Station 4	Joseph T Jones Building
Fire Station 5	Public Works Building
Fire Station 6	Public Works Building 2
Fire Station 7	Public Works Warehouse
Fire Station 10	Harbor Services Facility
Fire Station 11	Records Storage Facility
Fire Station 12	Leisure Service Admin Building
Police Stations	Building Maintenance Parks Facility
Police Training Building	Goldin Park - Maintenance Facility
Police Department Pistol Range	Horticulture Building
Police Department Old Electronic Shop	Sportsplex Maintenance Shop 1 (West)
North Gulfport Police Complex	Sportsplex Maintenance Shop 2 (East)
Orange Grove Police Sub	Cemetery Admin Office
Police Complex Motorcycle Storage/General	Armory Building
Police Complex Fleet Maintenance Center	Grasslawn Museum Support Building
Police Complex Technical Service Center	Emergency Operation Center
Robert J. Curry Public Safety Center	Harrison County Emergency Management Agency
Community/Recreational Centers	
Handsboro Community Center	Orange Grove Community Center
Gaston Point Community Center	Lyman Community Center
Charles L Walker Senior Center	Feed My Sheep
Westside Community Center	Katie Patterson Booth Rec Center
Herbert Wilson Rec Center	19th St Recreation Center
Gaston Hewes Rec Center	
Shelters	
Central Elementary School (Red Cross Primary Shelter)	Orange Grove Community Center (Primary Shelter-FEMA 361)
Central Middle School (Secondary Shelter)	

Table 4.6
Public/Private Utilities

Mississippi Power Company	Water Associations
Plant Jack Watson (MS Power)	Harrison County Utility Authority
Coastal Electric Power Association	Sewer Lift Stations
CenterPoint Energy (natural gas)	Water Wells and Tanks

Table 4.7
Other Facilities/Agencies

National Guard Complex	Humane Society
Naval Battalion Construction Center Gulfport	Dialysis Centers
U.S. Coast Guard	Pharmacies
U.S. Customs	Medical Supply Stores
Social Security Office	Grocery Stores
U.S. Postal Service	Fuel Centers
Media Outlets	Building Supply Centers

Housing

Certain housing units, such as mobile homes, substandard and older structures not constructed to current building standards, are more susceptible to damage from certain types of hazards. According to the 2011 American Community Survey by the U. S. Census, 1,539 housing units or 4.7% of Gulfport housing units were mobile homes. This is a decrease from the 2000 census and the 2010 census counts. Recreational vans (RV)/campers and boats account for 174 units.

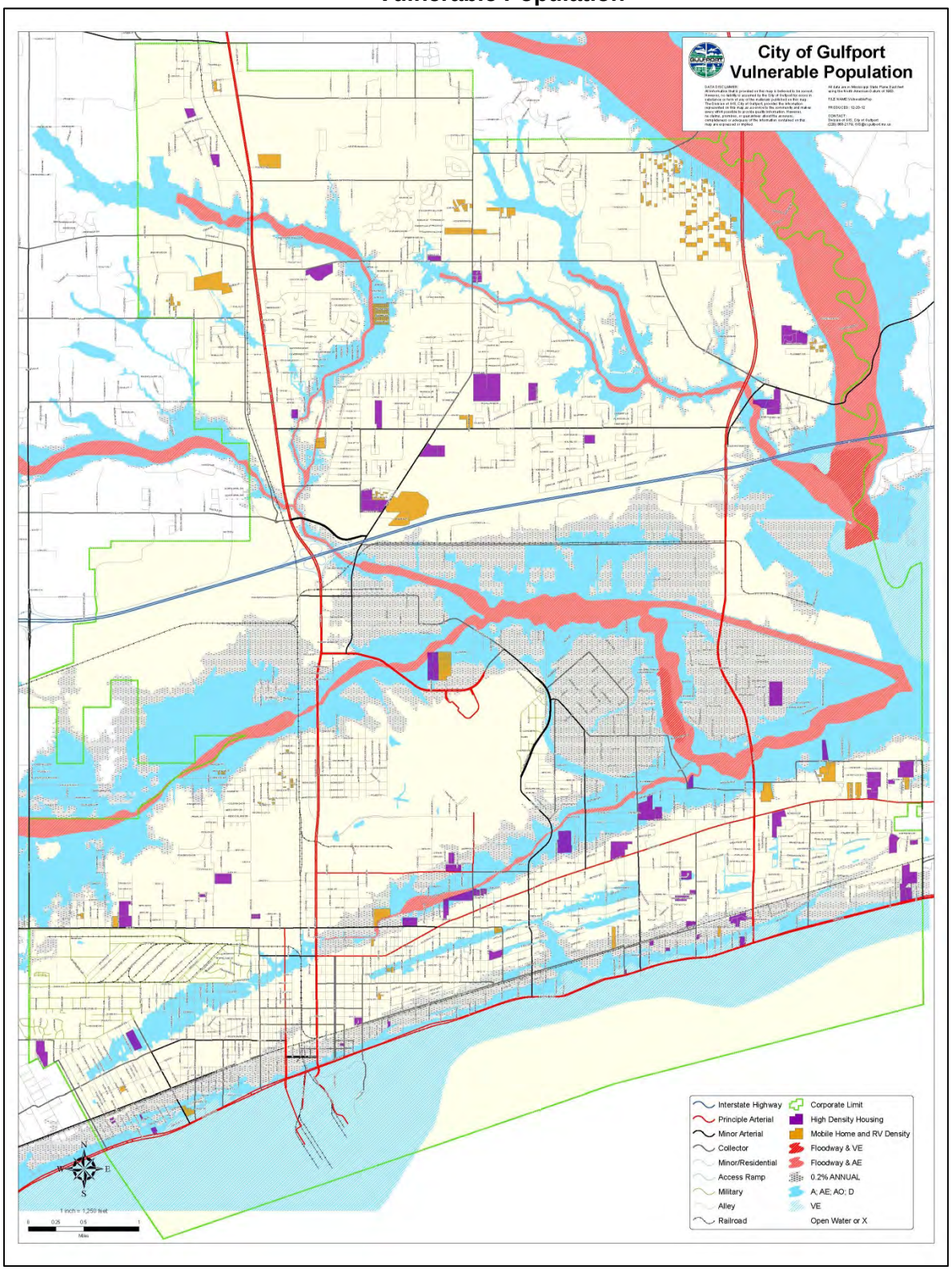
As shown in Table 4.8, approximately 51.5% of the housing stock was built prior to 1970 and the implementation of building standards. These homes may be at an increased risk from certain hazards.

Table 4.8
Year Housing Structure Built

Year Built	Number of Units	Percent of Total
Built 2005 or later	3,954	12.2%
Built 2000 to 2004	4,535	14.0%
Built 1990 to 1999	4,652	14.3%
Built 1980 to 1989	2,637	8.1%
Built 1970 to 1979	6,932	21.3%
Built 1960 to 1969	3,892	12.0%
Built 1950 to 1959	1,969	6.1%
Built 1940 to 1949	1,482	4.6%
Built 1939 or earlier	2,438	7.5%
Total Housing Units	32,491	100%
Source: U. S. Census Bureau		

Persons living in high density units, such as multi-family developments, are also considered vulnerable due to the concentration of housing units within a relatively small area. According to the 2010 census, 21.5% of housing units contained three or more units. The location of vulnerable population groups is shown on Map 4.1.

Map 4.1
Vulnerable Population



Asset Inventory for Flood Zones

The city of Gulfport GIS Department provided data for city-owned assets and other assets listed in their database. Table 4.9 provides a summary of the number of facilities and how many falls within the SFHA and 0.2% annual flood zones.

Table 4.9
Asset Inventory Located in Flood Zones

Building Type	No. of Buildings	No. of Buildings in SFHA	No. of Buildings in 0.2% Annual
City-Owned Facilities	49	7	13
Sewer Lift Stations	197	86	28
Wells	28	2	8
Schools	35	2	2
Child Care Centers	31	5	5
Colleges	4	1	1
Hospitals	3	0	1
Nursing Homes	6	1	0
Psychiatric Clinics	17	0	5
Source: City of Gulfport GIS			

4.2 HIGH RANKED HAZARDS

4.2.1 Coastal Storms (Hurricanes, Tropical Storms, Storm Surge)

Hurricanes/Tropical Storms

Hazard Description

By far the most severe, common and geographically extensive impact to the city of Gulfport from a natural hazard is caused by hurricanes, coastal storms and the associated wind and storm surge.

Among all the natural hazards considered, the Hazard Mitigation Committee determined hurricanes and tropical storms were most likely to cause extensive damage within city Gulfport. The committee determined planning for these events a high priority natural hazard due to the historic damage from past events, the extent of damage and the probability of occurrences of coastal storms in the future.

Hurricanes and tropical storms are naturally occurring events that produce damaging high winds, generate dangerous storm surge flooding, cause pounding storm surf, spawn tornadoes, and produce torrential rainfall that can cause inland flooding.

On a recurrent basis, hurricanes are the strongest natural hazard threat to human life and property. Tropical storms and hurricanes threaten the city with high winds, rain, and storm surge. The Gulfport participates with local media educating the public about the dangers of hurricanes. Due to the size of hurricanes and tropical storms, the entire city can be impacted by these storms.

The Atlantic hurricane season begins June 1 and ends November 30, but hurricanes have developed outside of the designated season. The city of Gulfport has been subjected to winter and spring extra-tropical storms driving higher than normal tides from southerly and southeasterly winds. Gulfport also experienced tropical depressions and tropical storms causing higher than normal tides, storm surge and gusting winds.

FEMA defines coastal storms as causing “increases in tidal elevations (called storm surge), wind speed and erosion, caused by both extra-tropical events and tropical cyclones.” FEMA defines hurricanes as “tropical cyclones characterized by thunderstorms and defined wind circulation.” These winds “blow in a large spiral around a calm center called the eye.”

Hurricane wind intensity is measured with the Saffir-Simpson Scale based on a 1-5 rating of a sustained wind speed at the time of measurement. This is used to estimate the potential property damage expected along the coast from hurricane landfall. Hurricanes reaching Category 3 and higher are considered major hurricanes because of potential significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require

preventative measures. Wind speed is the determining factor in the scale. All winds are described using the U.S. 1-minute average. Previously, storm surge was described by the Saffir-Simpson Scale, but is no longer included.

The following excerpt from the National Hurricane Center explains the revised definition of the Saffir-Simpson Hurricane Scale and the separation of storm surge from storm category followed by an explanation of the need to revise the new range of wind speeds:

> *Earlier versions of the Saffir-Simpson Hurricane Scale incorporated central pressure and storm surge as components of the categories. The central pressure was used during the 1970s and 1980s as a proxy for the winds as accurate wind speed intensity measurements from aircraft reconnaissance were not routinely available for hurricanes until 1990. Storm surge was also quantified by category in the earliest published versions of the scale dating back to 1972. However, hurricane size (extent of hurricane-force winds), local bathymetry (depth of near-shore waters), topography, the hurricane's forward speed and angle to the coast also affect the surge that is produced. For example, the very large Hurricane Ike (with hurricane force winds extending as much as 125 mi from the center) in 2008 made landfall in Texas as a Category 2 hurricane and had peak storm surge values of about 20 feet. In contrast, tiny Hurricane Charley (with hurricane force winds extending at most 25 mi from the center) struck Florida in 2004 as a Category 4 hurricane and produced a peak storm surge of only about 7 feet These storm surge values were substantially outside of the ranges suggested in the original scale. Thus to help reduce public confusion about the impacts associated with the various hurricane categories as well as to provide a more scientifically defensible scale, the storm surge ranges, flooding impact and central pressure statements are removed from the Saffir-Simpson Hurricane Scale and only peak winds are employed in this revised version.*
>
> *The Saffir-Simpson Hurricane Wind Scale (SSHWS) has undergone a minor modification for 2012 in order to resolve awkwardness associated with conversions among the various units used for wind speed in advisory products. The change broadens the Category 4 wind speed range by one mile per hour (mph) at each end of the range, yielding a new range of 130-156 mph. This change does not alter the category assignments of any storms in the historical record, nor will it change the category assignments for future storms.*

Table 4.10 depicts the revised Saffir-Simpson Scale by category, associated wind speeds and expected damages from a particular event.

Table 4.10
Saffir-Simpson Hurricane Wind Scale (revised 2012)

Category	Previous Range	New Range	Effects on Land
One	74-95 mph	No change	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days

Table 4.10
Saffir-Simpson Hurricane Wind Scale (revised 2012)

Category	Previous Range	New Range	Effects on Land
Two	96-110 mph	No Change	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
Three	111-130 mph	111-129 mph	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable several days to weeks after the storm passes
Four	131-155 mph	130-156 mph	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
Five	Greater than 155 mph	Greater than 157 mph	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center

The following terms are used to describe tropical storms / hurricanes:

Tropical Wave: A trough or cyclonic curvature maximum in the trade-wind easterlies. The wave may reach maximum amplitude in the lower middle troposphere.

Tropical Depression: A tropical cyclone with maximum sustained surface wind speeds (using the U.S. 1-minute average) of 33 kt (38 mph or 62 km/hr) or less.

Tropical Storm: A tropical cyclone with maximum sustained surface wind speed (using the U.S. 1-minute average) ranges from 34 kt (39 mph or 63 km/hr) to 63 kt (73 mph or 118 km/hr).

Hurricane: A tropical cyclone with maximum sustained surface winds (using the U.S. 1-minute average) of 64 kt (74 mph or 119 km/hr) or more.

Location and Extent

The entire land area of the city of Gulfport is at risk to damage from hurricanes and Coastal Storms. The city's coastal area is subject to tidal flooding from these events. Also the city's bayous and creeks, part of the regional hydrologic regime, are subject to heavy rains in the

upper reaches of Harrison County causing flooding downstream, and can also be subject to tidal flooding. A direct or indirect impact from these systems can produce damage from surge and flooding along the coastal areas, inflicting high wind and isolated tornadoes across the city.

The Flood Insurance Study determined flood zones based upon hydraulic and hydrologic modeling and the study of historical events within the city of Gulfport. Coastal areas within the city of Gulfport are subject to tidal flooding and wave action.

The information presented in this plan update reflects a significant part of the recovery costs from strong winds and storm surge. However, there are also very significant costs associated with interrupted business, lost wages, and utility disruption that are very difficult to quantify, but nevertheless important metrics for determining the impact.

Previous Occurrences

Table 4.11 includes a list of Presidential Disaster Declaration events from 1965 to 2012 for which the city of Gulfport received Public Assistance.

Table 4.11
Declared Hurricane/Tropical Storm Disasters
Harrison County

Event/Declaration Number	Incident Period	Major Declaration Declared
Hurricane Isaac (DR-4081)	August 26, 2012 to September 11, 2012	August 29, 2012
Hurricane Gustav (DR-1794)	August 28, 2008 to September 8, 2008	September 22, 2008
Hurricane Katrina (DR-1604)	August 29, 2005 to October 14, 2005	August 29, 2005
Hurricane Dennis (DR-1594)	July 10, 2005 to July 15, 2005	July 10, 2005
Hurricane Ivan (DR-1550)	September 13, 2004 to September 20, 2004	September 15, 2004
Tropical Storm Isidore (DR-1436)	September 23, 2002 to, October 6, 2002	October 1, 2002
Tropical Storm Allison (DR-1382)	June 6, 2001 to June 13, 2001	June 21, 2001
Hurricane Georges (DR-1251)	September 25, 1998 to October 5, 1998	October 1, 1998
Hurricane Elena (DR-741)	August 29, 1985 to September 4, 1985	September 4, 1985
Hurricane Frederic (DR-599)	September 13, 1979	September 13, 1979
Hurricane Camille (DR-271)	August 18, 1969	August 18, 1969
Hurricane Betsy (DR-210)	September 25, 1965	September 25, 1965

Source: NCDC

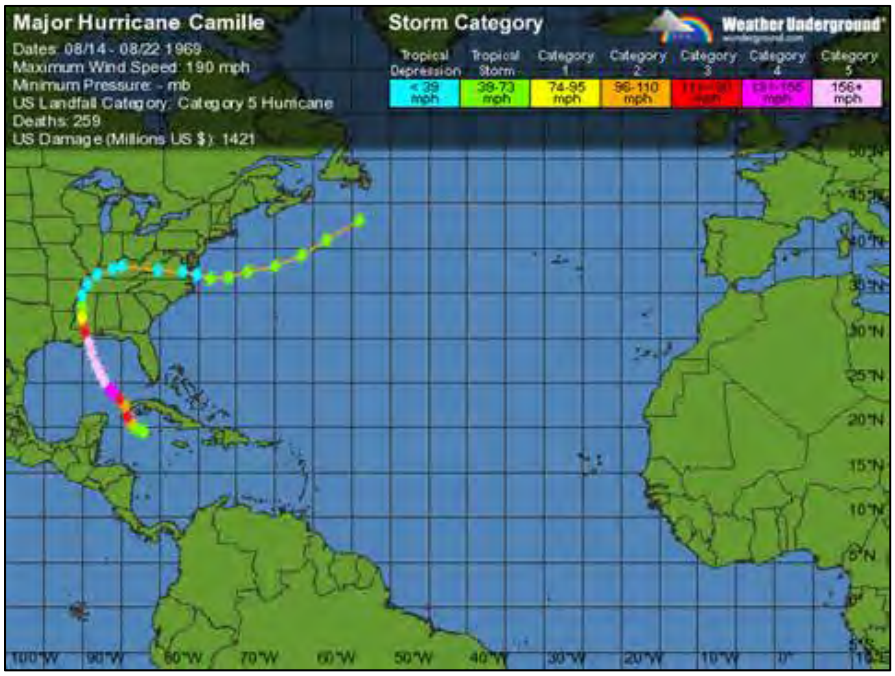
In addition to these major storms, the following tropical systems also impacted the city of Gulfport to some degree. Hurricane/tropical storm events are listed by storm name and year.

- Erin - 1995
- Opal - 1995
- Danny - 1997
- Hermine – 1998
- Bertha – 2002
- Hanna – 2002
- Bill - 2003
- Arlene - 2005
- Cindy- 2005
- Fay – 2008
- Lee – 2011

Hurricanes of the 1800's

Based upon historical accounts and scientific research, NOAA documented Atlantic hurricanes and tropical storms back to 1850. Using this data, the city of Gulfport, or the land area which was to become the city of Gulfport, may have been affected by the following hurricanes and tropical storms:

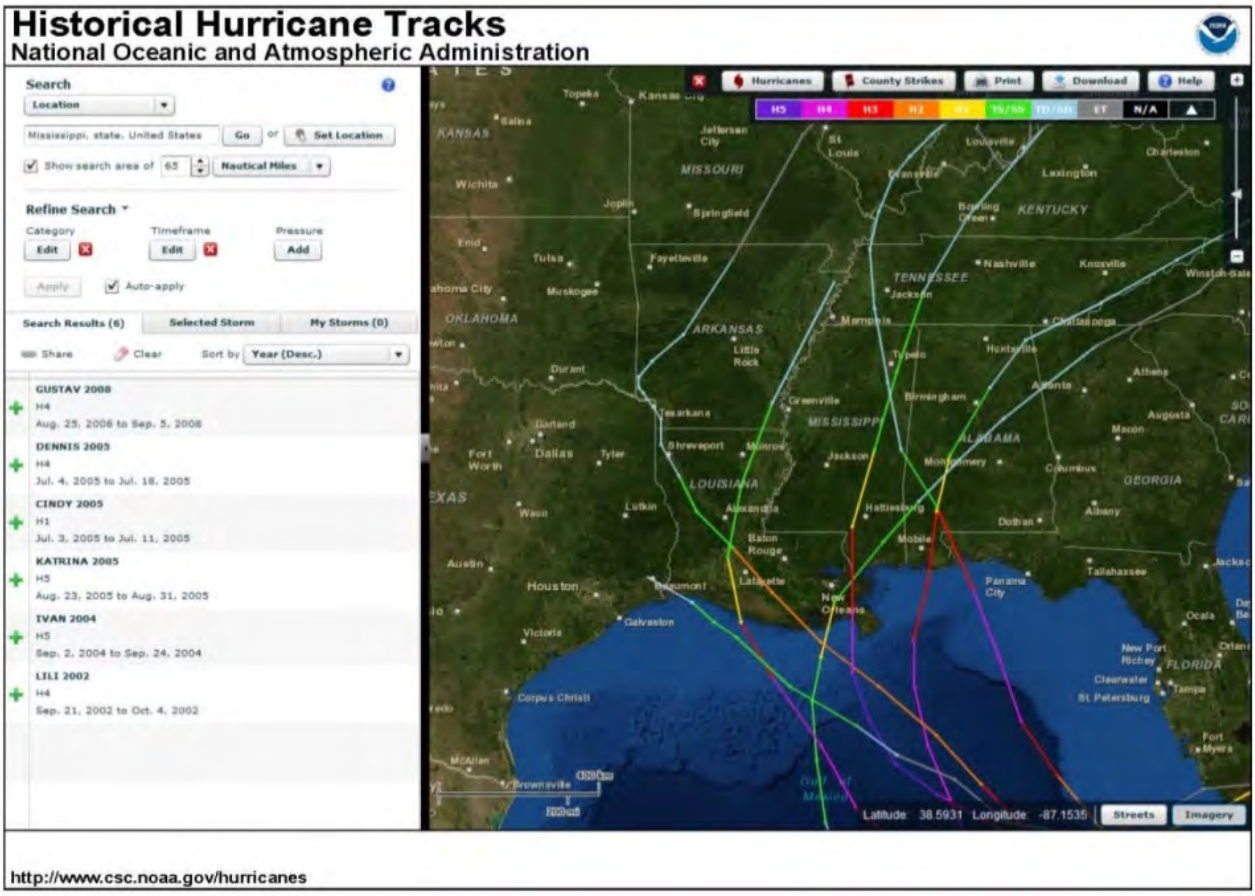
- 1895 Tropical Storm
- 1893 Major Hurricane
- 1892 Tropical Storm
- 1887 Tropical Storm
- 1885 Hurricane
- 1881 Tropical Storm
- 1879 Tropical Storm
- 1877 Hurricane
- 1872 Tropical Storm
- 1869 Hurricane
- 1863 Tropical Storm
- 1860 Major Hurricane
- 1860 Hurricane
- 1859 Hurricane
- 1855 Major Hurricane
- 1852 Major Hurricane



Hurricane Camille 1969

Map 4.2 illustrates the historic tracks of hurricanes and tropical storms that crossed over or near the city of Gulfport.

Map 4.2
Hurricane Tracking Map Gulf of Mexico -2000 to 2012



Below is a description of declared disaster events occurring over the past ten years, summaries from FEMA on impacts to people and property, and public assistance dollars obligated. Appendix 4.2-C contains detailed information on other events prior to 2001 as provided in the 2007 plan.

August 28, 2012–Hurricane Isaac

Hurricane Isaac entered the Gulf of Mexico as a tropical storm on August 26, 2012, moving northwest after crossing Haiti, Cuba and the Florida Straits. Isaac moved slowly north northwest over the eastern Gulf. Isaac strengthened into a hurricane on the morning of the 28th 75 miles south southeast of the mouth of the Mississippi River. Isaac made landfall in Plaquemines Parish as a Category 1 Hurricane near Southwest Pass of the Mississippi River on the evening of the 28th; and made a second landfall near Port Fourchon the following morning. The storm weakened to a tropical storm on the afternoon of the 29th about 50 miles west southwest of New Orleans, and weakened further to a tropical depression near Monroe, Louisiana on the afternoon of the 30th.

Even though Isaac was hurricane status near the mouth of the Mississippi River and into southeast Louisiana, only tropical storm force winds were recorded on land areas of Mississippi. The maximum sustained wind in south Mississippi was 46 knots or 53 mph measured at the Gulfport-Biloxi-Airport during the early afternoon of August 29th. A portable weather station (Weatherflow, Inc) near Gulfport measured a 48 knot gust, or 55 mph, late on the morning of August 29. A maximum wind gust of 58 knots or 67 mph was recorded at the NOAA NOS Bay Waveland station and also at Gulfport (Weatherflow, Inc) late on the morning of August 29. The long duration of tropical storm force winds downed some trees and power lines across the region.

The minimum sea level pressure was 995.9 mb and was measured from the NOAA-NOS station at Bay-Waveland station during the early morning of August 29th. A storm tide ranged from approximately 5 feet in Jackson County to nearly 10 feet in Hancock County closer to Isaac's center. These values are approximately 3 to 8 feet above normal astronomical values. Storm surge flooding impacts were greatest in Hancock County. Persistent rain bands affected south Mississippi, especially the coastal sections producing heavy rainfall over a three day period. Ten to twenty inches of rainfall were common across the region. A co-operative observer near Pascagoula recorded the maximum reading of 22.20 inches of rain. Heavy rainfall produced both flash flooding and later moderate-to-major river flooding. Record crests were observed on the Wolf River near Landon (August 31) and Gulfport (September 1), and the East Hobolochitto River near Caesar (August 31). Storm surge and high tides restricted outflow of the rivers near the coast and lakes exacerbating flooding of low lying areas along rivers and bayous near the coast as they emptied into the Gulf. There were two weak tornadoes documented along the Mississippi coast which resulted in generally minor property damage

Overall, impacts from Isaac resulted in at least $7 million in damages in south Mississippi and one direct fatality. Much of the damage in the coastal counties of Hancock, Harrison, and Jackson, was related to storm surge on the coast, flash flooding, or river flooding. There will likely be adjustments in the damages as additional information and assessments are made. There was one direct fatality in south Mississippi on the morning of August 30 when a tree fell on a tow truck killing the 52 year old male driver.

Harrison County		
Deaths	Injuries	Property Damage
1	0	$300,000
Source: NCDC		
Public Assistance Dollars Obligated Declared Counties		
Total Public Assistance Grants	Emergency Work (Categories A-B)	Permanent Work (Categories C-G)
$29,319,161.93	$15,377,861.71	$13,941,300.22
Source: FEMA March 21, 2013		

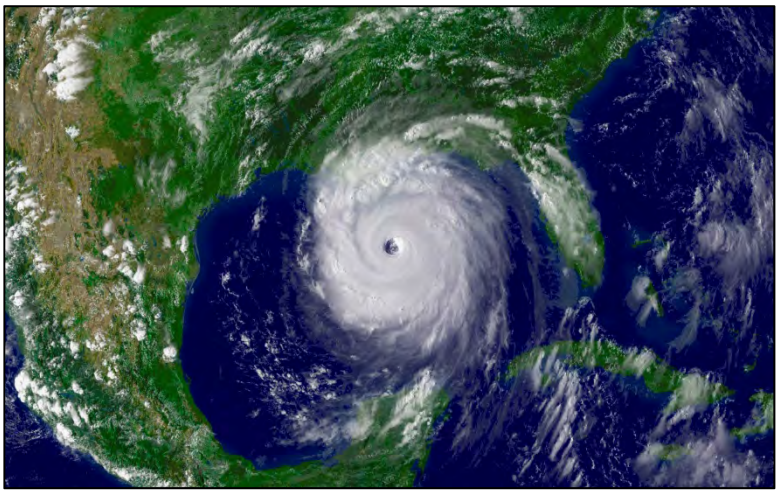
September 1, 2008–Hurricane Gustav

Hurricane Gustav made landfall during the morning of September 1, 2008 as a Category 2 hurricane near Cocodrie, LA Gustav continued to move northwest and weakened to a Category 1 storm over south central Louisiana . The highest wind gust recorded in south Mississippi was 74 mph at the Gulfport-Biloxi International Airport, while the highest sustained wind of 54 mph was recorded at the Waveland Yacht Club. No official wind observations were available in far southwest Mississippi; however hurricane force wind gusts may have occurred. Rainfall varied considerably ranging from 4 to 10 inches. Gustav produced mainly light wind damage across coastal Mississippi, although more significant and concentrated damage occurred in southwest Mississippi closer to the track of the center of the storm. Widespread power outages occurred in southern Mississippi.

Harrison County		
Deaths	Injuries	Property Damage
0	0	$6.5million
Source: NCDC		
Public Assistance Dollars Obligated Declared Counties		
Total Public Assistance Grants	Emergency Work (Categories A-B)	Permanent Work (Categories C-G)
$33,693,135.75	$19,932,178.32	$12,648,062.43
Source: FEMA March 21, 2013		

August 28, 2005-Hurricane Katrina

Hurricane Katrina was one of the most destructive hurricanes on record to impact the coast of the United States. It was one of the worst natural disasters in the history of the U.S., resulting in catastrophic damage and numerous casualties along the Mississippi coast. Damage and casualties resulting from Hurricane Katrina extended as far east as Alabama and the panhandle of Florida. Post-event analysis by the National Hurricane Center indicates Katrina weakened slightly before making initial landfall in Plaquemines Parish as a strong Category 3 storm. The storm continued on a north northeast track with the center passing about 40 miles southeast of New Orleans, and a second landfall occurring near the Louisiana / Mississippi border as a Category 3 storm with maximum sustained winds estimated at 121 mph. Katrina continued to weaken as it moved north-northeast across Mississippi, but remained at hurricane strength 100 miles inland.



Damage across coastal Mississippi was catastrophic. The storm surge associated with Hurricane Katrina approached or exceeded the surge associated with Hurricane Camille (1969) 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, 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. Excluding losses covered by the National Flood Insurance Program (NFIP), 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 2005, the Harrison County Emergency Operations Center reported 83 fatalities from Hurricane Katrina in Harrison County.

The NCDC reports tide gauges were destroyed by Hurricane Katrina; therefore, storm surge was determined by post storm high water marks. It was estimated the storm surge along Harrison County was between 19 and 25 feet. The city of Gulfport estimated 3,500 homes within the city of Gulfport were destroyed by Hurricane Katrina and another 5,000 homes were severely damaged. The city of Gulfport reported 15 city buildings were destroyed and 20 city buildings were severely damaged. Ten of the city's twelve fire stations sustained major damage, and three community centers were destroyed. The city estimated damage to city buildings, equipment and vehicles at $150 million.

Harrison County		
Deaths	Injuries	Property Damage
83	0	$2.94 billion
Source: NCDC		
Public Assistance Dollars Obligated Declared Counties		
Total Public Assistance Grants	Emergency Work (Categories A-B)	Permanent Work (Categories C-G)
$3,247,920,216.77	$1,170,324,170.23	$1,897,168,798.38
Source: FEMA March 21, 2013		

July 10, 2005 – Hurricane Dennis

Hurricane Dennis crossed over Cuba, entered the central Gulf of Mexico, and strengthened to a Category 4 on July 10th. . Hurricane Dennis weakened to a Category 3 prior to making landfall along the western Florida panhandle. The Mississippi Gulf Coast felt some tropical weather from Hurricane Dennis. The highest wind gusts over land in Mississippi were reported at Keesler Air Force Base at 46 mph. The highest wind gusts over water adjacent to Mississippi was 52 mph from a buoy located 22 miles south-southeast of Biloxi. Rainfall on the Mississippi Gulf Coast was reported to be less than 2 inches. The lowest reported pressure on the Mississippi Gulf Coast was 994.2 mb, and the highest reported tide was 4 feet MMSL at Waveland (NCDC: Event Details). Harrison County received public assistance under a Presidential Disaster Declaration.

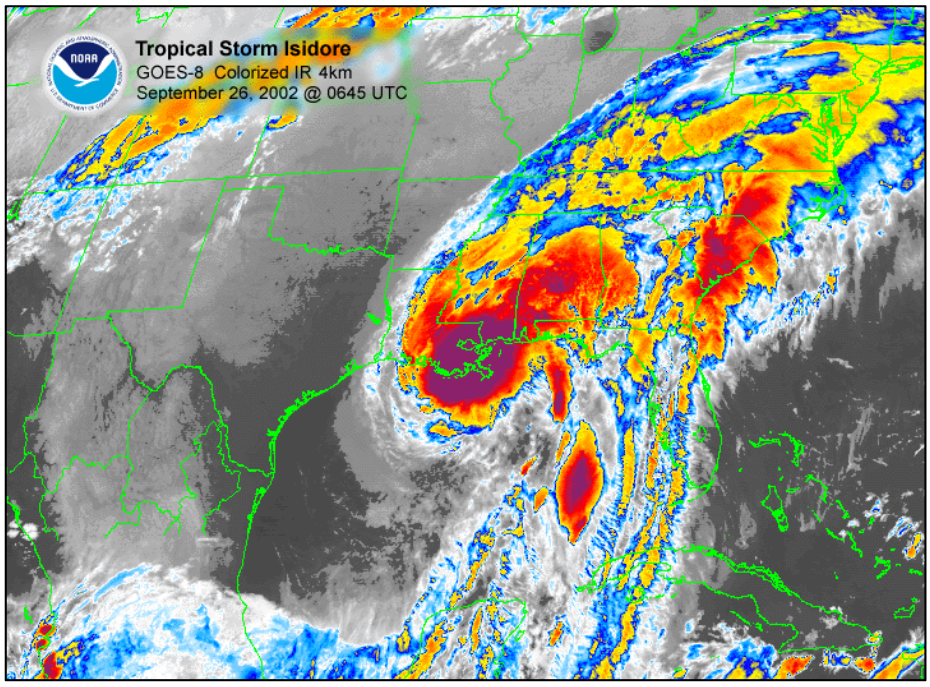
Harrison County		
Deaths	Injuries	Property Damage
0	0	0
Source: NCDC		
Public Assistance Dollars Obligated Declared Counties		
Total Public Assistance Grants	Emergency Work (Categories A-B)	Permanent Work (Categories C-G)
$1,735,639.02	$1,735,639.02	$0.00
Source: FEMA March 21, 2013		

September 16, 2004 Hurricane Ivan

Hurricane Ivan made landfall as a Category 3 during the morning of September 16, 2004, near Gulf Shores, Alabama. The storm caused extensive damage in coastal Alabama and Florida, with Harrison and Hancock Counties experiencing tropical storm force winds. A wind gust of 78 mph was captured at Point Cadet in Biloxi. The lowest pressure reported on the Mississippi Gulf Coast was 975.6 mb at the Jackson County Emergency Operations Center. About two hours after landfall, Keesler Air Force Base captured a low pressure of 982.9 mb. The highest storm surge on the Mississippi Gulf Coast was at the mouth of the Pascagoula River and was 3.72 feet NGVD. A Presidential Disaster Declaration was made, providing individual assistance to residents of Harrison County and public assistance to local governments in Harrison County.

Harrison County		
Deaths	Injuries	Property Damage
0	0	$1.2 million
Source: NCDC		
Public Assistance Dollars Obligated Declared Counties		
Total Public Assistance Grants	Emergency Work (Categories A-B)	Permanent Work (Categories C-G)
$14,403,028.70	$10,113,754.90	$4,289,273.80
Source: FEMA March 21, 2013		

September 26, 2002-Tropical Storm Isidore



Tropical Storm Isidore made landfall near Grand Isle, LA during the early morning of September 26, 2002. The tropical storm moved north across southeast Louisiana and by the evening was located in central Mississippi and downgraded to a tropical depression. Tropical Storm Isidore had a large circulation with tropical storm force winds extending several hundred miles from its center. Tide levels were generally 4 to 7 feet above normal, with locally higher levels, across much of coastal Mississippi. Significant beach erosion occurred along the coast and on the barrier islands. The maximum storm surge reading on the Mississippi Coast was 7.61 feet NGVD at the Corps of Engineers tide gage at Gulfport Harbor, and 6.86 feet NGVD in Biloxi Bay at Point Cadet. There were two fatalities on the Mississippi Coast related to the tropical storm: one direct and another indirect. Rainfall amounts associated with Isidore were generally 5 to 8 inches and resulted in some river flooding and flash flooding. Approximately 2,500 homes in Hancock County and 1,400 in Harrison County were flooded, primarily as the result of storm surge, with river flooding and flash flooding causing some of the flood damage.

Harrison County		
Deaths	Injuries	Property Damage
0	0	$6.25 million
Source: NCDC		
Public Assistance Dollars Obligated Declared Counties		
Total Public Assistance Grants	Emergency Work (Categories A-B)	Permanent Work (Categories C-G)
$6,784,616.96	$999,661.03	$5,784,955.93
Source: FEMA March 21, 2013		

Probability of Future Occurrences

Numerous hurricanes and coastal storms have impacted southern Mississippi including the city of Gulfport. Since 1995, 23 hurricanes/tropical storms have impacted Gulfport, yielding a 100% probability of annual occurrence; therefore, the probability of a future occurrence is high. In addition Colorado State University has issued the following landfall probabilities for Harrison County (Table 4.12)

Table 4.12
Harrison County Hurricane/Tropical Storm Predictor

Predictor	Probability of 1 or more Named Storms Making Landfall	Probability of 1 or more Hurricane(s) Making Landfall	Probability of 1 or more Intense Hurricane(s) Storms Making Landfall	Probability of Tropical Storm-Force (>= 40 mph) Wind Gusts	Probability of Hurricane-Force (>= 75 mph) Wind Gusts	Probability of Intense Hurricane-Force (>= 115 mph) Wind Gusts
2013	7.7%	3.8%	1.7%	48.9%	16.5%	5.8%
50 Year	90.3%	67.6%	39.7%	>99.9%	99.6%	82.3%
Source: Colorado State University (http://landfalldisplay.geolabvituralmaps.com)						

Tropical cyclones can be anticipated to enter the Gulf of Mexico and may impact the city of Gulfport, which sits on the middle cusp of the coast of the Gulf of Mexico and, therefore, included in many threat forecasts.

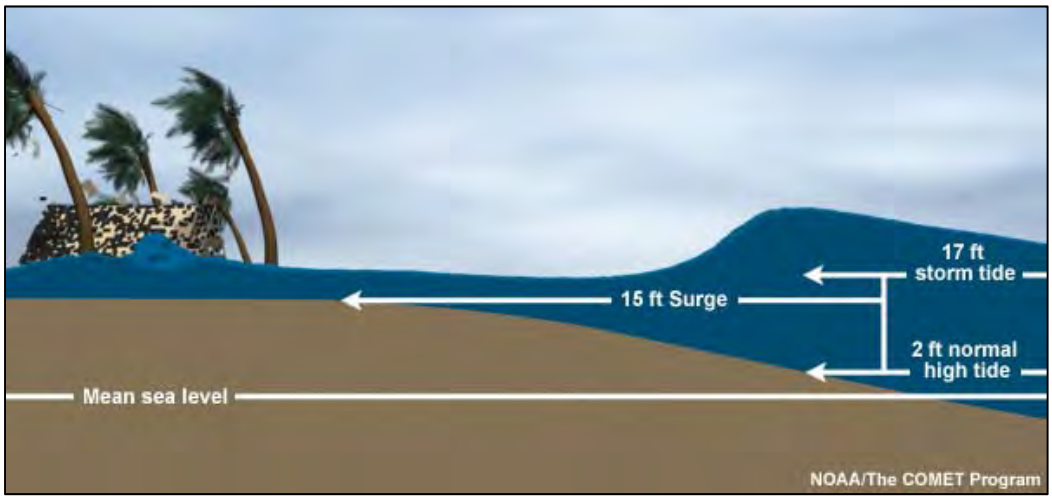
In this West Gulfport community located between Camp and Broad Avenue, freight trailers and barges coupled with the sight of concrete slabs from buildings and homes help show the magnitude of destruction. This photo was taken just a couple of days after Katrina came ashore – Hurricane Katrina 2005

Storm Surge

Hazard Description

The National Hurricane Center defines storm surge as an abnormal rise of water generated by a storm over and above the predicted astronomical tides. Storm surge should not be confused with storm tide, which is defined as the water level rise due to the combination of storm surge and the astronomical tide. This rise in water level can cause extreme flooding in coastal areas particularly when storm surge coincides with normal high tide, resulting in storm tides reaching up to 20 feet or more in some cases (Figure 4.1).

Figure 4.1
Storm Surge vs. Storm Tide
(Source: NHC)

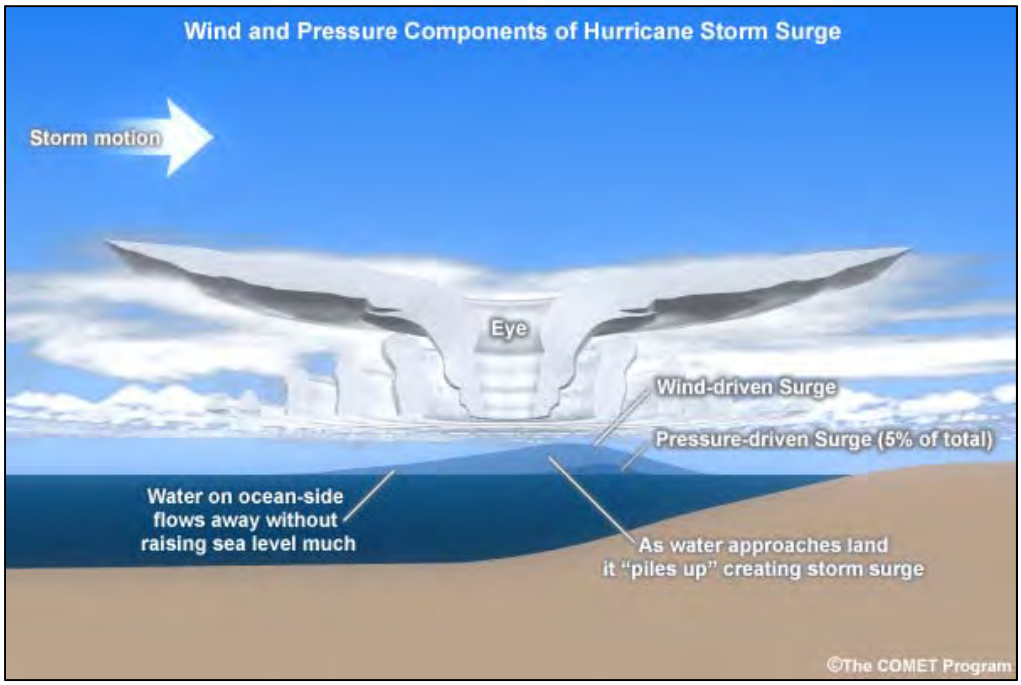


Storm surge is produced by water being pushed toward the shore by the force of the winds moving cyclonically around the storm. The impact on surge of the low pressure associated with intense storms is minimal in comparison to the water being forced toward the shore by the wind

The maximum potential storm surge for a particular location depends on a number of different factors. Storm surge is a very complex phenomenon because it is sensitive to the slightest changes in storm intensity, forward speed, size (radius of maximum winds-RMW), angle of approach to the coast, central pressure (minimal contribution in comparison to the wind), and the shape and characteristics of coastal features, such as bays and estuaries (Figure 4.2).

Other factors impacting storm surge are the width and slope of the continental shelf. A shallow slope will potentially produce a greater storm surge than a steep shelf. For example, a Category 4 storm hitting the Louisiana coastline, which has a very wide and shallow continental shelf, may produce a 20-foot storm surge;, while the same hurricane in a place like Miami Beach, Florida, with the continental shelf dropping off very quickly, might see an 8 or 9-foot surge.

Figure 4.2
Wind and Pressure Components of Hurricane Storm Surge
(Source: NHC)



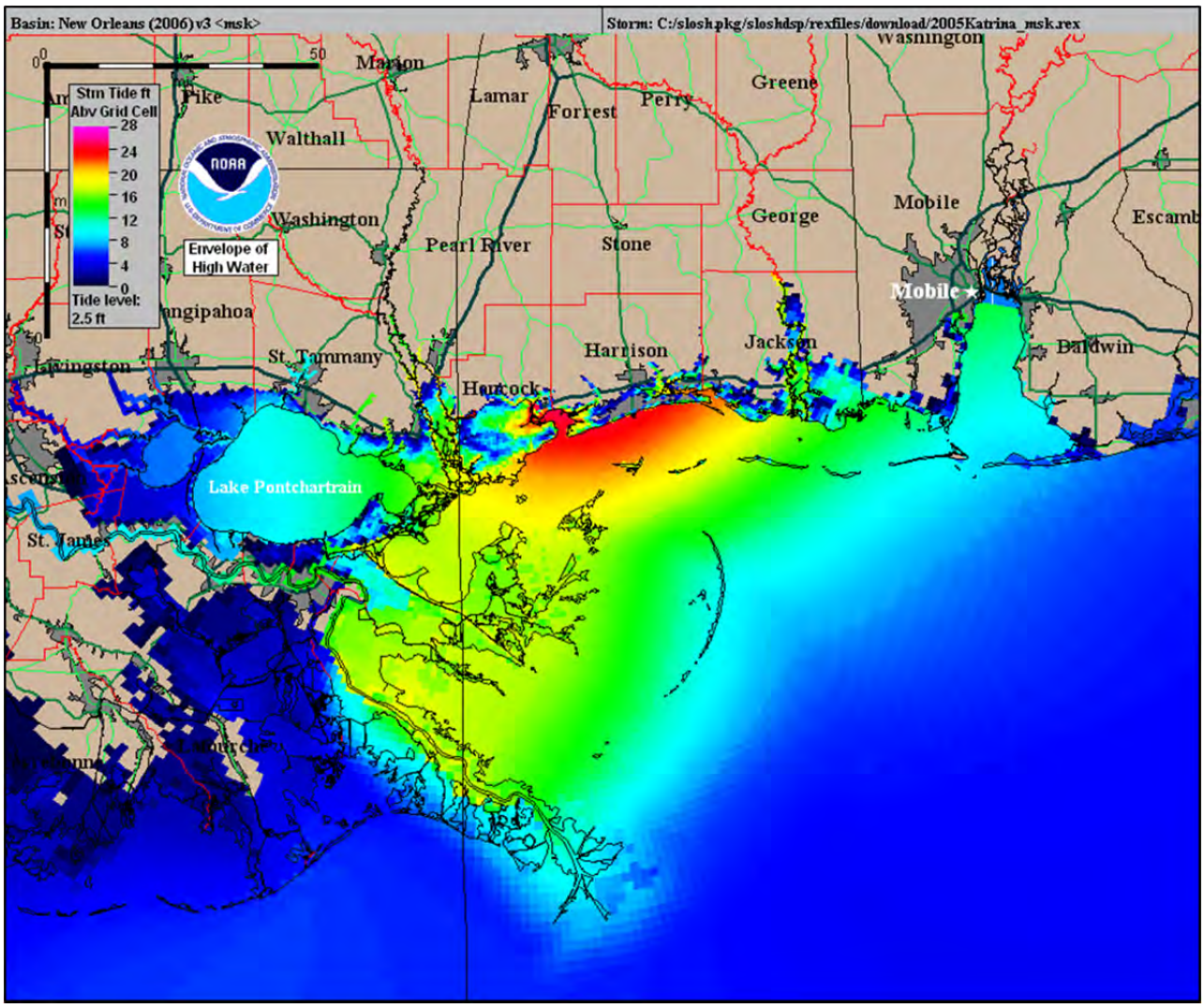
In 2012, the National Hurricane Center separated storm surge from the coastal storm category for the purpose of public advisories. The Saffir-Simpson Hurricane Scale was modified to factor in associated wind speeds and expected damages and is reflected in Table 4.10 on page 47.

Location and Extent

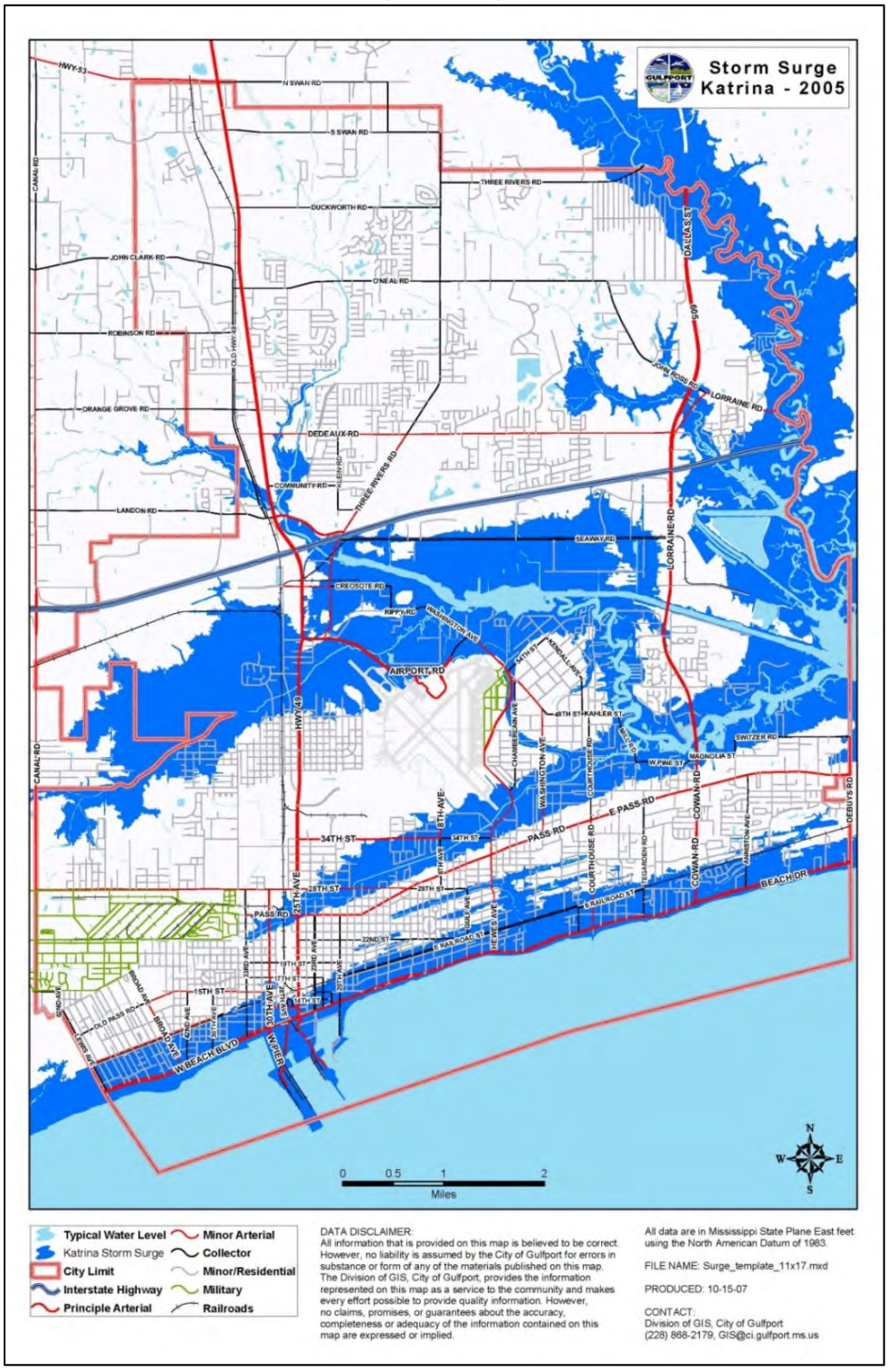
Storm surge is potentially the most devastating factor associated with hurricanes. Within the boundaries of the city of Gulfport, properties adjacent to areas affected by tides, particularly areas south of U.S. Highway 90, are the most susceptible to damage from storm surge with heavy flooding as the most common result. In extreme cases, such as Hurricanes Camille and Katrina, the incoming wall of water and wind could destroy well-built buildings along the immediate coastline.

Hurricane Katrina produced high water associated with the storm. To demonstrate the impacts of storm surge, The Sea, Lake and Overland Surges from Hurricanes (SLOSH) model of Hurricane Katrina is shown in Map 4.3 followed by an enhanced map of the inundation of Katrina in the city of Gulfport (Map 4.4). SLOSH is a computerized numerical model developed by the National Weather Service (NWS) to estimate storm surge heights resulting from historical, hypothetical, or predicted hurricanes by taking into account the atmospheric pressure, size, forward speed, and track data. These parameters are used to create a model of the wind field which drives the storm surge.

Map 4.3
SLOSH Model Hurricane Katrina
(Source NHC)



Map 4.4
Hurricane Katrina Inundation Map
(Source NHC)



Previous Occurrences

As shown in table 4.13, the NCDC database indicates Harrison County, which includes the city of Gulfport, experienced nine storm surge events since 2003. Included in these events were Hurricanes Katrina, Gustav, Ike, and Isaac as well as Tropical Storms Lee, Matthew, and Allison. All of these events produced storm surge within the planning area of the city of Gulfport, with the most significant event being Hurricane Katrina. A storm surge of more than 27 feet was reported in Pass Christian, while the severe damage and high water marks indicate the surge reached six to twelve miles inland in some areas, especially along bays and rivers. Data provided by NOAA suggests the storm surge recorded in Gulfport was between 19 and 25 feet.

As with the hurricane hazard, this information reflects a significant part of the recovery costs from strong winds and storm surge. However, there are also very significant costs associated with interrupted business, lost wages, and utility disruption, and very difficult to quantify but nevertheless important metrics for determining the impact.

Table 4.13
Harrison County Storm Surge/Tidal Events

Date	Magnitude	Property Damage
8/28/2012	A storm tide ranged from approximately 5 feet in Jackson County to nearly 10 feet in Hancock County closer to Isaac's center. These values are approximately 3 to 8 feet above normal astronomical values	$2.1M
9/2/2011	Tides were generally 2 to 4 feet above normal. One of the highest tide gage readings was 4.91 ft. NAVD in Biloxi Bay. Storm surge flooding was primarily confined to areas near the coast and bays. Low lying roadways were flooded at times of high astronomical tide	$10,000
9/11/2008	Storm surge flooding of 3 to 5 feet above normal inundated low lying areas near the coast, roadways, and impacted a few structures.	$0
9/1/2008	Storm surge ranged from 4.5 to 6 feet in Jackson County to 8 to 11 feet in Hancock County. Storm surge flooded roadways and several structures along the coast , with minor to moderate beach erosion occurring.	$750,000
8/29/2005	Storm surge damage across coastal Mississippi was catastrophic and approached or exceeded the surge associated with Hurricane Camille and impacted 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. Most tide gages were destroyed 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 ft., Harrison County 19-25 feet, and Jackson County 17-21 ft. Wave action on top of	$5.63B

Table 4.13
Harrison County Storm Surge/Tidal Events

Date	Magnitude	Property Damage
	the storm surge enhanced the damage in many area. All storm surge heights are still water elevations referenced to NAVD88 datum	
7/5/2005	Tropical Storm Cindy produced tides of generally 3 to 5 feet above normal which resulted in mainly minor damage. The highest tide measured along the Mississippi coast was 6.2 feet NGVD at Ocean Springs.	$300,000
10/9/2004	The storm surge was generally 2 to 4 feet above normal along portions of the Mississippi coast with the highest storm surge recorded at Waveland at 5.13 ft MLLW.	$15,000
9/15/2004	The highest storm surge recorded was at the mouth of the Pascagoula River near Pascagoula with a storm surge 6.72 ft. NGVD. Some tidal surge flooding occurred in low lying areas near the coast.	$400,000
6/30/2003	No storm surge details available on NCDC	$250,000
Source: NCDC		

Probability of Future Occurrences

There were nine recorded storm surge events since 2003 impacting the Gulfport coast. Based on that data, the planning area experiences storm surge at a 100% chance of annual occurrence, making the probability of future storm surge impact high.

Vulnerability Assessment

Damage from coastal storms can vary greatly and is dependent on many different factors, including the position of the eye of the storm as it relates to Gulfport, the strength of the storm, the direction of the storm and tides. These factors determine the amount, location, and type of damage caused by hurricanes and coastal storms.

Population: Due to its proximity to the Mississippi Sound, Gulfport's entire land area and population are at risk from coastal storms. Hurricanes have had widespread impact across the city of Gulfport.

Critical Facilities: Many of the city's municipal buildings are located near Highway 90 and the Mississippi Sound. The city of Gulfport reported 15 of 70 municipal buildings were completely destroyed during Hurricane Katrina and 20 were severely damaged. While only one of the 12 fire stations is within the SFHA, ten sustained damage caused by high winds generated by coastal storms. The station located on Cowan Road is in the SFHA. Map 4.5 (page 70) shows critical facilities located within the SFHA. Critical facilities listed within this plan, and located within the Advisory Base Flood Elevation area, are Fire Station #7 and the Charles Walker Senior Center.

Essential Services: While most of the city-owned buildings are located outside the flood zones, several are vulnerable due to their proximity to major bodies of water. Non-city owned facilities providing essential services and located within the SFHA include Garden Park Medical Center; Carlow Manor Retirement Home; and a kidney dialysis facility.

Transportation Systems—Major roadways, such as U. S. Highway 90 and the southern-most portion of U. S. Highway 49, are subject to coastal storm impacts and the associated flooding. Some water inundation can also be expected on other arterials and collector roadways throughout the southern most areas of the city. With extreme events, transportation systems as far as Airport, Creosote and Rippy Roads may also be impacted.

Lifeline Utility Systems: Several critical facilities may be impacted by coastal storms. Wind, storm surge, and flooding are factors that could damage these lifeline utility systems. Among these systems are electric utilities, natural gas lines, water and sewer systems, and communications. Hurricane protection systems, such as the seawall and sand beach, can experience severe damage as a result of storm surge.

Among the existing infrastructure located in the city and within the Advisory Base Flood Elevation areas is the Plant Jack Watson electrical power generating plant. One of Harrison County's wastewater treatment plants is also located within the Advisory Base Flood Elevation area.

There are 86 sewer lift stations within the SFHA and 28 within the 0.2% annual zone. This does not include water lines and sanitary sewer lines located within flood districts. Two of the city's water wells are located within the SFHA and eight within the 0.2% district.

Both Mississippi Power and Coast Electric Power Association provide electrical service to residences and businesses in Gulfport. Mississippi Power provides services to much of the area located adjacent to the Mississippi Sound, while Coast Electric Power Association provides electrical services to properties along the Biloxi River. CenterPoint Energy is the natural gas supplier in Gulfport. All utility companies have emergency response plans for hurricanes.

4.2.2 Flood

Hazard Description

Flooding is natural and inevitable, occurring seasonally with general or torrential rains associated with tropical storms. These rains later drain into river basins and fill them with an abundance of water. Rivers, lakes, and other water bodies have always overflowed their normal beds to inundate nearby land. The land adjacent to these bodies of water is called a floodplain. There are generally four leading causes/types of flooding as defined below – river, flash, coastal, and drainage – to which the city of Gulfport is susceptible.

River (Riverine or Stream) Flooding: Riverine floods occur along rivers, streams, or channels primarily during heavy or prolonged rainfall. Other contributing factors include: (1) elimination of ground cover on drainage slopes resulting from tree cutting, wildfires, land development, or overgrazing; (2) the simultaneous arrival of flood crests from major tributaries; and (3) blocked drainage by items, such as debris, dams, or inadequately sized drainage structures. Floods from these sources can be "flash" or rapid, but are usually more gradual and have longer duration than flash floods.

Flash Flooding (Rapid): Flash floods are a result of heavy, localized rainfall - possibly from a slow-moving intense thunderstorm causing small creeks, streams, branches, and rivers to overflow. They are most common when rain falls on areas with steep slopes or built-up areas where impervious surfaces, gutters, and storm sewers speed up the flow of run-off. The torrential nature of flash floods makes this hazard particularly lethal, especially in or near the river, streambeds, city streets, coastal areas, and narrow valleys, which contribute to the development of rapid water movement.

Coastal (Tidal) Flooding: All lands bordering the Mississippi Sound, such as various bays, estuaries or lakes, are prone to tidal-effect flooding. Coastal lands, such as sand bars, barrier islands, and delta, provide a buffer zone to help protect human life and real property relative to the sea, much as floodplains provide a buffer zone along rivers or other bodies of water. Coastal floods usually occur as a result of abnormally high tides or tidal waves, storm surge and heavy rains in combination with high winds, tropical storms or hurricanes.

Drainage: Drainage flooding occurs primarily in urban or developed areas when the volume of run-off exceeds the capacity of the drainage system. Flooding of this nature can be the result of increased development, inadequate drainage, riverine flooding, flash flooding, or a combination of all.

Flooding occurs not only with coastal storms, but also with seasonal rainfall. The majority of properties having repetitive flood insurance claims over the past two decades made at least one of those claims due to rainfall not associated with a hurricane. The flooding of structures

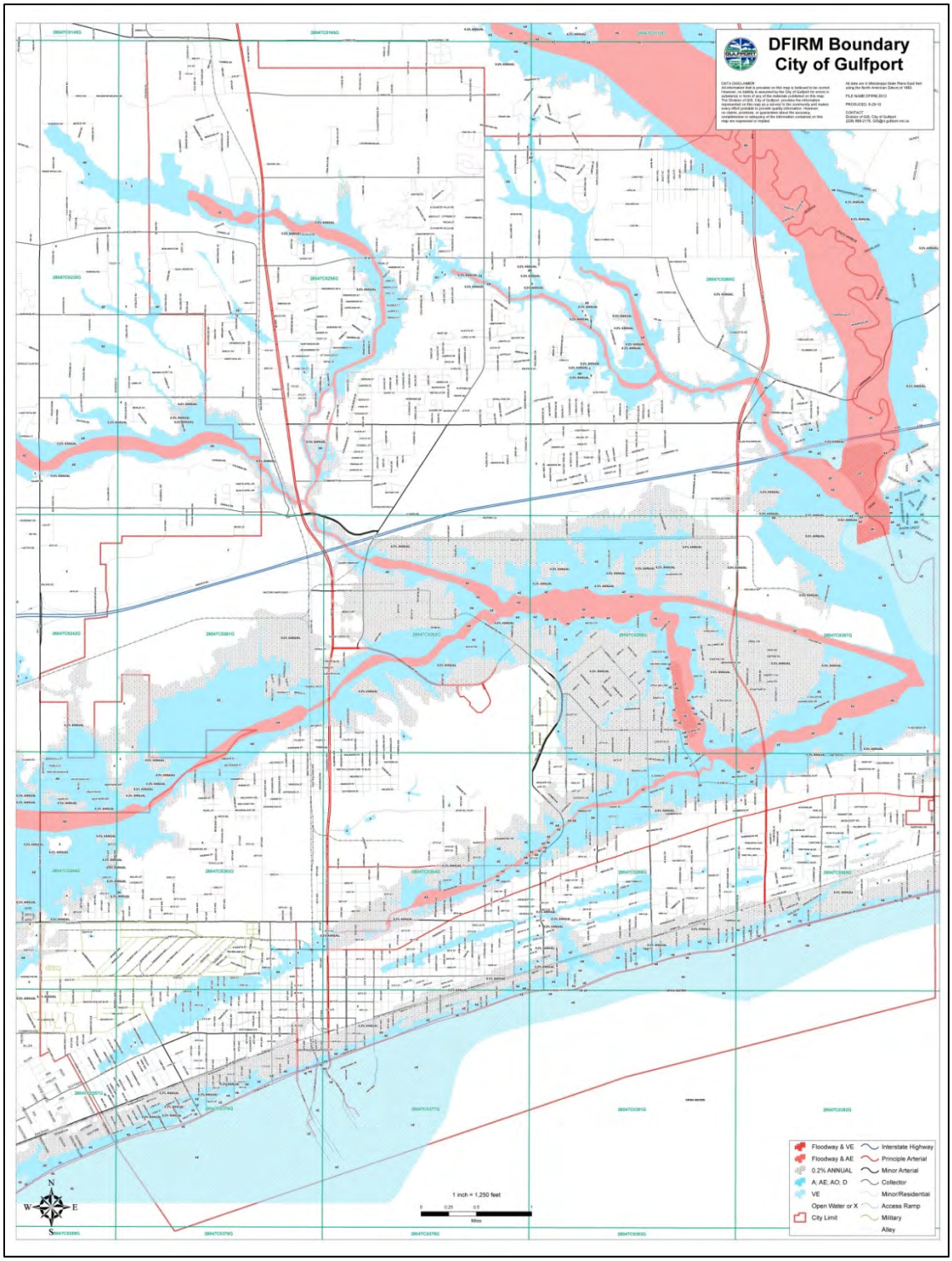
occurred because of localized drainage problems, which Gulfport has addressed over the past years.

The city of Gulfport regulates the development of areas subject to periodic or occasional inundation from stream overflows and tide conditions. All lands lying within this district are subject to inundation by the base (or 100 year) flood as defined on the Flood Insurance Rate Maps (FIRMs) of Gulfport, Mississippi. The FEMA Flood Insurance Rate Maps estimate the amount of risk associated with flood hazard areas within the mapped area. Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the Flood Hazard Factor (FHF), respectively. A unique zone number is associated with each possible FHF and varies from a one for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater. Table 4.14 provides a listing of the zones and their definitions found within the planning area followed by the city's DFIRM Boundary (Map 4.5).

Table 4.14
FEMA Flooding Map Classifications

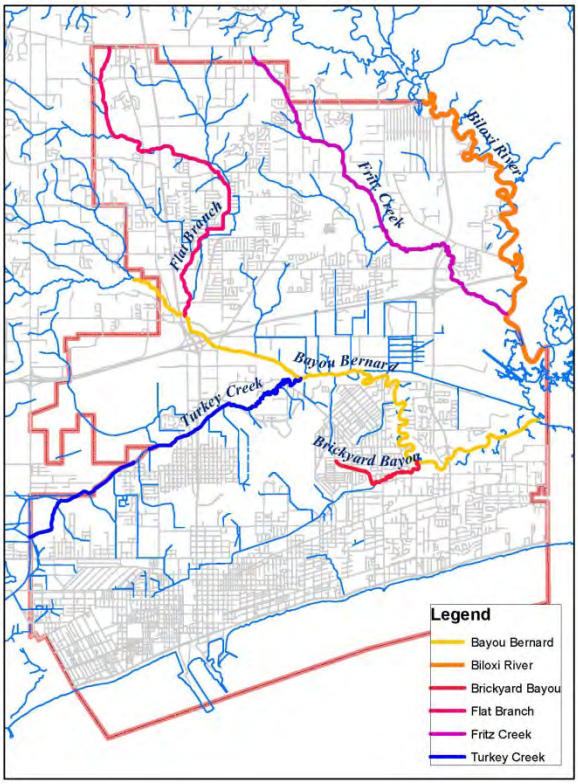
Moderate to Low Risk Areas	
Zone B and X (shaded)	Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. Also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than one square mile.
Zone C and X (unshaded)	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level
High Risk Areas	
Zone A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the lift of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
Zone AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
Zone AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from one to three feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
High Risk – Coastal Areas	
Zone VE	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
Undetermined Risk Areas	
Zone D	Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.
Source: FEMA Flood Zone Designations	

Map 4.5
City of Gulfport DFIRM



Location and Extent

Map 4.6
Gulfport Waterways

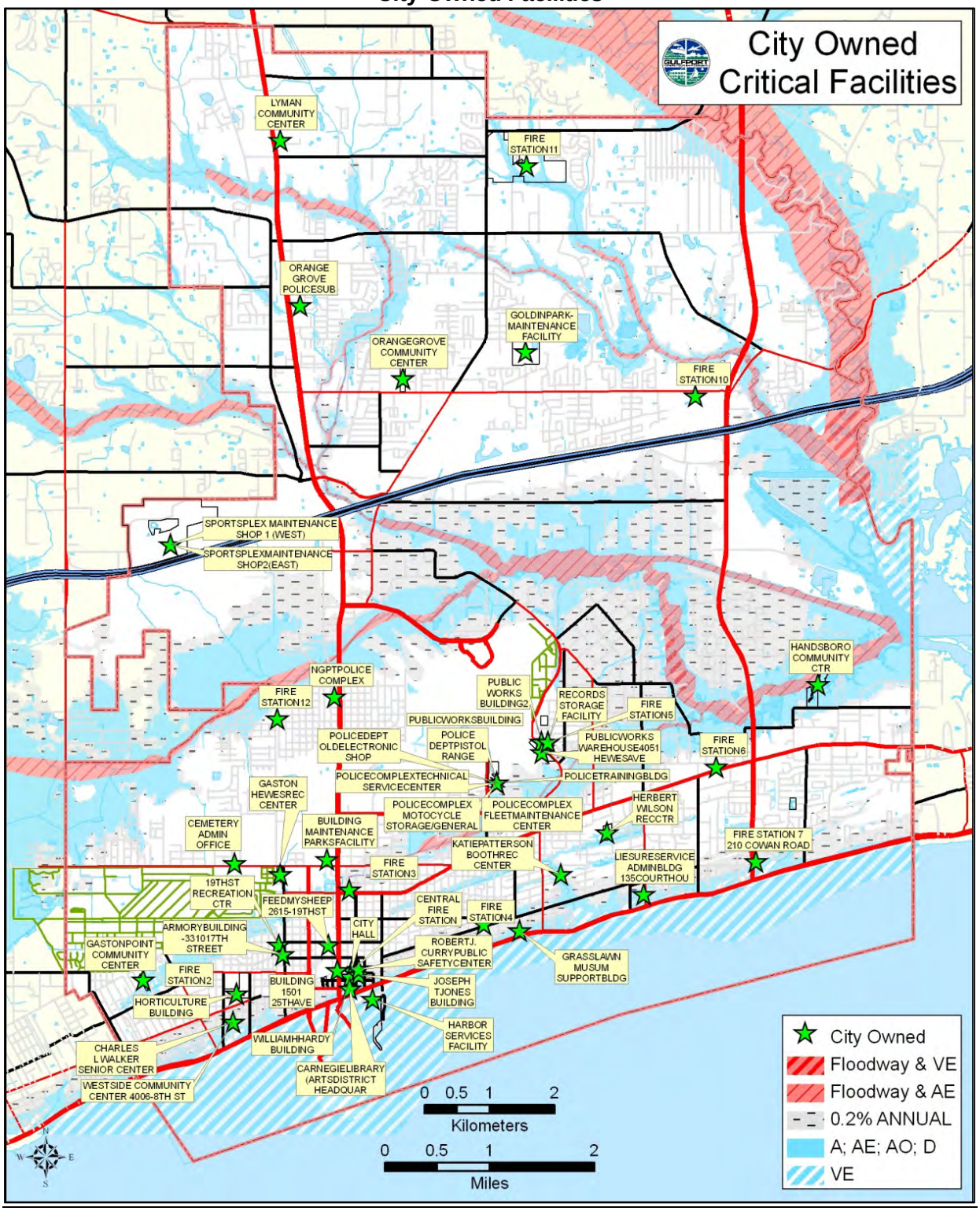


Historical documentation indicates flooding may occur during any season of the year. For the planning area, the most damaging floods occur in April, June, and July. Based on historical analysis, floods are most likely to occur between March and September. Floods are least likely to occur in autumn and winter months, but two floods were recorded in January (1991 and 1993).

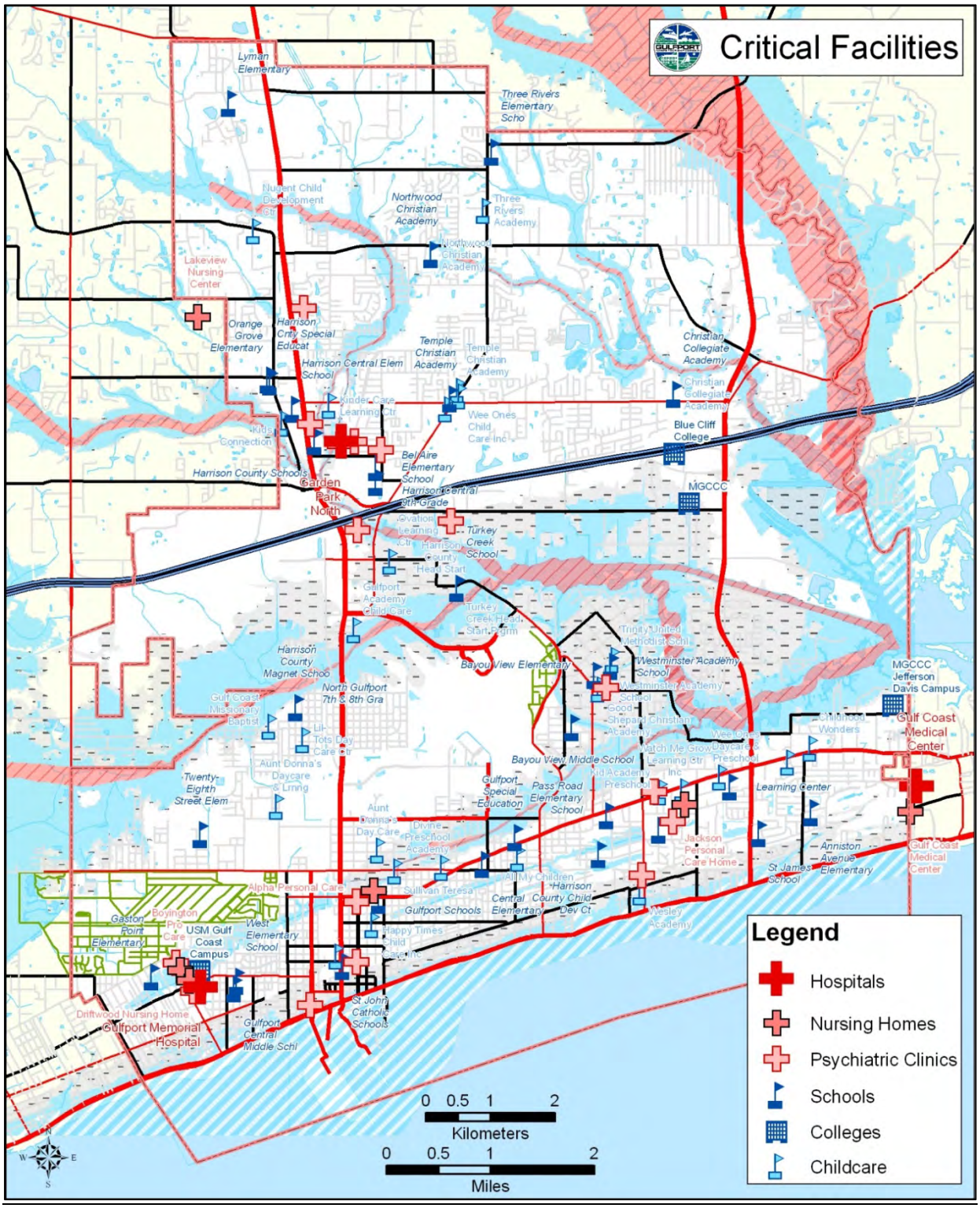
Flooding is a relatively frequent hazard in the planning area. Severity ranges from localized to city-wide and regional events. Flood events can last from a few hours to a few days, leaving roads and bridges impassible. Other than the effect of a direct assault from a hurricane, there are three varieties of flooding experienced within the corporate limits of Gulfport. The first is major river flooding. The Biloxi River, one of two major sources of freshwater for the Back Bay of Biloxi, is a classic tidal river floodplain with a clearly defined flood zone and floodway. A second variety is local creek flooding. Turkey Creek and Flat Branch are lesser waterways with a shallower gradient and historically, with the former dense forest that surrounds them, did not carry the quantities of water now carried. They connect with the Biloxi River/Back Bay of Biloxi at the western most extreme of the back water (Map 4.6). The third problem area is generally distributed pocket flooding caused by inadequate provisions for drainage and lowlands that naturally collect runoff. With increased development and paved parking areas, there is a decrease in the amount of forested land able to absorb rainfall and runoff. One does not need to live next to a river or creek to experience flooding. The city of Gulfport is continuing to urbanize rapidly and as a result, extra pressure is placed on the existing drainage systems due to faster water surface runoff.

Beyond using standardized DFIRM zones, it is difficult to predict the extent of flood depth without performing detailed land surveys because depth is variable based on topography and the amount of water entering the floodplains and planning area. The city of Gulfport has a total of seven identified city-owned facilities within the SFHA. Thirteen of the city's facilities are located in the .02% annual chance flood zone. Maps 4.2 through 4.4 identify the critical facilities located within the SFHA. According to the November 15, 2007 FIS, the estimated flood levels for both the lower and higher end of 1% flood depth range is one foot.

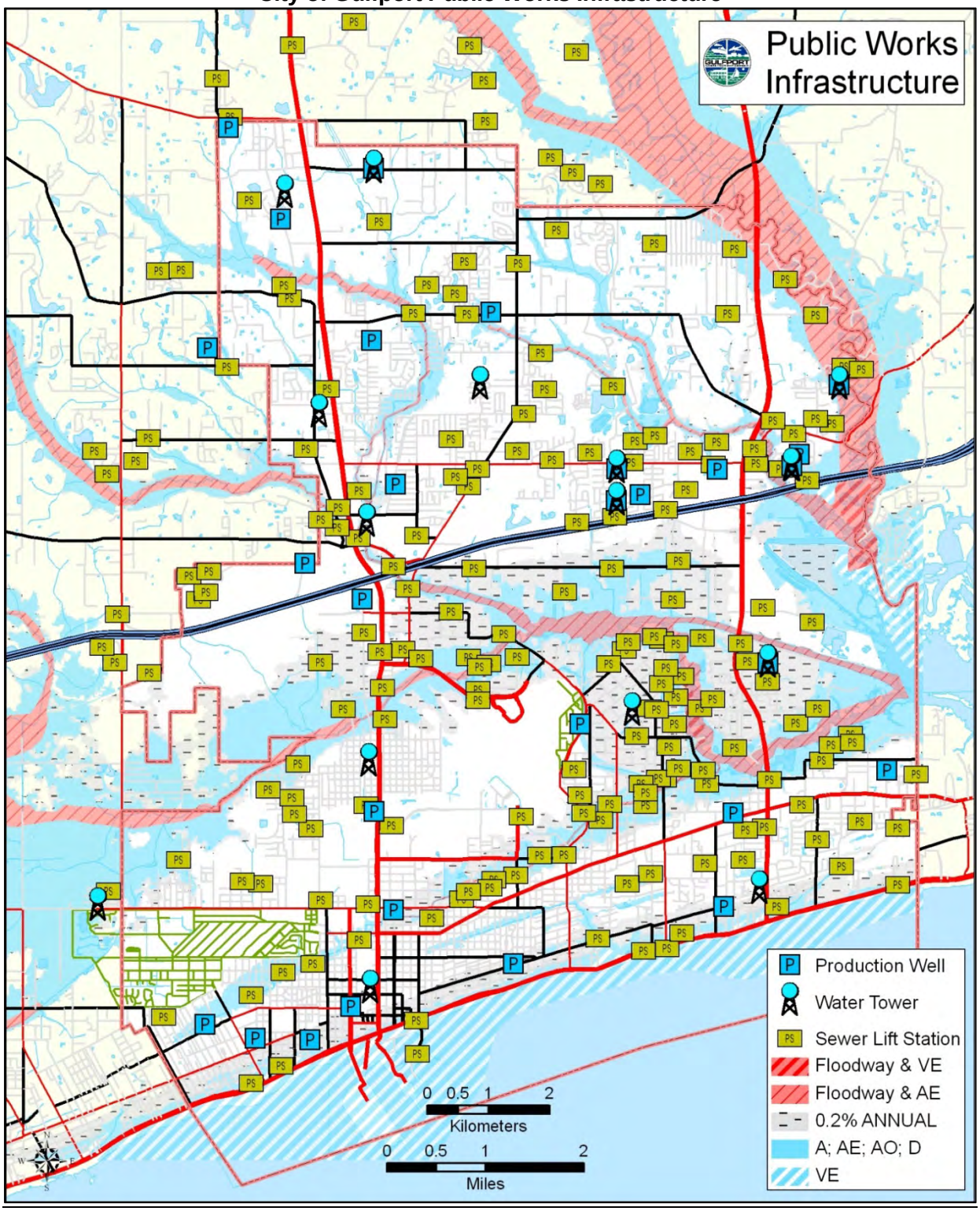
Map 4.7
City-Owned Facilities



Map 4.8
Critical Facilities



Map 4.9
City of Gulfport Public Works Infrastructure



Addressing Repetitive Loss Properties

Requirement CFR §201.6(2)(ii) the risk assessment in all plans approved after October 1, 2008 must also address National Flood Insurance Program (NFIP) insured structures that have been repetitive damaged by floods.

The National Flood Insurance Program (NFIP) is a Federal program created by Congress to mitigate future flood losses nationwide through sound, community-enforced building and zoning ordinances and to provide access to affordable, federally backed flood insurance protection for property owners. The NFIP is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

The Community Rating System (CRS) recognizes and encourages community floodplain management activities that exceed the minimum NFIP standards. Depending upon the level of participation, flood insurance premium rates for policyholders can be reduced up to 45%. Besides the benefit of reduced insurance rates, CRS floodplain management activities enhance public safety, reduce damages to property and public infrastructure, avoid economic disruption and losses, reduce human suffering, and protect the environment. Technical assistance on designing and implementing some activities is available at no charge. Gulfport participates in the CRS and works diligently to maintain and improve the city's floodplain management program.

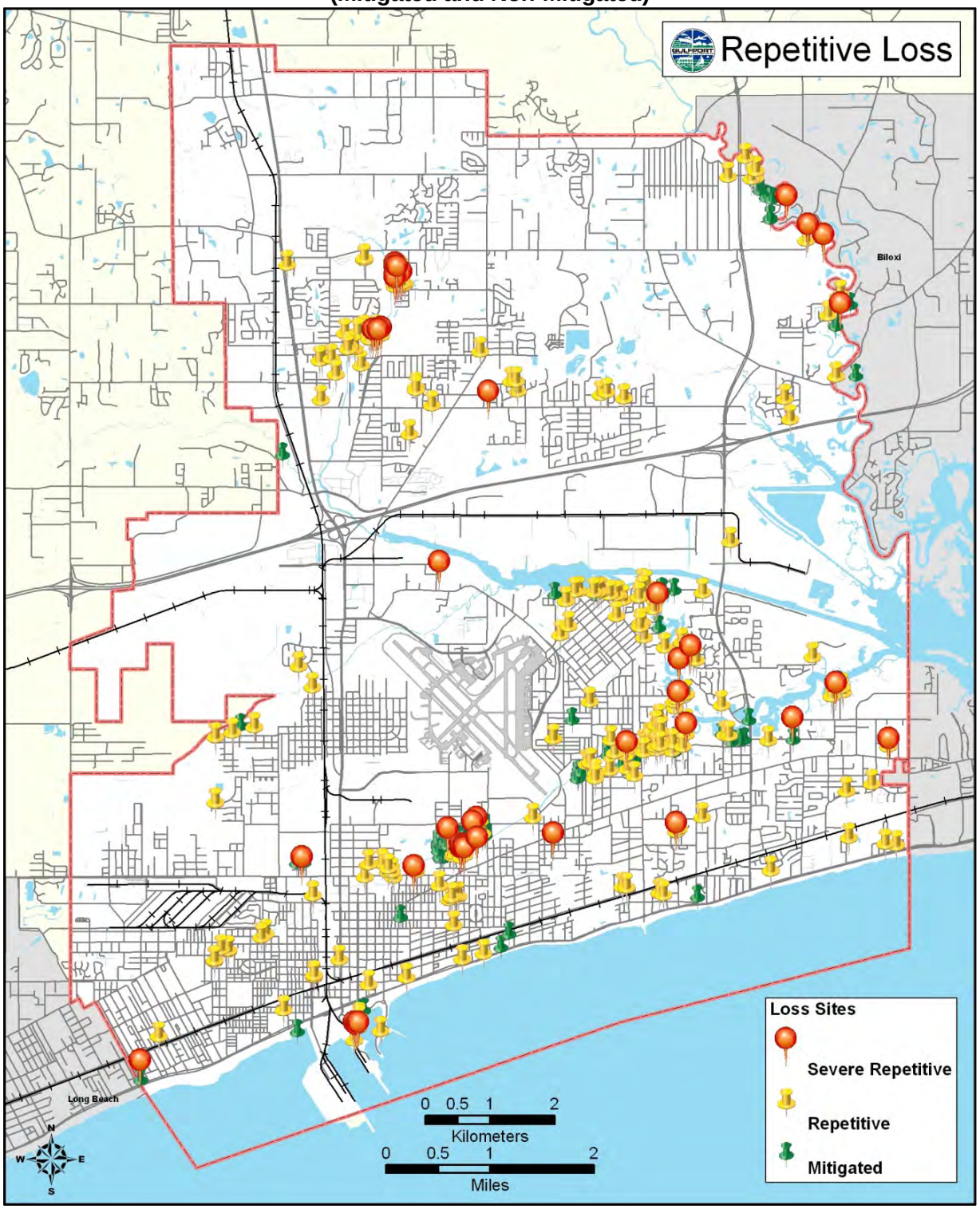
Community Number	CRS Entry Date	Current Effective Date	Current Class	% Discount for SFHA	% Discount for Non-SFHA
285253	10-1-1996	10-1-2011	6	20	10

Repetitive Loss Areas

By definition, a Repetitive Loss property is "any insurable building" with two or more National Flood Insurance Program (NFIP) losses of at least $1,000 each and paid within any ten year period since 1978. A Severe Repetitive Loss is defined as a "single family property" with four or more separate claims exceeding $5,000 and with cumulative amounts of such claim payments exceeding $20,000; or at least two separate claim payments made and the cumulative amount of these claims exceeding the reported value of the property.

The list of repetitive loss and severe repetitive loss properties included in this plan update was furnished by the State Floodplain Manager. Map 4.10 provides a graphic representation of the general location of mitigated, RFC and SRL properties within the planning area.

Map 4.10
Repetitive Loss Properties
(Mitigated and Non-Mitigated)



Historical Summary of Insured Flood Losses

According to the FEMA Flood Insurance Policy Report dated February 28, 2011, there were 1,408 flood loss claims on properties located within Gulfport reported through the NFIP with a total of $62,641,313.88 paid to date. Table 4.15 provides a summary of the claims filed by occupancy type for non-mitigated and mitigated properties. A detailed report of the data is provided in Appendix 8.4-D (does not include address or owner information).

Table 4.15
NFIP Flood Claim Summary
As of February 28, 2011

Non-Mitigated Property			
Occupancy	No. of Properties	Total Losses	Total Paid (Building and Contents)
2-4 Family	11	35	$2,392,082.27
Assmd Condo	5	13	$1,591,397.53
Non Resident	38	124	$8,435,406.05
Other Resident	5	12	$5,973,053.75
Single Family	236	629	$28,164,147.67
Sub Total Non-Mitigated	295	813	$46,556,087.27
Mitigated Property Flood Claim Summary			
2-4 Family	1	2	150,211.72
Assmd Condo	9	35	1,362,757.90
Non Resident	8	26	1,113,261.60
Other Resident	1	10	190,541.99
Single Family	145	522	13,268,453.40
Sub Total Mitigated	164	595	16,085,226.61
Total Flood Properties/Claims	459	1408	$62,641,313.88

Source: State of Mississippi NFIP Listing

Previous Occurrences

Flooding events, as shown in Table 4.16, are entered into the National Climatic Data Center (NCDC) at the county level with no distinction of separate jurisdiction or municipalities. For the purposes of this plan update, the data provided is considered the best available.

Table 4.16
Previous Occurrences of Flooding

Date	Event Type	Event Details
April 1, 2005	Flood	Heavy rainfall occurred on March 31st and April 1st in southern Mississippi. Gulfport reported closed roads and some flooding to homes.
July 17, 2003	Flood	Heavy rains, which lasted one hour in the afternoon (3:15 to 4:15), caused street flooding in northwest Gulfport.
Sept. 26, 2002	Coastal Storm	Hurricane Isidore caused flash flooding from heavy rains and higher than normal tides.
June 11, 2001	Coastal Storm	Approximately 5 to 10 inches of rainfall was reported in south Louisiana and south Mississippi from the remnants of Allison. Some roadways in Gulfport were flooded due to heavy rainfall. A rainfall total of 11.99 inches was recorded in Gulfport. Flooding from Tropical Storm Allison was not related to storm surge, but rather flooding was caused by excessive rainfall over two days and strong southerly winds. The excessive rain saturated soils and caused storm water runoff in areas of Harrison County and Gulfport.
Sept. 19, 2001	Flash Flood	Rainfall amounts of 2 to 4 inches caused flash flooding in Gulfport.
March 7, 1998	Flash Flood	Approximately 4 to 6 inches of rain fell along the Mississippi Gulf Coast. Harrison County reported 75 to 80 homes flooded and people were required to evacuate.
July 26, 1997	Flash Flood	Heavy rain fell for two hours in Gulfport causing minor street flooding in several subdivisions.
July 8, 1996	Flood	Approximately 5 to 8 inches of rain fell over a 5 hour period and caused street flooding. High tides slowed drainage along the coast, causing drainage ways to back up with excessive runoff.
April 15, 1996	Flood	Approximately 7 to 9 inches of rain fell over an 18 hour period causing street flooding in Gulfport.
May 9-11, 1995	Flood	A cut-off low pressure system produced nearly 25 inches of rain throughout south Mississippi. The Wolf River crested at a record flood stage of 15.39 feet on May 10. One fatality was reported in Long Beach
April 11, 1995	Flood	A thunderstorm caused approximately 5 inches of rain.
August 5, 1994	Flood	Approximately 6 inches of rain fell in Gulfport and Biloxi causing street flooding near Dubuys Road. Several homes were flooded and Edgewater Mall closed for several hours due to flooding.
Jan. 11, 1993	Flood	Localized heavy rains, up to 7 inches, caused flooding to 171 homes in Harrison County.
Aug. 27, 1992	Flood	Widespread thunderstorms occurred throughout the state.
Jan. 6, 1991	Flood	Localized heavy rains caused flooding in Gulfport.
June 8, 1989	Coastal Storm	An unnamed tropical system caused heavy rainfall and flooding damage along the Mississippi Gulf Coast.
April 6, 1983	Flood	A week-long thunderstorm outbreak in the center of the state, with heavy rainfall caused rivers to flood.
April 22, 1979	Flood	Heavy rains in the upper reaches of the Coastal Streams Watershed, combined with higher than average tides, caused flooding in Gulfport.

Source: NCDC

Probability of Future Occurrences

The planning area is subject to flash, coastal, drainage and riverine flooding. With 18 events occurring since 1979, an annualized average of 55% chance of occurrence can be expected with varying degrees of impact. Based on historical data, the probability of a future occurrence of the flooding hazard is medium.

Vulnerability Assessment

Population: Persons with property located within the high-risk flood areas, as shown in Table 4.14, are most vulnerable to periodic flooding of property. Flash flooding events can affect other areas, dependent upon the efficiency of drainage facilities.

Critical Facilities: As previously stated, the city of Gulfport has a total of seven identified city-owned properties within the SFHA and 13 identified buildings within flood zones which have a 0.02% chance of flooding annually. Maps 4.7 to 4.9 show critical facilities located within the SFHA. Critical facilities listed in this plan and located within the Advisory Base Flood Elevation area are Fire Station #7 and the Charles Walker Senior Center.

Essential Services: While most of the city-owned buildings are located outside the flood zones, several are vulnerable due to their proximity to major bodies of water. The following non- city owned facilities providing essential services and located within the SFHA include Garden Park Medical Center, Carlow Manor Retirement Home, and a kidney dialysis facility.

Transportation Systems: Major roadways, such as U. S. Highway 90 and the southernmost portion of U. S. Highway 49 are subject to coastal storm impacts and the associated flooding. Some water inundation can also be expected on many other arterials and collector roadways throughout the southern most areas of the city. With extreme events, transportation systems as far as Airport, Creosote and Rippy Roads outside the SHFA also become flooded.

Lifeline Utility Systems: Several critical facilities may be impacted by coastal storms. Wind, storm surge, and flooding are factors that could damage these lifeline utility systems. Among these systems are electric utilities, natural gas lines, water and sewer systems, and communications.

Among the existing infrastructure located in the city and within the Advisory Base Flood Elevation areas is the Plant Jack Watson electrical power generating plant. One of the Harrison County wastewater treatment plants is also located within the Advisory Base Flood Elevation area.

There are 86 sewer lift stations within the SFHA and 28 within the 0.2% annual zone. This does not include water lines or land sanitary sewer lines located within flood districts. Two of the city's water wells are located within the SFHA and eight within the 0.2% district.

4.2.3 Tornado

Hazard Description

Tornadoes are nature's most violent storms, spawned from powerful thunderstorms, causing fatalities and devastating a neighborhood in seconds. A tornado appears as a rotating, funnel-shaped cloud that extends from a thunderstorm to the ground with whirling winds that can reach 300 miles per hour. Damage paths can exceed one mile wide and 50 miles long. Every state is at some risk from this hazard. Some tornadoes are clearly visible, while rain or nearby low-hanging clouds obscure others. Occasionally, tornadoes develop so rapidly little, if any, advance warning is possible. Before a tornado hits, the wind may die down and the air may become very still. A cloud of debris can mark the location of a tornado even if a funnel is not visible. Tornadoes generally occur near the trailing edge of a thunderstorm. It is not uncommon to see clear, sunlit skies behind a tornado.

Prior to February 2007, the Fujita Scale was used to measure tornado severity (Table 4.17).

Table 4.17
Pre-2007 Fujita Scale

F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages 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 reinforced concrete structures badly damaged.

Source: NOAA

The Enhanced Fujita Scale, or EF Scale (Table 4.18), is the current scale for rating the strength of tornadoes in the United States; magnitude is estimated via the damage left behind. Implemented in February 2007, it replaced the Fujita Scale. The scale has the same basic design as the original Fujita Scale, six categories from zero to five, representing increasing degrees of damage. The new scale takes into account how most structures are designed, and is thought to be a much more accurate representation of the surface wind speeds in the most violent tornadoes.

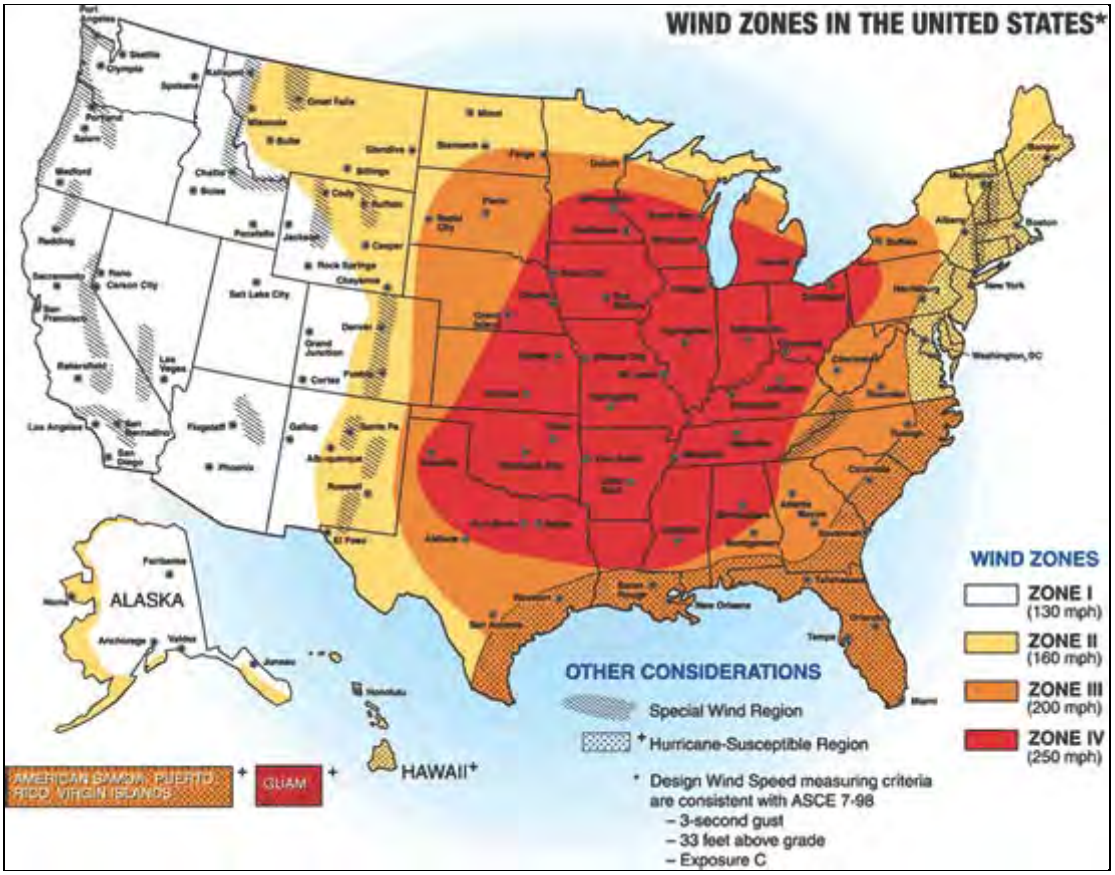
Table 4.18
Enhanced Fujita Scale

Enhanced Fujita Category	Wind Speed (mph)	Potential Damage
EF0	65-85	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86-110	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings, such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	>200	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd.); high-rise buildings have significant structural deformation; incredible phenomena will occur.

Source: NOAA

Figure 4.3 shows wind zones across the United States; note the planning area falls in Zone 3 (200 mph).

Figure 4.3
Wind Zones in the United States
(Source: FEMA)



Location and Extent

The path of a tornado cannot be predicted and damage is not limited by location. Every home, business, industry and utility lifeline within the city of Gulfport has a probability of being impacted by a tornado. However, due to the city's location adjacent to the Mississippi Sound, there is a higher probability of a waterspout making landfall and causing damage to properties immediately adjacent to coastal areas. Therefore, all locations within the planning area are subject to tornadoes.

Gulfport experienced tornado activity in all months except January and December. Most of the events occurred in the spring and fall. Nearly 43% of the tornados affecting the city of Gulfport were F2 or F3 tornados and the remaining 57% were EF0-1 and F0-1.

Previous Occurrences

Table 4.19 provides a summary of the impacts that have occurred in the Gulfport planning area. This information was collected from the city's 2007 plan and NCDC records.

Table 4.19
Tornado/Funnel Cloud/Water Spout History

Location	Date	Type	Magnitude	Fatalities	Injuries	Property Damage
Gulfport	8/29/2012	Tornado	EF1	0	0	$25,000
Lyman	9/4/2011	Tornado	EF1	0	0	$20,000
Gulfport	2/12/2008	Tornado	EF0	0	0	$0
Gulfport	7/13/2005	Funnel Cloud		0	0	$0
Gulfport	11/24/2004	Tornado	F2	0	0	$3,000,000
Ship Island	8/11/2001	Water Spout		0	0	$0
MS Sound south of Gulfport	7/26/2001	Water Spout		0	0	$0
Gulfport	6/11/2001	Tornado	F1	0	0	Unknown
Gulfport	9/2/2000	Tornado	F0	0	0	$30,000
MS Sound south of Gulfport	6/25/1999	Water Spout		0	0	$0
MS Sound south of Gulfport	8/11/1997	Water Spout		0	0	$0
Gulfport Harbor	4/13/1996	Water Spout		0	0	$1,000
Gulfport	5/9/1995	Funnel Cloud		0	0	$0
Gulfport	3/14/1995	Funnel Cloud		0	0	$0
Gulfport	4/12/1994	Tornado	F2	2	15	$1,000,000
Gulfport	3/29/1987	Tornado	F0 and F1	0	0	$25,000
Gulfport	9/23/1985	Tornado	F0	0	0	$25,000
Gulfport	9/23/1985	Tornado	F2	0	0	$250,000
Gulfport	9/23/1985	Tornado	F1	0	0	$250,000
Gulfport	5/19/1980	Tornado	F3	0	4	$2,500,000
Gulfport	5/16/1980	Tornado	F3	0	0	$250,000
Gulfport	4/13/1980	Tornado	F3	0	4	$25,000,000
Gulfport	5/7/1972	Tornado	F2	0	0	$25,000
Gulfport	5/7/1972	Tornado	F1	0	0	$2,500
Gulfport	5/7/1972	Tornado	F1	0	0	$0
Gulfport	5/7/1972	Tornado	F1	0	0	$2,500
Gulfport	11/3/1968	Tornado	F3	0	5	Unknown
Gulfport	10/30/1967	Tornado	F3	4	Unknown	$25,000,000

Probability of Future Occurrences

According to NOAA, the state of Mississippi has been ranked in the top 10 nationally for tornado occurrences since 2007. The city of Gulfport experienced 20 confirmed tornadoes since 1967, which equates to an annual occurrence rate of 2.25% producing a low probability of occurrence. Although the probability of occurrence is low the Hazard Mitigation Committee determined the hazard should be considered an imminent hazard due to the unpredictable and violent nature of tornadoes.

Vulnerability Assessment

All locations within the planning area are subject to tornadoes.

Population: The entire population is vulnerable to tornadoes.

Critical Facilities: All above ground facilities are vulnerable to tornadoes.

Essential Services: Since the location of possible tornado damage is not predictable, there is no way of knowing which essential services may be affected. Damage to municipal buildings would hinder services.

Transportation Systems: Roadways are subject to closure before, during and after a tornado event due to the likelihood of debris on the roadway.

Lifeline Utility Systems: Above-ground critical facilities may be impacted by tornadoes. Among these systems are electric utilities, water tanks, and communication towers

4.2.4 Wild/Urban Fire

Hazard Description

A wildfire is any fire that burns uncontrollably in a natural setting (such as grasslands, forest, and brush land). Prescribed burnings are the only exception to a wildfire, which can be either man-made or natural. While the typical cause of a natural wildfire in western states is lightning, the major cause of wildland fires in Gulfport is open burning of debris and/or garbage.

Prescribed burning, also known as controlled burning, is the deliberate use of fire under specified and controlled conditions. Prescribed burning is used by forest management professionals and individual landowners to accomplish one or more of the following tasks:

Fuel Reduction – The reduction of accumulated grass, weeds, pine needles, and hardwood leaves. This type of vegetation can encourage wildfires in young stands and hinder regeneration of older stands.

Hardwood Control – Prevents hardwood trees from competing with pines for nutrients and moisture; impeding visibility and access through the stands; and interfering with natural regeneration in areas better suited for growing pines.

Wildfires are very common in many places around the world. Fires are particularly prevalent in summer, autumn and during droughts when fallen branches, leaves, grasses and scrub can dry out and become highly flammable. Some experts believe global warming is increasing the intensity and frequency of droughts in many areas, thus creating more intense and frequent wildfires.

Wildfires tend to be most common and severe during years of drought and occur on days of strong winds. With extensive urbanization of wildlands, these fires often involve destruction of suburban homes located in the wildland urban interface, a zone of transition between developed areas and undeveloped wildland.

On occasion, wildfires have caused large scale damage to private or public property, destroying many homes and causing deaths, particularly when they have reached urban fringe communities. Wildfires are extremely dangerous, and often deliberately lit.

It is important to note what constitutes an urban fire and how that impacts mitigation planning for the city of Gulfport. Urban fires may be created by electrically-related structural and vehicle fires, incendiary arson, unattended cooking fires, smoking materials, heating devices, fuel systems, sparks, hazardous material spills, and spontaneous combustion.

Table 4.20 demonstrates the Fire Danger Rating System, from the U.S. Forest Service's Wildland Fire Assessment System.

Table 4.20
Fire Danger Rating System
(Source USFS WFAS)

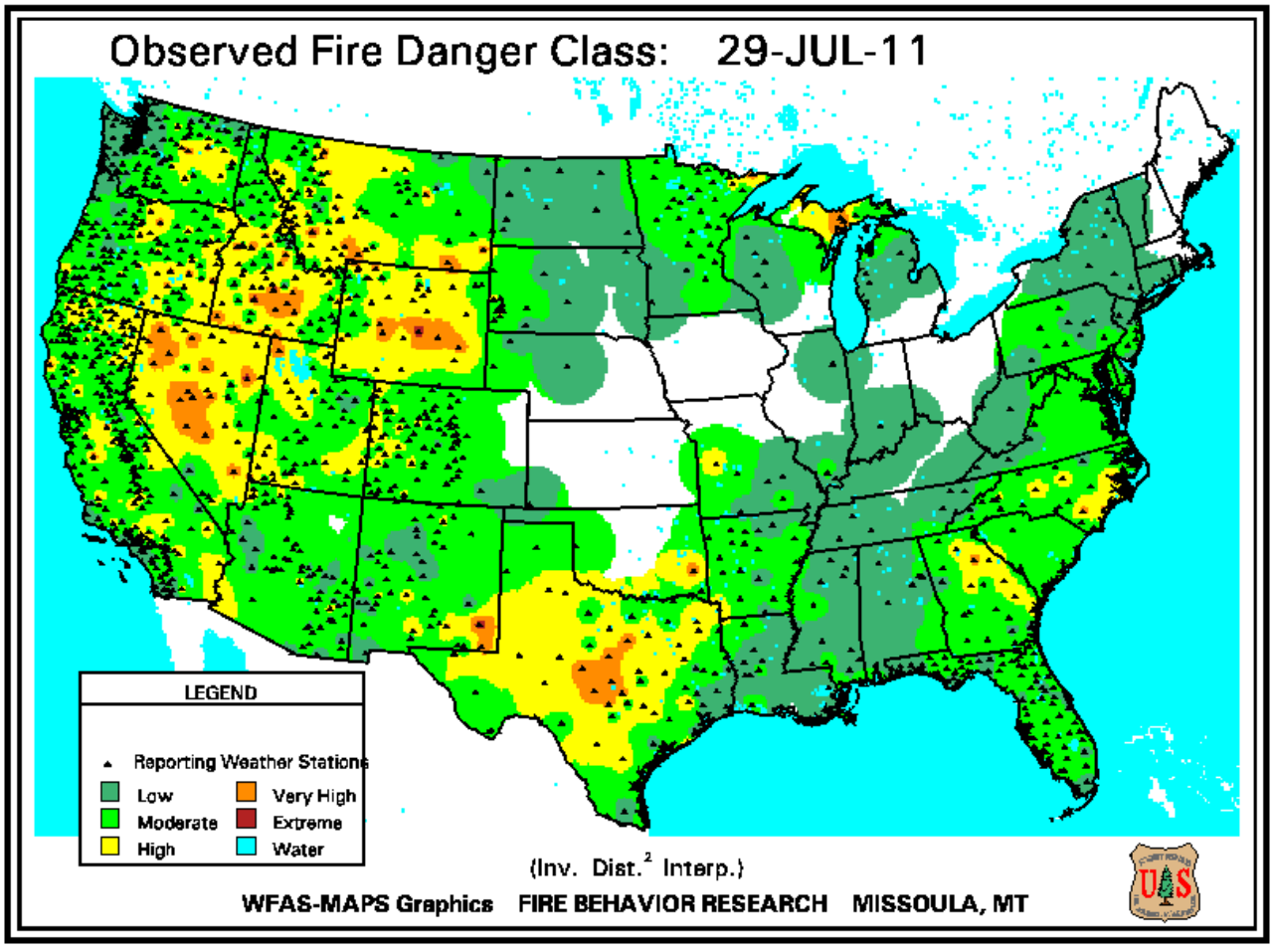
Fire Danger Rating and Color Code		Description
Low (L)	Dark Green	Fuels do not ignite readily from small firebrands although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering, and burn in irregular fingers. There is little danger of spotting.
Moderate (M)	Light Green or Blue	Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.
High (H)	Yellow	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.
Very High (VH)	Orange	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high intensity characteristics, such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.
Extreme (E)	Red	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.

Fire managers in the south also use the Keetch-Byram Drought Index (KBDI) a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. This system, originally developed for the southeastern United States, is based primarily on recent rainfall patterns and was specifically developed to equate the effects of drought with potential fire activities.

A full discussion on the KBDI is provided in Section 4.2.6 – Drought.

Figure 4.4 provides data on observed fire dangers as reported through various weather stations. For the time period reflected, a majority of Mississippi is in a low danger class while the southern counties experienced a moderate danger class

Figure 4.4
Keetch-Byram Observed Fire Danger Class
July 29, 2011
(Source: Wildland Fire Assessment System)



Location and Extent

While there are no large open spaces or preserves within the city of Gulfport, which could contribute to wildfire threat within the city, there are smaller localized agricultural and undeveloped lands on the city's outskirts where wildfires could become established, threatening structures and infrastructure within the city. As more people seek to move away from the coastline, there is the increasing threat of creating an opportunity for wildland/urban interface. Gulfport does not allow outside burning within the city.

The city of Gulfport supports a paid professional firefighting staff, with 12 fire stations strategically located throughout the city providing services.

Given the number of recent incidents and the multitude of areas within the city vulnerable for potential wildfires, the Gulfport Fire Department and the Hazard Mitigation Committee consider wildfires an impending hazard.

Previous Occurrences

The Fire Department reports fire statistics to NFIRS. Data provided in Table 4.21 was obtained from the NFIRS annual incident reports. The entire reports for 2008-2012 are provided in Appendix 8.4-E.

Table 4.21
Gulfport Fire Incident Report Summary

	2008		2009		2010		2011		2012	
Calls by Incident Type	Frequency	% of Calls	Frequency	% of Calls	Frequency	% of Calls	Frequency	% of Calls	Frequency	% of Calls
Structural Fires	137	1.44%	145	1.57%	139	1.44%	161	1.66%	124	1.22%
Pressure, Ruptures, Explosion, Overheat	16	.17%	12	.13%	13	.14%	12	.12%	16	.16%
Hazardous Condition Calls	333	3.49%	235	2.54%	285	2.96%	257	2.65%	281	2.77%
Severe Weather or Natural Disaster Calls	11	.12%	5	.05%	2	.02%	6	.06%	12	.12%
Casualty Summary	Civilian	Fire Service	Civilian	Fire Service	Civilian	Fire Service	Civilian	Fire Service	Civilian	Fire Service
Fire Related Injuries	10	0	6	3	3	4	6	1	9	3
Non-Fire Injuries	211	2	275	0	332	1	124	4	12	6
Fire Related Deaths	1	0	1	0	3	0	4	0	0	0
Non-Fire Deaths	11	0	5	0	10	0	2	0	2	0
Total Fire Dollar Losses	$3,064,100		$3,088,600		$3,283,250		$4,127,945		$2,007,065	

Source: City of Gulfport Fire Department

Probability of Future Occurrences

Based on the best available data provided by the city's fire department, the probability of man-made fires remains high due to undeveloped areas and a transportation system that can be impacted by unforeseen fires. Natural events, such as tornado and hurricanes, will continue to generate debris but the impacts can vary from light to heavy depending on the size of the storm.

With two years of data collected prior to Hurricane Katrina, it appears that an anticipated 47 natural vegetation fires can occur in any one year within the city of Gulfport or in the area

immediately adjacent to Gulfport. Currently, natural vegetation calls are about 0.4% of total emergency calls to the fire department.

The Gulfport Fire Department enforces a burn ban, thereby reducing the potential of wildfire within the city. Debris remaining from Hurricane Katrina, for the most part, was mitigated and there were no substantial storms generating vegetative debris that could increase the probability of wildfires.

Vulnerability Assessment

Subsequent to Hurricane Katrina there was concern about wildfires due to the fuel load of dead plant material sustained as a result of high winds. Southern Mississippi Planning and Development District developed the 2006 Harrison County Wildfire Protection Plan and continues to monitor data on natural vegetation fires in southern Mississippi ascertaining any trends of locations, seasons and ability to threaten homes and commercial developments. This study is primarily based on the unincorporated limits of Harrison County and the Volunteer Fire Departments serving these communities.

Population: Areas on the perimeter of the city located close to forested areas are most vulnerable for wildfires. Should wildfires become established in forested areas, they could threaten structures and infrastructure within the city. Wildland areas of undeveloped land are located on Canal Road, Landon Road, John Clark Road and Swan Road. There is also land utilized for forestry production on County Farm Road located outside the city's municipal limits.

It was determined in the 2007 plan there may be about 4,545 housing units located at the city's edge impacted by wildfire in the adjacent unincorporated county. These numbers were derived from census block information for areas near Canal Road, Landon Road, John Clark Road and Swan Road.

Critical Facilities: One fire station is located within this area, but not located within an area immediately adjacent to the city/county corporate limit and, therefore, not likely to be subject to damages from wildfire.

Essential Services: Interruption of essential services, such as power, phones and public roadways, can disrupt dispatch and other emergency services. Electric power facilities, communication facilities, and municipal buildings, including fire stations, have the potential of being damaged or affected by wildfires. No major treatment facilities for sewer or water are located within this area. .

Transportation Systems: Wildfires may affect major transportation routes. Smoke from wildfires can cause unsafe driving conditions and may damage roadways, if the fire crosses it. Several years ago in Jackson County, fires combined with heavy morning fog led to a multiple-car accident on Interstate 10. Similar conditions could create the same scenario in Gulfport along Interstate 10.

Lifeline Utility Systems: The most likely lifeline utility system to be impacted by a wildfire would be the electric power utility system. Mississippi Power and Coast Electric Power Association provide electric power services in Gulfport.

4.3 MEDIUM RANKED HAZARDS

4.3.1 Drought

Hazard Description

According to NOAA, a drought is defined as a period of unusually dry weather persisting long enough to cause serious problems, such as crop damage and/or water supply shortages. The severity of the drought depends upon the degree of moisture deficiency and the duration of the drought.

Drought occurs under differing conditions, based on the reference points:

Meteorological drought is defined by a period of substantially diminished precipitation duration and/or intensity. The commonly used definition of meteorological drought is an interval of time, generally on the order of months or years, during which the actual moisture supply at a given place consistently falls below the average moisture supply.

Agricultural drought occurs when there is inadequate soil moisture to meet the needs of a particular crop at a given time. Agricultural drought usually occurs after or during meteorological drought, but before hydrological drought and can affect livestock and other dry-land agricultural operations.

Hydrological drought refers to deficiencies in surface and subsurface water supplies from deficiencies in precipitation. It is measured as stream flow, snow pack, and as lake, reservoir, and groundwater levels. There is usually a delay between lack of rain or snow and less measurable water in streams, lakes, and reservoirs. Therefore hydrological measurements tend to lag behind other drought indicators.

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

A drought's severity depends on numerous factors, including duration, intensity, and geographic extent, as well as regional water demands by humans, livestock, crops, and vegetation. The severity of drought can be aggravated by other climatic factors, such as prolonged high winds and low relative humidity. Due to its multi-dimensional nature, drought is difficult to define in exact terms and also poses difficulties in terms of comprehensive risk assessments.

In 1965, Wayne Palmer developed an index to "measure the departure of the moisture supply." This index was based on the supply-and-demand concept of the water balance equation, taking into account more than merely the precipitation deficit at specific locations. The objective of the

Palmer Drought Severity Index (PDSI) was to provide a measurement of moisture conditions that were "standardized" so comparisons using the index could be made between locations and between time periods. While Palmer's indices are water balance indices that consider water supply (precipitation), demand (evapotranspiration) and loss (runoff), another commonly used drought index, the Standardized Precipitation Index (SPI), is a probability index that considers only precipitation. Therefore and for the purposes of this plan, drought will be analyzed using the PDSI.

The PDSI varies between -4.0 and +4.0. Weekly Palmer Index values are calculated for the Climate Divisions during every growing season and are available from the Climate Prediction Center. Gulfport could expect to experience the entire range of drought severity and classification. Table 4.22 lists the Palmer Drought Severity Index.

Table 4.22
Palmer Drought Severity Index

Index Value	Classification	Index Value	Classification
4.00 or more	Extremely wet	-0.50 to -0.99	Incipient dry spell
3.00 to 3.99	Very wet	-1.00 to -1.99	Mild drought
2.00 to 2.99	Moderately wet	-2.00 to -2.99	Moderate drought
1.00 to 1.99	Slightly wet	-3.00 to -3.99	Severe drought
0.50 to 0.99	Incipient wet spell	-4.00 or less	Extreme drought
0.49 to -0.49	Near normal		

Source: http://drought.unl.edu/whatis/indices.htm

Another means of analyzing drought is the Keetch-Byram Drought Index (KBDI) which is a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. This system was originally developed for the southeastern United States and is based primarily on recent rainfall patterns.

The KBDI drought index system is the most widely used by fire managers in the south. It is also one of the only drought index systems specifically developed to equate the effects of drought with potential fire activities.

The result of this system is a drought index number ranging from 0 to 800 accurately describing the amount of moisture missing. A rating of zero defines the point of no moisture deficiency and 800 is the maximum drought possible.

These numbers correlate with potential fire behavior as follows:

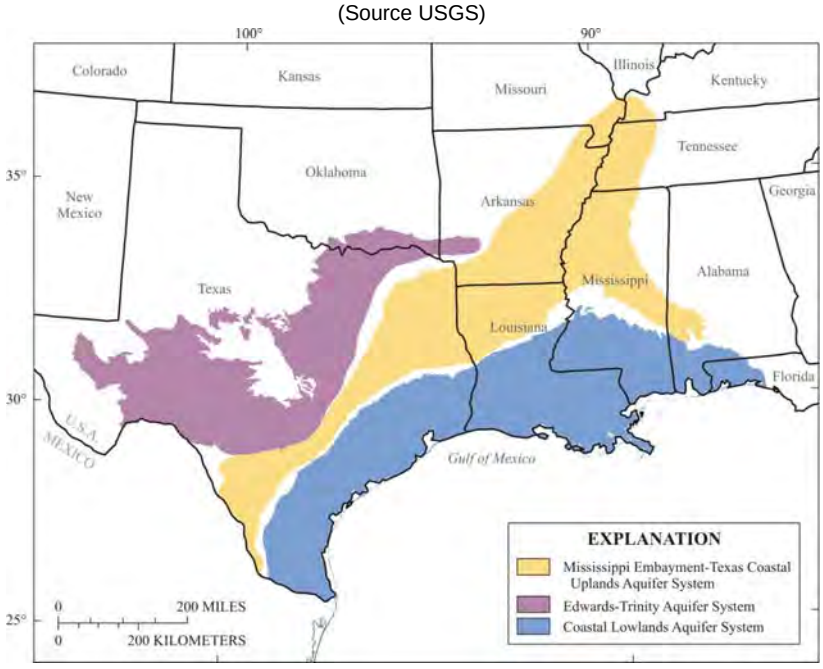
- 0 - 200: Soil moisture and large class fuel moistures are high and do not contribute much to fire intensity. Typical of spring dormant season following winter precipitation.

- 200 - 400: Typical of late spring, early growing season. Lower litter and duff layers are drying and beginning to contribute to fire intensity.
- 400 - 600: Typical of late summer, early fall. Lower litter and duff layers actively contribute to fire intensity and will burn actively.
- 600 - 800: Often associated with more severe drought with increased wildfire occurrence. Intense, deep burning fires with significant downwind spotting can be expected. Live fuels can also be expected to burn actively at these levels.

Location and Extent

Drought is not a location-specific hazard. All areas of Gulfport are equally vulnerable to drought. Figure 4.5 shows the location of the Coastal Lowlands Aquifer System which provides drinking water to the city of Gulfport.

Figure 4.5
Southern Coastal Aquifer System
(Source USGS)



A severe, prolonged drought could have negative and lasting impacts on residents, agriculture, industry and infrastructure in Gulfport. When available water tables decline and potable water becomes harder to obtain, the residents, commuting population, and visitors are exposed to greater health risks. Any water-dependent functions in the city are exposed to potential loss of or failure to function.

Previous Occurrences

The current conditions across southern Mississippi show Gulfport outside any drought condition zone. Historically, Mississippi is the third wettest state in the nation (behind Hawaii and Louisiana), receiving an average of 59.23' of rain per year (source NCDC). Since the forecast period is a snapshot of current or foreseeable conditions over a reasonably long planning period, seasonal weather trends and use of the U.S. Drought Monitor can provide indicators of oncoming drought conditions. There are no recorded droughts for the city of Gulfport.

Probability of Future Occurrences

A lack of recorded historical drought data and forecasting limitations makes estimating probability of drought unrealistic within the context of this plan. Given statewide drought indices, the probability of future drought conditions is considered to be low as determined by the U.S. seasonal drought outlook. However, it is important to note the seasonal drought outlook is a forecast through June 2013 (Figure 4.6) and a much shorter timeframe than the five year planning horizon of this plan. Continuous monitoring of drought indices and forecasts are recommended.

Figure 4.6
U.S. Seasonal Drought Outlook
(Source: USDA)

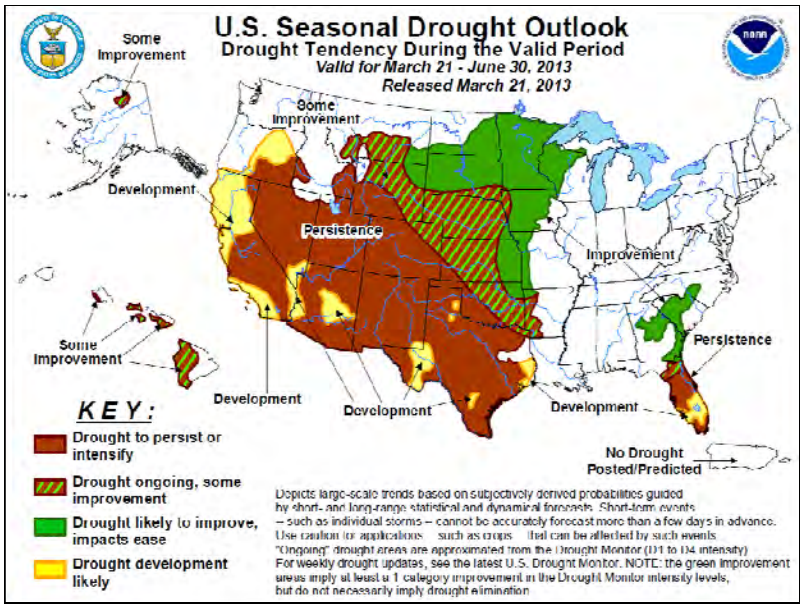
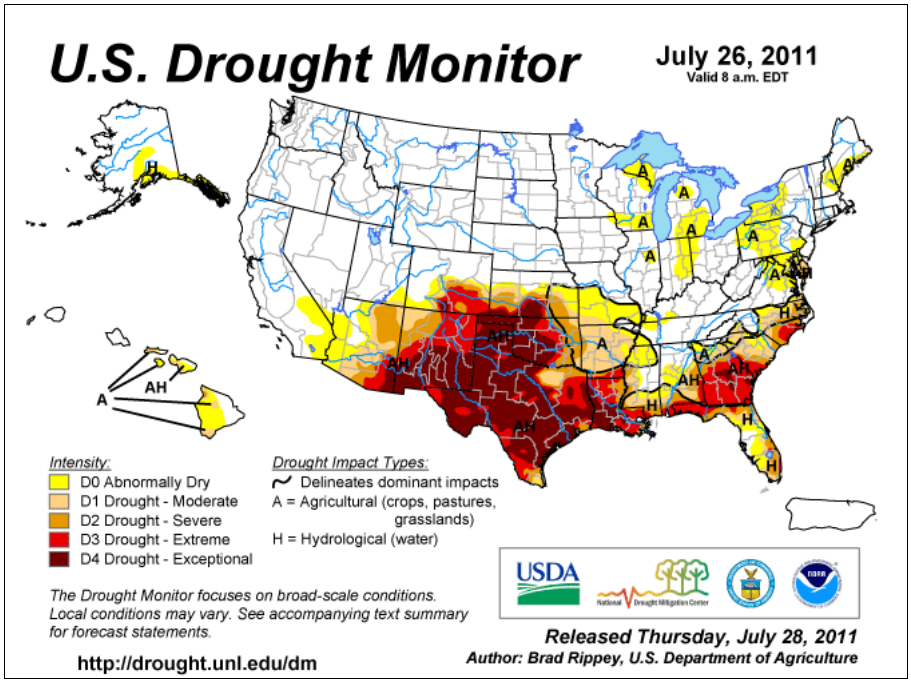
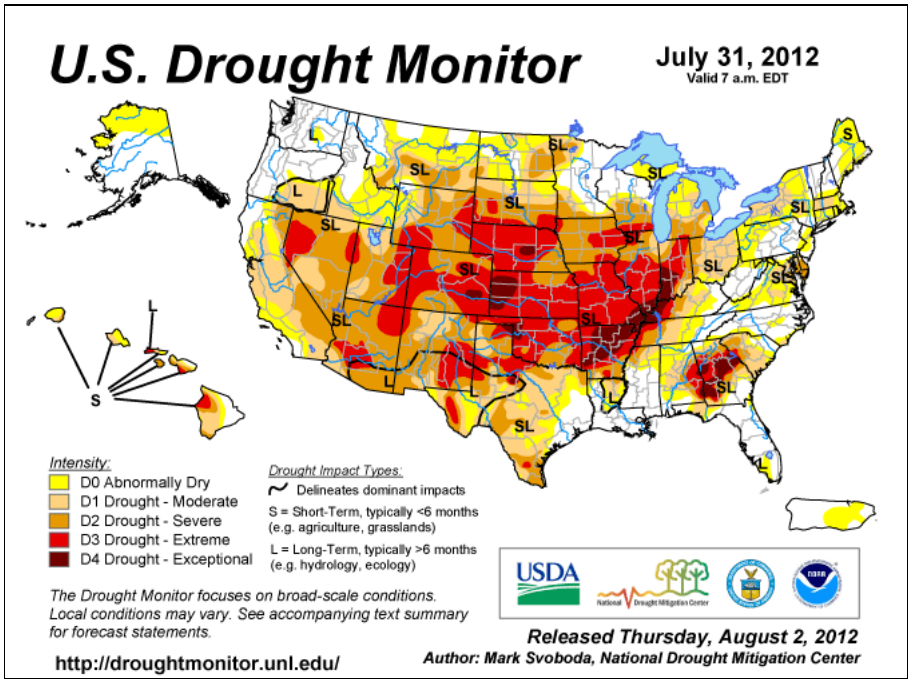


Figure 4.7 show drought data for Mississippi (the smallest unit of data available); for June 2011 and June 2012.

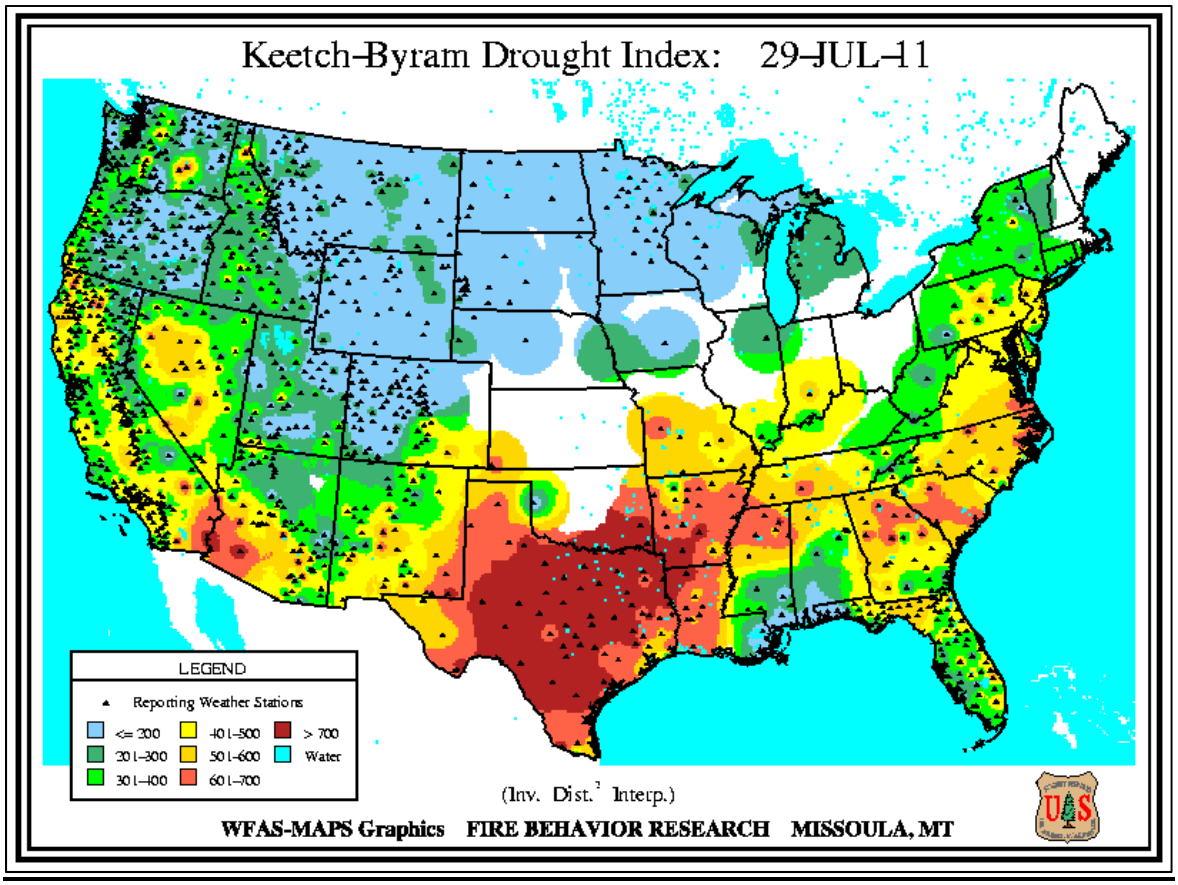
Figure 4.7
Drought Monitor Data for the United States
July 26, 2011 and July 31, 2012
(Source: USDA)



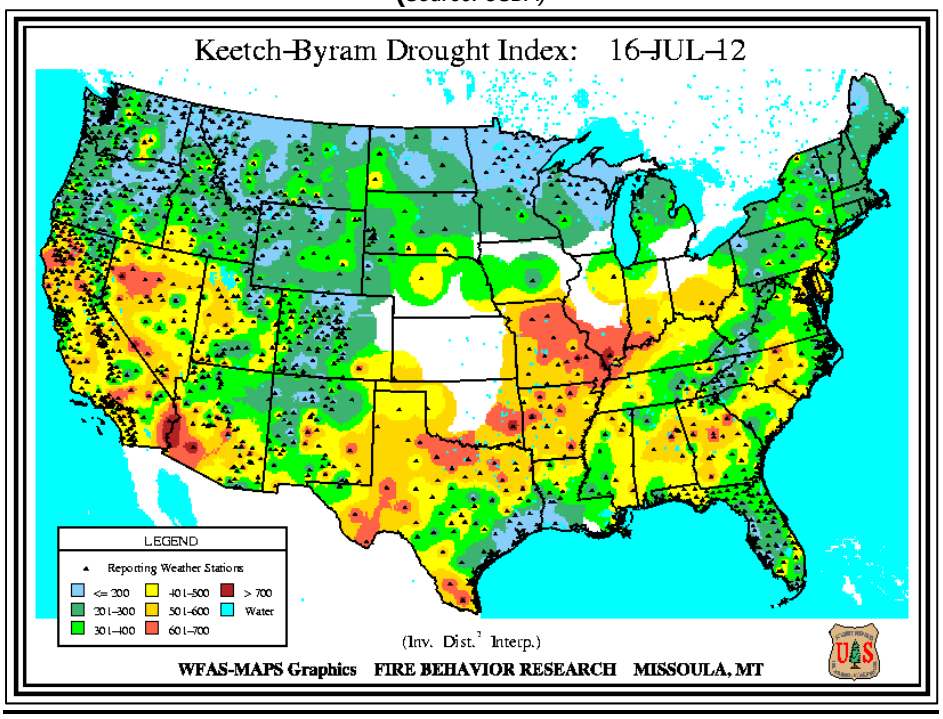


Figures 4.8 and 4.9 provide another illustration to drought potential by using the Keetch-Bryam index for a similar time period as the U.S. Drought Monitor. These figures indicate fire intensity significantly increased due to lower litter and duff layers drying out.

Figures 4.8
Keetch-Byram Drought Index Data for the United States
July 29, 2011 and July 16, 2012
(Source: USDA)



Figures 4.9
July 16, 2012
(*Source: USDA)*



Vulnerability Assessment

Population: Drought is not a location-specific hazard. All areas of Gulfport are equally vulnerable to drought. Drought can have a widespread impact on the environment and the economy, depending upon its severity, although it typically does not result in loss of life or damage to property, as do other natural disasters. A drought does affect companies offering recreational services, such as river rafting and landscape and nursery businesses. People will not invest in new plants if water is not available to sustain them. Rationing of water can affect property owners who are not able to water lawns.

Critical Facilities: Critical facilities are not likely to be affected by drought.

Essential Service: Drought threatens supplies of water for irrigated crops and communities. Prolonged drought increases the threat of wildfires from dry conditions in forest and rangelands.

Transportation System: Transportation systems are not likely to be affected by drought.

Lifeline Utility Systems: Drought has the potential of affecting the supply of electricity. When supplies of locally generated hydropower shrink because of drought, utilities seek other sources of electricity and energy for power generation, driving up prices and reducing supply.

4.3.2 Severe Storms (Thunderstorm/High Wind/Lightning/Hail)

Hazard Descriptions

On the Mississippi Gulf Coast severe storms can occur at most any time. Cold fronts and daytime heating of the atmosphere cause these events. Severe storms can produce tornadoes, strong, gusty winds, lightning, hail and heavy rain. This hazard section focuses on the high wind, hail and lightning hazards associated with thunderstorms. Flood and tornadoes are discussed as separate hazards in Sub-sections 4.2.2 (Flood) and 4.2.3 (Tornado).

Thunderstorms are defined by the National Weather Service (NWS) as "a local storm produced by a cumulonimbus cloud and accompanied by lightning and thunder". The storms alone don't cause losses to life or property, but the components of a thunderstorm can be devastating. Thunderstorms can include high winds, lightning, tornadoes, heavy rain (flash flood) and hail. The NWS further defines a thunderstorm that produces a tornado, winds of at least 58 mph (50 knots), and/or hail at least ¾" in diameter as a "severe thunderstorm". Structural wind damage may imply the occurrence of a severe thunderstorm.

High winds are a general term associated with sustained or gusting winds of significant strength to cause risk or damage to crops, vegetation, buildings, infrastructure, or transportation. High winds are typically associated with weather frontal systems often bringing other severe weather products, such as hail and lightning.

High winds can damage property by carrying projectile debris or by breaking building envelopes as wind buffets weak points around doors, windows, and roof structures. Winds can increase speed as they pass between closely situated buildings through a Venturi effect that may increase the potential for damage. Metal buildings, tall structures, open fields, and swimming pools are at greater risk of lightning strikes.

The National Weather Service recognizes and defines three levels of wind events:

- *Wind Advisory* – Sustained winds of 30mph or more or gusts of 45mph or greater for a duration for one hour or longer.
- *High Winds* – Sustained winds of 40mph or greater for at least one hour, or frequent gusts of wind to 58mph or greater.
- *Extreme Wind Warnings* – Sustained winds of 115mph or greater during a land-falling hurricane.

Winds and related damages can also be defined through the Beaufort Wind Scale as shown in Table 4.23.

Table 4.23
Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects	
			On the Water	On Land
0	Less than 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft. taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft., whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-20 ft., white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Moderately high (13-20 ft.) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Whole trees in motion, resistance felt walking against wind
9	41-47	Strong Gale	High waves (20 ft.), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (20-30 ft.) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	Exceptionally high (30-45 ft.) waves, foam patches cover sea, visibility more reduced	
12	64+	Hurricane	Air filled with foam, waves over 45 ft., sea completely white with driving spray, visibility greatly reduced	

Source: NOAA Storm Prediction Center

Lightning is a visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground or between the ground and a cloud. Lightning is created by static electrical energy and can generate enough electricity to set buildings on fire and electrocute people.

Lightning can strike anywhere and anytime thunderstorms are in the area. Almost all lightning occurs within 10 miles of the parent thunderstorm, but in rare cases it can strike as much as 50 miles away. There are two major categories of lightning:

- *Cloud Flashes* – Cloud flashes sometimes have visible channels that extend out into the air around the storm but do not strike the ground. This is often further defined as cloud-to-air, cloud-to-cloud, or intra-cloud lightning.
- *Ground Flashes* – Lightning channels that travel from cloud-to-ground or ground-to-cloud. There are two categories of ground flashes: natural and artificially initiated/triggered. Artificially initiated lightning includes strikes to tall structures, airplanes, rockets, and towers on mountains. Artificially initiated lightning travels from ground to cloud while natural lightning travels from cloud to ground.

Hail is defined by the National Weather Service (NWS) as a showery precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud. Studies of thunderstorms provided through the NWS indicate two conditions are required for hail to develop: sufficiently strong and persistent up-draft velocities and an accumulation of liquid water in a super-cooled state in the upper parts of the storm. Hailstones are formed as water vapor in the warm surface layer rises quickly into the cold upper atmosphere. The water vapor is frozen and begins to fall; as the water falls, it accumulates more water vapor. This cycle continues until there is too much weight for the updraft to support and the frozen water falls too quickly to the ground to melt along the way.

The size of hailstones is best determined by measuring their diameter with a ruler. In the absence of a ruler, hailstone size is often visually estimated by comparing its size to that of known objects. Table 4.24 provides a reference of commonly used objects for this purpose.

Table 4.24
Hail Size Chart

Hail Diameter Size	Description	Hail Diameter Size	Description
1/4"	Pea	2"	Hen Egg / Lime
1/2"	Plain M&M	2 1/2"	Tennis Ball
3/4"	Penny	2 3/4"	Baseball
7/8"	Nickel	3"	Teacup / Large Apple
1" (severe)	Quarter	4"	Softball
1 1/4"	Half Dollar	4 1/2"	Grapefruit
1 1/2"	Ping Pong Ball / Walnut	4 3/4"- 5"	Computer CD-DVD
1 3/4"	Golf Ball		
Source: National Weather Service			

Location and Extent

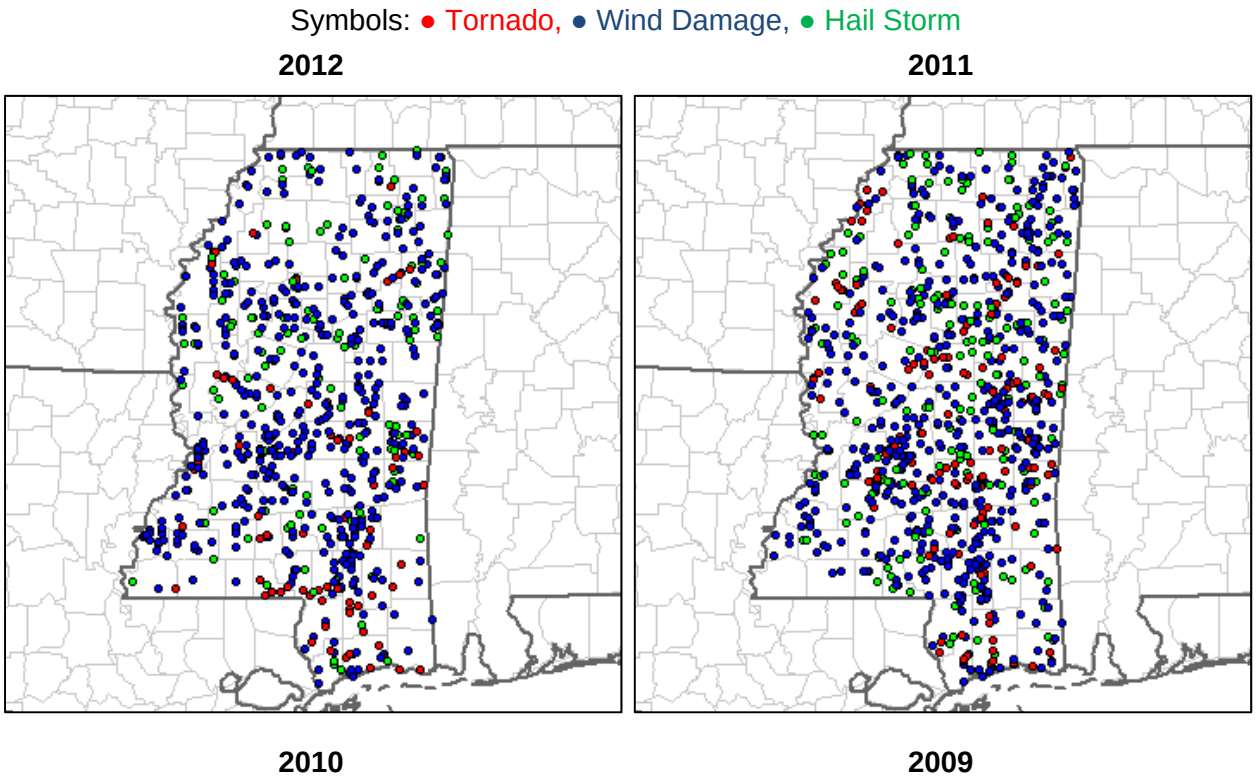
Severe storms are likely to affect an entire region. Therefore, every location within Gulfport can be subject to the probability of damage from lightning, hail and winds associated with thunderstorms.

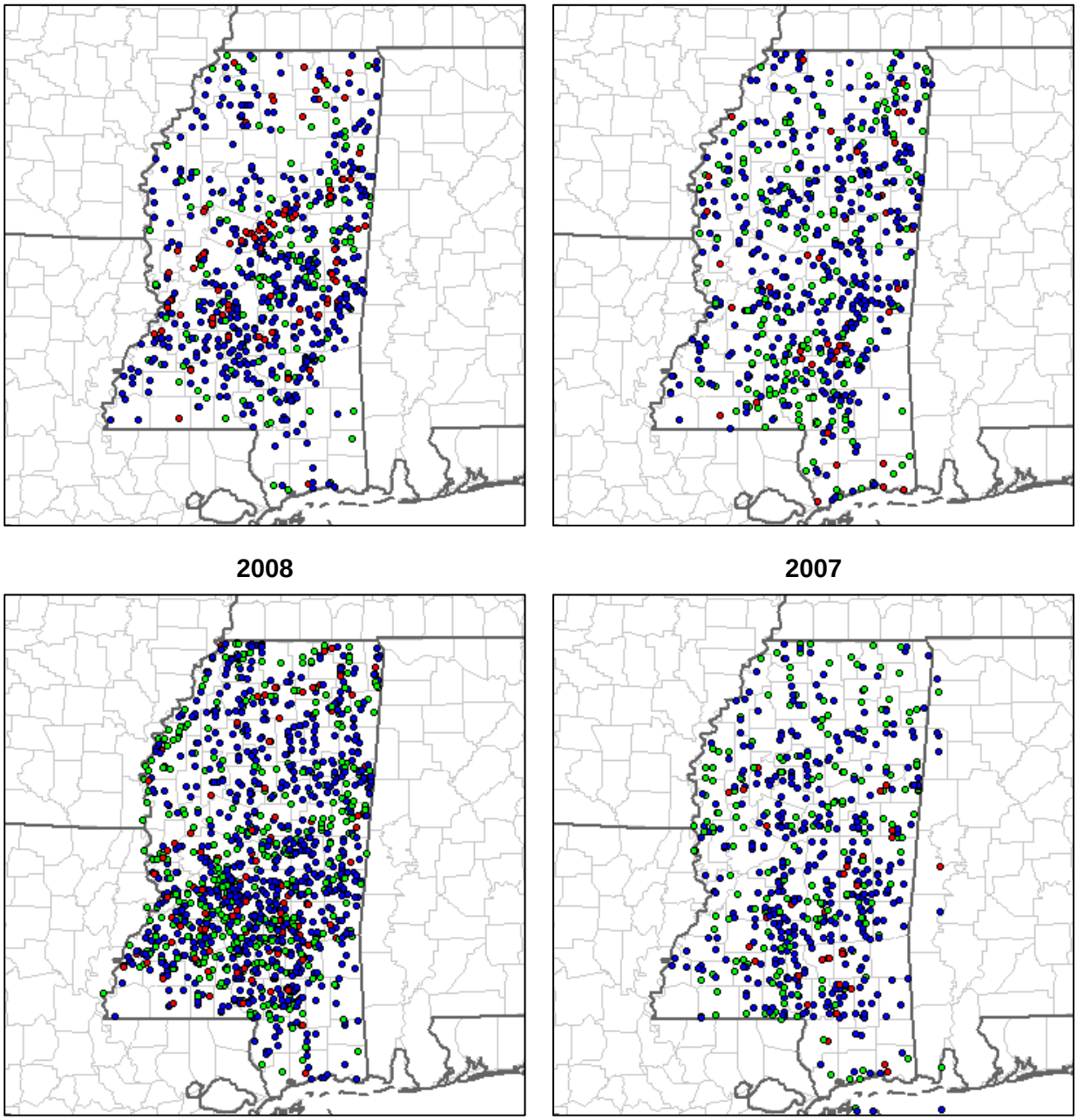
People, buildings, and property are at risk from the effects of high wind and lightning. Buildings, automobiles, and infrastructural components (such as electrical feed lines) can suffer damage from high wind and lightning; outdoor populations are vulnerable to injury of death from lightning. High winds can cause debris to strike people, animals, buildings and property, which in turn can cause significant injuries, fatalities, and property damage.

Critical infrastructure associated with power transmission, telecommunications and road signage are vulnerable to hail. Manufactured homes are particularly susceptible to hail events due to construction types (vinyl siding, lesser gauge metal roofs). People and animals can also be impacted by hail if they are caught outdoors with no protection.

Figure 4.10 shows the recorded tornado, high wind and hailstorm activity from 2007 to 2012 within the state of Mississippi.

Figure 4.10
Severe Weather Activity in Mississippi
(Source: National Weather Service)





2008 2007

Previous Occurrences

Tables 4.25 to 4.27 present data obtained from the 2007 Hazard Mitigation Plan and the NCDC database. The data was separated into thunderstorm/straight line wind, lightning and hail to facilitate ease in reviewing the data and understanding the impacts caused to the planning area.

Severe thunderstorm and high wind impacts were recorded at least once a year and therefore can be expected to continue this pattern.

Table 4.25
Thunderstorm/Straight line Wind Events

Location	Date	Event	Property Damage
Gulfport	3/9/2011	Thunderstorm Wind	$50,000
Lorraine	3/9/2011	Thunderstorm Wind	$2,000
Lorraine	3/9/2011	Thunderstorm Wind	$0
Gulfport	5/18/2010	Thunderstorm Wind	$500
Gulfport Regional Airport	4/8/2010	Thunderstorm Wind	$15,000
Gulfport	12/24/2009	Thunderstorm Wind	$750
Gulfport	7/14/2008	Thunderstorm Wind	$3,000
Lyman	5/15/2008	Thunderstorm Wind	$8,000
Lyman	6/19/2007	Thunderstorm Wind	$1,500
Gulfport	1/5/2007	Thunderstorm Wind	$10,000
Gulfport	8/15/2006	Thunderstorm Wind	$1,000
Wortham	8/30/2004	Thunderstorm Wind	$2,000
Gulfport	7/1/2004	Thunderstorm Wind	$500
Gulfport	6/19/2004	Thunderstorm Wind	$2,000
Gulfport	5/1/2004	Thunderstorm Wind	$10,000
Orange Grove	7/31/2003	Wind	$8,000
Gulfport	7/24/2002	Wind	$800
Lyman	8/7/2001	Wind	$1,000
Lyman	7/5/2001	Wind	$1,000
Gulfport	3/12/2001	Thunderstorm Wind	$2,500
Lyman	11/24/2000	Thunderstorm Wind	$30,000
Lyman	10/2/2000	Thunderstorm Wind	$0
Lyman	8/30/2000	Thunderstorm Wind	$10,000
Gulfport Regional Airport	8/14/2000	Wind	$2,000
Gulfport	9/1/1997	Thunderstorm Wind	$800
Gulfport Regional Airport	7/11/1997	Thunderstorm Wind	$25,000
Lyman	1/24/1997	Thunderstorm Wind	$500
North Gulfport	1/18/1996	Thunderstorm Wind	$500
North Gulfport	7/9/1995	Thunderstorm Wind	$2,000
Lyman	5/9/1995	Thunderstorm Wind	Unknown
Gulfport	3/14/1995	Wind	$0
Gulfport	4/18/1994	Thunderstorm Wind	$50,000
Gulfport	9/4/1990	Wind	$0
Gulfport	5/9/1990	Wind	$0
Gulfport	4/22/1990	Thunderstorm Wind	$0
Gulfport	6/14/1989	Thunderstorm Wind	$0
Gulfport	5/24/1988	Thunderstorm Wind	$0
Gulfport	7/26/1987	Thunderstorm Wind	$0
Gulfport	3/17/1987	Thunderstorm Wind	$0
Gulfport	3/12/1986	Thunderstorm Wind	$0
Gulfport	9/23/1985	Thunderstorm Wind	$0
Gulfport	8/15/1985	Thunderstorm Wind	$0
Gulfport	5/21/1985	Thunderstorm Wind	$0

Table 4.25
Thunderstorm/Straight line Wind Events

Location	Date	Event	Property Damage
Gulfport	8/11/1984	Thunderstorm Wind	$0
Gulfport	6/22/1984	Thunderstorm Wind	$0
Gulfport	10/22/1983	Thunderstorm Wind	$0
Gulfport	4/7/1983	Thunderstorm Wind	$0
Gulfport	5/7/1982	Thunderstorm Wind	$0
Gulfport	4/20/1982	Thunderstorm Wind	$0
Gulfport	3/17/1982	Thunderstorm Wind	$0
Gulfport	2/10/1981	Thunderstorm Wind	$0
Gulfport	7/15/1980	Thunderstorm Wind	$0
Gulfport	7/7/1978	Thunderstorm Wind	$0
Gulfport	5/3/1978	Thunderstorm Wind	$0
Gulfport	5/8/1975	Thunderstorm Wind	$0
Gulfport	1/10/1975	Thunderstorm Wind	$0
Gulfport	8/21/1974	Thunderstorm Wind	$0
Gulfport	7/23/1974	Thunderstorm Wind	$0
Gulfport	5/22/1974	Thunderstorm Wind	$0
Gulfport	2/7/1974	Thunderstorm Wind	$0
Gulfport	3/24/1973	Thunderstorm Wind	$0
Gulfport	7/13/1971	Thunderstorm Wind	$0
Gulfport	5/12/1971	Thunderstorm Wind	$0
Gulfport	10/13/1970	Thunderstorm Wind	$0
Gulfport	6/15/1970	Thunderstorm Wind	$0
Gulfport	4/19/1970	Thunderstorm Wind	$0
Gulfport	8/10/1969	Thunderstorm Wind	$0
Gulfport	7/14/1969	Thunderstorm Wind	$0
Gulfport	7/29/1968	Thunderstorm Wind	$0
Gulfport	7/11/1968	Thunderstorm Wind	$0
Gulfport	8/16/1966	Thunderstorm Wind	$0
Gulfport	7/19/1965	Thunderstorm Wind	$0
Gulfport	4/26/1964	Thunderstorm Wind	$0
Gulfport	4/14/1964	Thunderstorm Wind	$0
Gulfport	7/21/1963	Thunderstorm Wind	$0

Source: NCDC and 2007 city of Gulfport Hazard Mitigation Plan

The results for lightning strikes are based on best available data obtained through the 2007 Hazard Mitigation Plan and the NCDC. Not all lightning strikes are accounted for – especially if there are no associated damages. Six recorded events over the past 14 years are accounted for in Table 4.25.

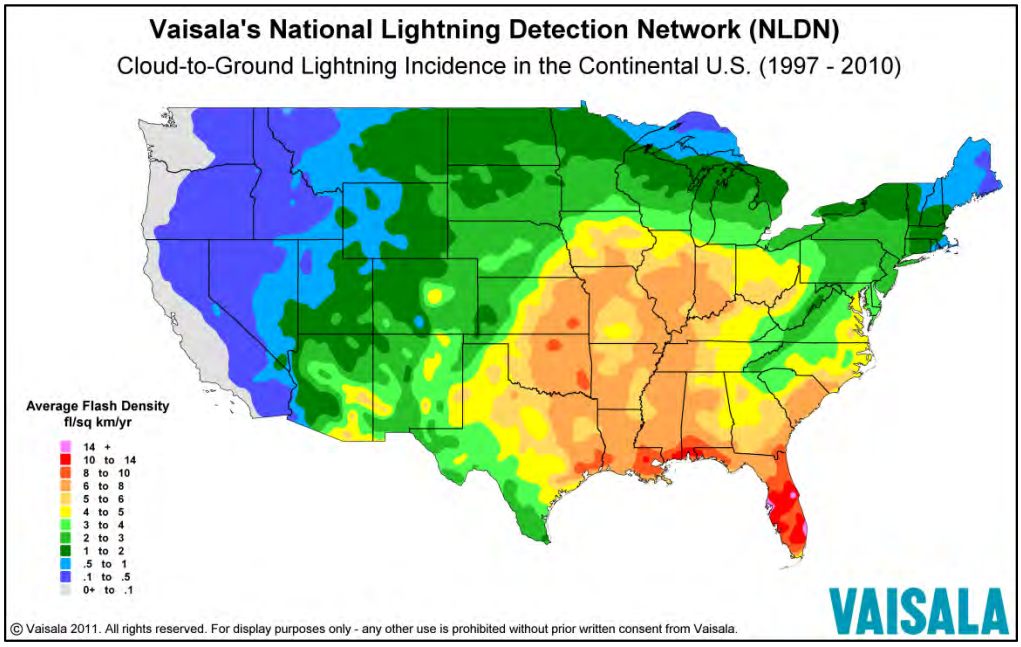
Table 4.26
Lightning Events

Location	Date	Magnitude	Fatalities	Injuries	Property Damage
Gulfport	5/15/2008	Lightning struck a house causing a fire in the attic.	0	0	25,000
Gulfport	2/2/2006	Lightning struck a home causing a fire that destroyed the roof, attic and second floor of the house.	0	0	Unknown
Gulfport	6/7/2001	A lightning strike killed a 25 year old women in Gulfport	1	0	$0
Orange Grove	7/22/2000	Three homes in the Orange Grove area were struck by lightning with one home receiving damage to its roof and attic.	0	0	30,000
Gulfport	7/22/1999	Unknown	Unknown	Unknown	10,000
Gulfport	7/16/1998	Unknown	Unknown	Unknown	Unknown

Source: NCDC and 2007 city of Gulfport Hazard Mitigation Plan

To further demonstrate lightning impacts, Figure 4.11 shows a lightning flash density map from 1997 to 2010 based upon data provided by Vaisala's U.S. National Lightning Detection Network. Harrison County has an average of 6-8 flash density per square mile annually.

Figure 4.11



Since 2000, the NCDC recorded 15 hail events in the incorporated areas of Gulfport. Of the reported events no property damage losses were reported. The following table provides dates, locations and magnitude (size) of the hail events.

Table 4.27
Hail Events in Gulfport
January 2000 – December 2012

Location	Date	Mag	Location	Date	Mag
Lyman	6/6/2011	1.00 in.	Lyman	7/20/2006	0.75 in.
Lyman	6/6/2011	1.00 in.	Wortham	8/30/2004	1.00 in.
Lyman	6/6/2011	1.25 in.	Gulfport	5/31/2004	0.75 in.
Gulfport	4/2/2009	0.75 in.	Gulfport	7/17/2003	0.75 in.
Gulfport	4/2/2009	0.88 in.	Gulfport	3/13/2003	0.88 in.
Lyman	6/13/2007	0.88 in.	Lyman	8/30/2000	1.00 in.
Gulfport	5/11/2007	1.75 in.	Lyman	8/30/2000	1.00 in.
Gulfport	2/13/2007	1.00 in.			
Source: NCDC					

Probability of Future Occurrences

Based upon data for the city of Gulfport, an estimation of future occurrences of damaging winds, lightning-causing damage and hail storms was made. It was determined severe thunderstorms will likely occur within Gulfport multiple times during a year, lightning strikes will occur frequently and hail events will occur approximately once a year.

Potential impacts to life are low, as high wind and lightning are primarily a threat to property especially mobile homes. Persons who are outdoors for activities and sporting events may be at risk. Gulfport does not currently have outdoor warning systems in place, but have a mitigation action to apply for funding to construct these devices in strategic areas of the city. Impacts to property are designated as low and are equal across the planning area.

Vulnerability Assessment

Population: People are vulnerable to injury or death from lightning, hail and from being struck by falling limbs and structural components. The likelihood of fatal incidents is relatively low due to public awareness as well as policies established by organizers of outdoor activities, such as football games and similar events.

High wind and hail from severe storms are most likely to impact the outside envelope of structures and cause property damage to items located outside and unprotected. Hail can cause significant cosmetic damage to cars, as well as to the roof and siding of structures. Over time these cosmetic damages can rust or weaken, putting the outside envelope of the car or the structure at risk.

Critical Facilities: Severe thunderstorms, high wind, lightning, and hail are not location-specific hazards since the entire planning area is vulnerable to these hazards. People, buildings, and property are at risk from the effects of high wind, lightning, and hail.

Essential Service: Power outages, as a result of downed power lines, are the most common results of severe storm activity. Dispatch, communications, and emergency service provisions must continue during a power outage.

Among essential medical services, Memorial Hospital and Garden Park Hospital, as well as city police and fire facilities, are equipped with generators and operate under an emergency operation plan during hazard events.

Transportation System: Roadways are most affected by flooding and debris from severe storm and wind damage.

Lifeline Utility Systems: Electric power lines within Gulfport are located above-ground, subjecting electric utility systems to lightning and high winds. Lift stations and water pumps can be struck by lightning. The city is in the process of installing surge protection devices to reduce future impacts.

4.4 LOW RANKED HAZARDS

4.4.1 Coastal Erosion

Hazard Description

As defined by NOAA, coastal erosion is a process whereby large storms, flooding, strong wave action, sea level rise, and human activities, such as inappropriate land use, alterations, and shore protection structures, erodes the beaches and bluffs along the U.S. ocean coasts. Erosion undermines and often destroys homes, businesses, and public infrastructure and can have long-term economic and social consequences.

In the United States, coastal erosion is responsible for approximately $500 million per year in coastal property loss, including damage to structures and loss of land. To mitigate coastal erosion, the federal government spent approximately $300 billion on beach nourishment and other shoreline erosion control measures and projects. Despite these efforts and according to NOAA scientists, it appears the new sand "often disappears rapidly, does not prevent erosion and remains vulnerable to loss from [storms]." Other experts estimate nourished beaches disappear two to 12 times faster than natural ones. (Source CBS News May 2009).

While coastal erosion affects all regions of the United States, erosion rates and potential impacts are highly localized. Average coastline recession rates of 25 feet per year are not uncommon on some barrier islands in the Southeast. In a single event, severe e storms can remove even wider beaches. In undeveloped areas, these high recession rates are not likely to cause significant concern, but in some heavily populated locations, one or two feet of erosion may be considered catastrophic.

The Gulf of Mexico is impacted by the development of oil, gas and mineral resources. The Gulf accounts for over 95% of the U.S.'s outer continental shelf oil and gas production, and the region processes over two-thirds of the nation's oil imports. Invasive species are a serious threat to native biota in many Gulf coast ecosystems, and aquatic nuisance species pose severe economic problems; interfering with transportation, energy production, reservoir capacity and recreational uses. The effect of oil breaches on coastal erosion is determined by how much oil reaches the coastal regions and how long it remains. Oiled plants can die, along with roots that bind and stabilize the soil, leading to erosion.

Location and Extent

The Harrison County Board of Supervisors built a seawall to protect coastal areas. The seawall extends along U.S. Highway 90 from Pass Christian to Biloxi and includes the city of Gulfport. This seawall was built in the 1920's. After the hurricane of 1947, Harrison County secured funding to build a beach in front of the seawall protecting the seawall and U.S. Highway 90.

Erosion of the sand beach occurs from two sources, water-borne and wind-borne erosion; and, is a constant threat to the seawall. The county established beach profiles and maintains these

profiles daily to ensure the longevity of the beach and its protective function. Additionally, the county established natural vegetation to hold sand in place on the beach; and established sand fences and dunes to capture sand on the beach. Even with these methods in place, and without a storm event, the Harrison County sand beach loses about 100,000 cubic yards of sand each year. This equates to about 10% of the sand on the beach.

Based upon the natural life of the Harrison County sand beach, engineers estimate the beach loses approximately 10% of its newly renourished site in the first year. Thereinafter, it is estimated the beach loses about 100,000 cubic yards per year over the entire beach. A majority of this loss is due to drifting of the sand which is located in the near shore waters adjacent to the beach. City engineers are developing a new report for sand beach erosion but were not completed during this plan update for inclusion. Figure 4.12 (page 109) provides the location of areas subject to coastal and marsh erosion.

The Harrison County Board of Supervisors considers the seawall and the sand beach significant protective infrastructure for residents of Gulfport and Harrison County. The Harrison County Board of Supervisors, through the Sand Beach Authority, is responsible for the maintenance of the sand beach and seawall. County crews are responsible for re-profiling the sand beach after each event. The Harrison County engineer surveys and defines the existing profiles, estimates the approximate loss of sand from each event, and estimates the need for additional sand to meet the required profiles.

Previous Occurrences

Natural hazards can shorten the renourishment time frame and coastal storms significantly erode the sand beach. In the past decade, the following storms had an impact on the sand beach:

- Hurricane Isaac (August 28, 2012) - Hurricane Isaac impacted the city of Gulfport with significant flooding associated with storm surge. Erosion in some locations was significant due to high water and winds.
- Deepwater Horizon Oil Spill (April 20, 2010) - An explosion on a rig caused by a blowout killed 11 crewmen and ignited a fireball visible 35 miles away. The resulting fire could not be extinguished and on 22 April 2010, Deepwater Horizon sank, leaving the well gushing at the seabed, causing the largest offshore oil spill in U.S. history. The resultant oil spill continued until July 15, 2010, when it was temporarily closed by a cap. Relief wells were used to permanently seal the well, which was declared "effectively dead" on September 19, 2010. Approximately 4.9 million gallons was discharged and slowly made its way to the Mississippi Coast line. Coastal erosion assessments are being conducted by the State however the information was not available during this plan update.

- Hurricane Katrina (August 29, 2005) - High tides and tidal surges damaged the profile of the beach, spurring erosion in some locations of the man-made beach. In some locations, the county engineer estimated that 500,000 cubic yards of sand was lost.
- Consistent southeast winds in February 2005 - A series of winter storms in February 2005 over a one week period caused significant wind-borne sand erosion along the beach. Isolated areas of the Harrison County Sand Beach lost sand.
- Hurricane Ivan (October 2004) - Hurricane Ivan moved east from the center of the Gulf of Mexico to make landfall in the Florida Panhandle. Prior to making landfall, high water caused about 53,200 cubic yards of sand to be lost along the Harrison County Sand Beach.
- Hurricane Lili and Tropical Storm Isidore (September 2002) - These tropical systems affected Harrison County within one week of each other in 2002. The county engineer estimated approximately 104,600 cubic yards of sand was lost to wind and water erosion because of these storms.
- Hurricane Georges- High waters pushed by Hurricane Georges wracked the beach for almost eight hours, until the hurricane shifted to the east.

Hurricane Katrina accelerated coastal erosion along the city's bayous and coastally influenced waterways including Gulfport Lake, Brickyard Bayou, Turkey Creek and Bayou Bernard.

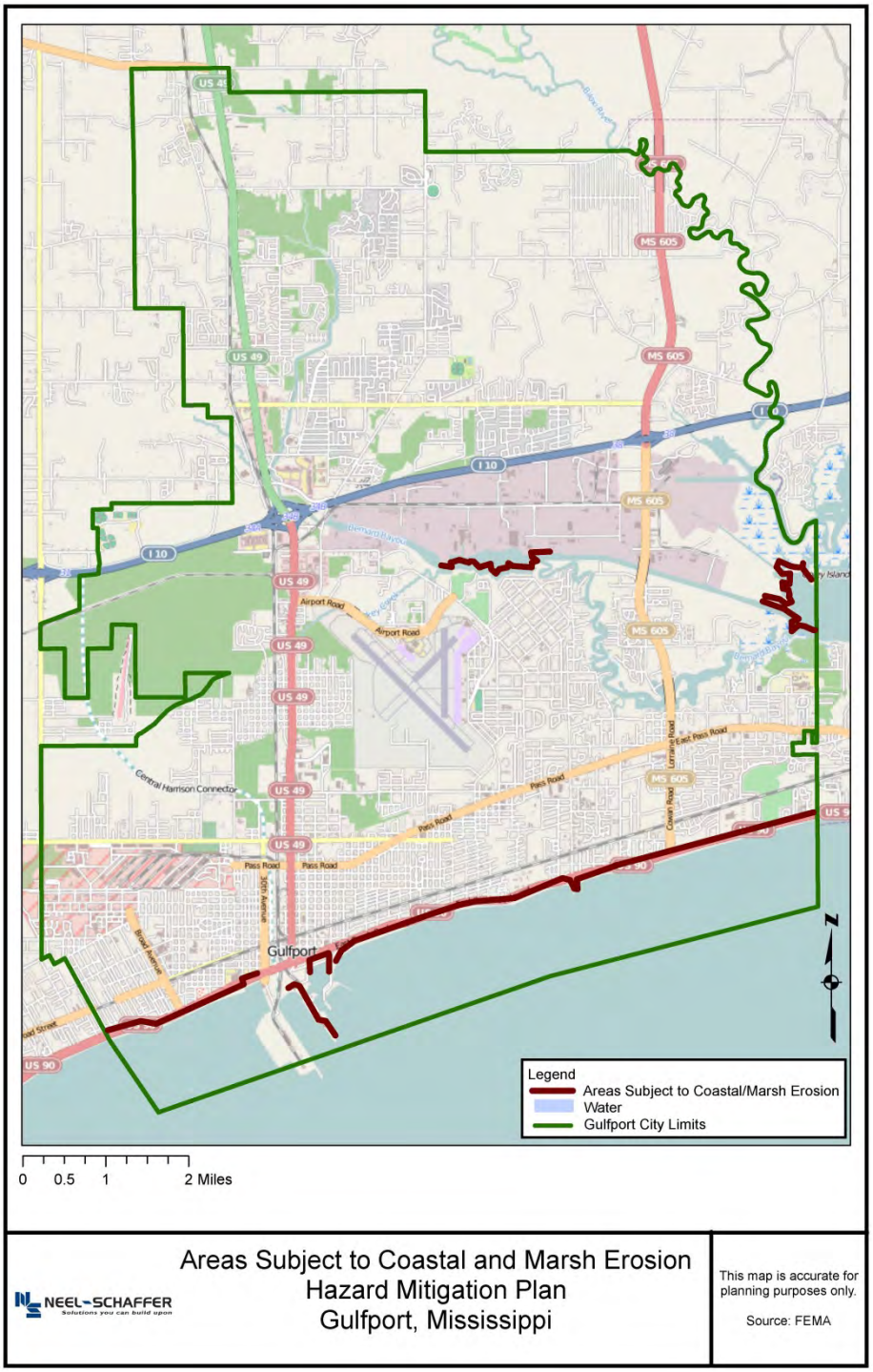
Loss of wetlands and marsh is an important concern, since wetlands may contribute to reducing storm surge associated with hurricanes. It is estimated coastal wetlands within the United States are being lost at a rate of approximately 59,000 acres per year (source NOAA).

Probability of Future Occurrences

The man-made sand beach is subject to minimal coastal erosion from normal tidal activities and moderate to severe erosion from coastal storms and southern winds. The Harrison County Board of Supervisors established policies for daily maintenance of the sand beach to protect the beach protective barrier and for replenishment as part of long-term maintenance and emergency repair. The intent of the sand beach is to protect the seawall and the intent of the seawall is to protect U.S. Highway 90 and upland properties from coastal flooding and erosion. The Harrison County Board of Supervisors is responsible for maintenance of the sand beach and seawall.

Engineers with Harrison County Sand Beach Authority renourish the sand beach annually and, if necessary, follow any significant coastal storms or hurricanes. Based upon data collected, the county can anticipate coastal storms or hurricanes to occur approximately once every three years.

Figure 4.12
Areas Subject to Coast and Marsh Erosion



Vulnerability Assessment

Population: Residents, tourists and business owners who rely on tourism business could be potentially affected by degradation of the sand beach.

Critical Facilities and Essential Services— The Harrison County Board of Supervisors does not allow permanent private structures to be built on the sand beach. Therefore, few structures are subject to coastal erosion. The county does allow supportive structures to be located on the sand beach and these include parking areas, boardwalks, piers, comfort stations, beach huts, pavilions and temporary beach vending facilities. These structures, however, are all public structures. No private establishment is permitted to build a structure on the beach. Neither Harrison County nor the city of Gulfport maintains critical facilities on the sand beach. Therefore, the only critical facility subject to damage from coastal erosion is the sand beach. Infrastructure along the sand beach is limited. The city provides water and wastewater collection to comfort stations located adjacent to U.S. Highway 90.

Transportation System-- U.S. Highway 90 can be impacted by wind-borne erosion from the Harrison County sand beach. During extraordinary high tides and periods of consistent southerly winds, sand can be carried over the seawall and deposited on U.S. Highway 90. No change to U.S. Highway 90 is anticipated.

Lifeline Utility Systems—Utility systems are not prone to being affected by coastal erosion.

4.4.2 Earthquake

Hazard Description

The United States Geologic Survey (USGS) defines an earthquake as a sudden motion or trembling of the earth caused by an abrupt release of stored energy beneath the earth's surface.

In 1935, Charles Richter developed the local magnitude, ML scale for moderate-size (3<ML<7) earthquakes in southern California. The ML scale is often called the "Richter scale" by the press and the public. All current methodologies for measuring earthquake magnitude (ML, duration magnitude mD, surface-wave magnitude MS, teleseismic body-wave magnitude mb, moment magnitude M, etc.) yield results consistent with ML. In fact, most modern methods for measuring magnitude were designed to be consistent with the Richter scale, which is shown in Table 4.28 (below).

Table 4.28
Richter Scale

Magnitude	Earthquake Effects
Less than 3.5	Generally not felt, but recorded.
3.5-5.4	Often felt, but rarely causes damage.
Under 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 greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: United States Geological Survey (USGS)

The Mercalli intensity scale is a seismic scale used for measuring the intensity of an earthquake. It measures the *effects* of an earthquake, and is distinct from the moment magnitude M_w usually reported for an earthquake (sometimes described as the obsolete Richter magnitude), which is a measure of the *energy* released. The intensity of an earthquake is not totally determined by its magnitude.

The scale quantifies the effects of an earthquake on the earth's surface, humans, objects of nature, and man-made structures on a scale from I (not felt) to XII (total destruction) as shown in Table 4.19. Values depend upon the distance to the earthquake, with the highest intensities being around the epicentral area. Data gathered from people who have experienced the quake is used to determine an intensity value for their location. The Mercalli (Intensity) scale originated with the widely-used simple ten-degree Rossi-Forel scale which was revised by Italian vulcanologist, Giuseppe Mercalli in 1884 and 1906.

In 1902 the ten-degree Mercalli scale was expanded to twelve degrees by Italian physicist Adolfo Cancani. It was later completely re-written by the German geophysicist August Heinrich Sieberg and became known as the Mercalli-Cancani-Sieberg (MCS) scale.

The MCS scale was modified and published in 1931 in English by Harry O. Wood and Frank Neumann as the Mercalli-Wood-Neumann (MWN) scale. It was later improved by Charles Richter, the father of the Richter magnitude scale.

The scale is known today as the Modified Mercalli scale or Modified Mercalli Intensity scale (Tables 4.29 and 4.30).

Table 4.29
Intensity Scale

Magnitude	Modified Mercalli Intensity
1.0 – 3.0	I
3.0 – 3.9	II - III
4.0 – 4.9	IV - V
5.0 – 5.9	VI - VII
6.0 – 6.9	VII - IX
7.0 and Higher	VIII or Higher
Source: USGS Earthquake Hazards Program	

Table 4.30
Intensity Definitions

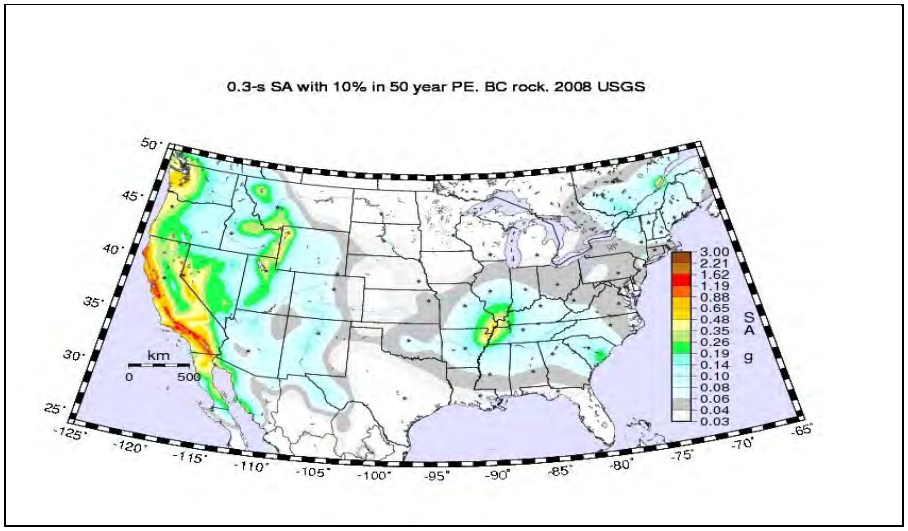
I - Not felt except by a very few under especially favorable conditions.
II - Felt only by a few persons at rest, especially on upper floors of buildings.
III - Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing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

Location and Extent

A belt of mostly seaward-facing normal faults borders the northern Gulf of Mexico in westernmost Florida, southwestern Alabama, southern Mississippi, all of Louisiana, southernmost Arkansas, and eastern and southern Texas (Ewing and Lopez, 1991 #2032). For the purposes of his compilation, the Gulf Coast faults were divided in four large groups because they number in the hundreds. To reflect regional differences in the characteristics of the faults, those in Florida and Alabama were evaluated together in a single group, as were those in Mississippi (described here), those in Louisiana and Arkansas, and those in Texas. Because numerous individual faults are combined into a single group for this compilation, it is not possible to provide digital information about the azimuth, length, and dip of each individual fault. The gulf-margin normal faults in Mississippi are assigned as Class B structures because their low seismicity and because they may be decoupled from underlying crust, making it unclear if they can generate significant seismic ruptures that could cause damaging ground motion. (Source: Wheeler, R.L., compiler, 1998, Fault number 2655, Gulf-margin normal faults, Mississippi, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, http://earthquakes.usgs.gov/hazards/qfaults)

The USGS rates areas of the U.S. for susceptibility to earthquakes based on a 10% probability of a given peak being exceeded in a 50 year period. The city of Gulfport lies in an area of low seismic risk, with a peak acceleration of 1%, which according to the USGS is equivalent to the potential for light shaking with no damage. Figure 4.13 provides an overview of the entire United States and peak ground acceleration. As FEMA guidelines suggest, areas located within a region of 2% peak acceleration or less are at nominal risk; therefore, the Hazard Mitigation Committee considered earthquakes a low ranking hazard.

Figure 4.13
Areas with 10% PE in 50 Years
(Source: USGS 2008)



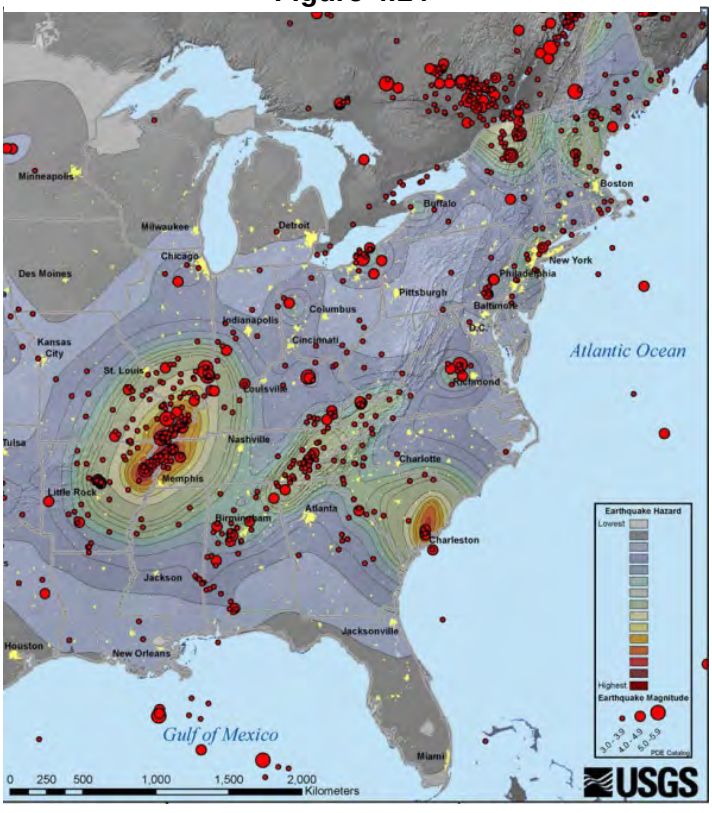
Previous Occurrences

While earthquakes are not believed to pose a great threat to Gulfport, there is some history involving earthquakes within the Gulf Coast area. Although the number of earthquakes known to have centered within Mississippi's boundaries is small, the state was affected by numerous events located in neighboring states. Specific events of record include the 1811 and 1812 series of great earthquakes near the New Madrid, MO area; the earthquakes were felt as far south as the Mississippi Gulf Coast. The New Madrid earthquakes caused the banks of the Mississippi River to cave in as far south as Vicksburg, more than 300 miles from the epicentral region.

The USGS reports the following earthquakes were felt in South Mississippi, including the city of Gulfport. These occurred on February 1, 1955, and on February 9, 2006. The USGS reported the epicenter of the 1955 earthquake was strongly felt by many people along a 30 mile strip of the Mississippi Gulf Coast. In Gulfport, houses shook, windows and dishes rattled and deep rumbling sounds were heard by many (intensity V). The 2006 earthquake was located approximately 125 miles south-southwest of Buras, Louisiana. No damage was reported in Gulfport from either of these earthquakes (source: USGS Earthquake Hazard Program: Earthquake Report).

The Figure 4.14 indicates earthquakes greater than magnitude 3.0 since 1974 plotted on the 2008 USGS National Seismic Hazard Map for the central and eastern United States. Warmer colors on this map indicate areas of higher hazard. Larger earthquakes are represented by larger circles.

Figure 4.14



Probability of Future Occurrences

With the limited history of occurrences of three earthquake events felt in Gulfport over a two hundred year period, the occurrence rate is <1%, making the probability low.

Vulnerability Assessment

Population—The types and numbers of existing and future buildings that may be impacted by earthquakes within the city of Gulfport is not dictated by location, as much as it is by soundness and age of the structure. Earthquakes could have widespread impact across a community and any structure could be at risk. The most likely type of damage anticipated from such an event would be to foundations, walls, and ceilings.

Critical Facilities and Essential Services—Most critical facilities within Gulfport were built to the Southern Standard Building Code or the International Building Code and therefore, not likely to be susceptible to damages from the type of earthquake anticipated on the Mississippi Gulf Coast. Any new additions or buildings built by the city must conform to the International Building Code, Seismic D standards.

Transportation System and Lifeline Utility Systems—Infrastructure may be impacted by earthquake damage. Bridges, including interstate overpasses, may be subject to damage from an earthquake. All bridges would have to be inspected for damages.

Sewer, water and gas lines are underground and might be susceptible to breaks. The city has mitigated much of the potential damaging breaks by installing shut off valves along major infrastructure lines.

Mississippi Power and Coast Electric Power Association maintain offices and service yards in Gulfport and provide electrical services to residents and businesses in the area. Mississippi Power has several significant facilities in Gulfport including Plant Jackson Watson. Coast Electric Power maintains administrative offices and a service yard on Highway 49 near the city's northern limits. CenterPoint Energy (natural gas) also has an office with staff and equipment in Gulfport and constantly monitors their lines for damage.

4.4.3 Sea Level Rise

Hazard Description

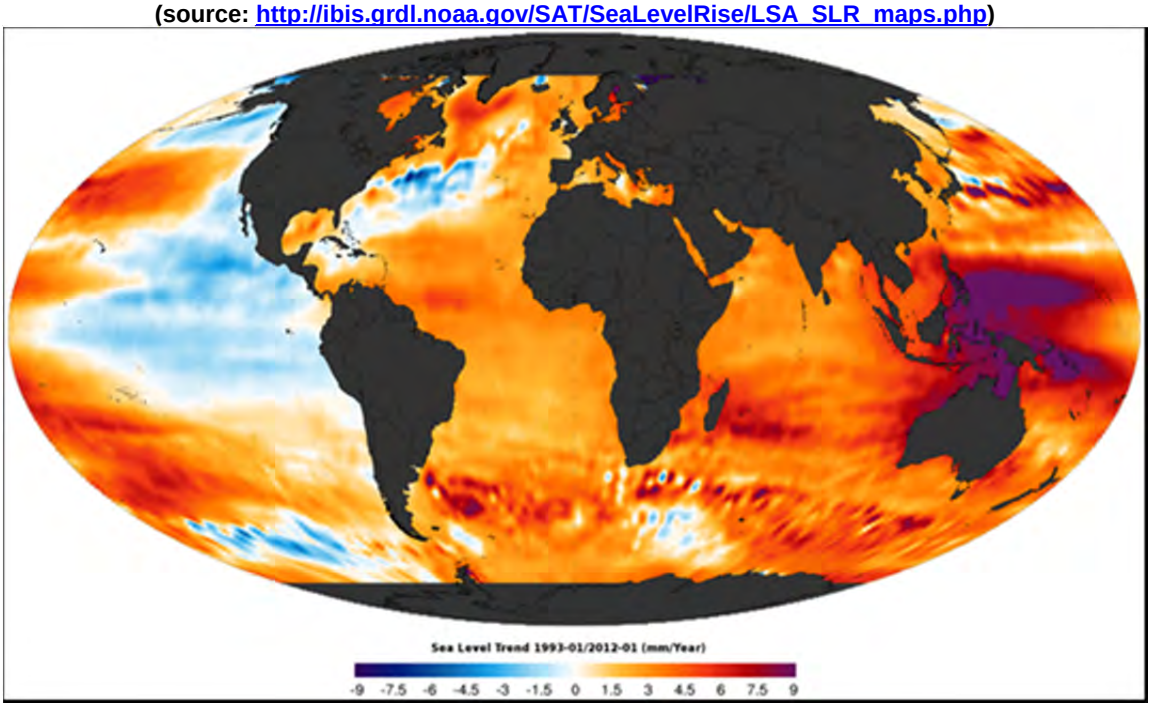
Sea-level rise is a phenomenon that affects coastal and tidal areas and land areas with elevations close to sea level. Land subsidence, caused by the compaction of loose soils such as that found in river delta areas, will affect land elevation. Relative sea-level rise in these areas will be greater.

Location and Extent

The city of Gulfport, with areas adjacent to the shoreline, is at risk to impact from sea level rise. The Mississippi-Alabama Sea Grant Consortium is conducting a study of the Gulf Coast Region to provide useful data that will be incorporated into the next plan update.

Figure 4.15 provides estimates of sea level rise based on measurements from satellite radar altimeters. The local trends were estimated using data from TOPEX/Poseidon (T/P), Jason-1, and Jason-2, which monitored the same ground track since 1992, and were published by NOAA.

Figure 4.15
Sea Level Change, in millimeters per year, 1993-2010
(source: http://ibis.grdl.noaa.gov/SAT/SeaLevelRise/LSA_SLR_maps.php)



As indicated by the color coding on the above map, the Mississippi Coast has experienced sea level changes of 1.5-4.5 millimeters since 1993.

Previous Occurrences

The Intergovernmental Panel on Climate Change (IPCC) concludes there was a global mean rise in sea level between 10 and 25 cm (approximately 4 to 10 inches) over the last 100 years.

NOAA tracks changes in sea level by body of water, such as the Caribbean Sea or the Gulf of Mexico. Therefore, all occurrence data available for this hazard as it relates to the city of Gulfport is at the level of the Gulf of Mexico. Figure 4.16, the most recent data available from NOAA, indicates the change in sea level rise in the Gulf of Mexico from 1992 through 2010.This data indicates an increase in sea level in the Gulf of Mexico of 2.9 mm per year (+/- 4 mm per year).

Figure 4.16
Mean Sea Level – Gulf of Mexico
(Source: NOAA)

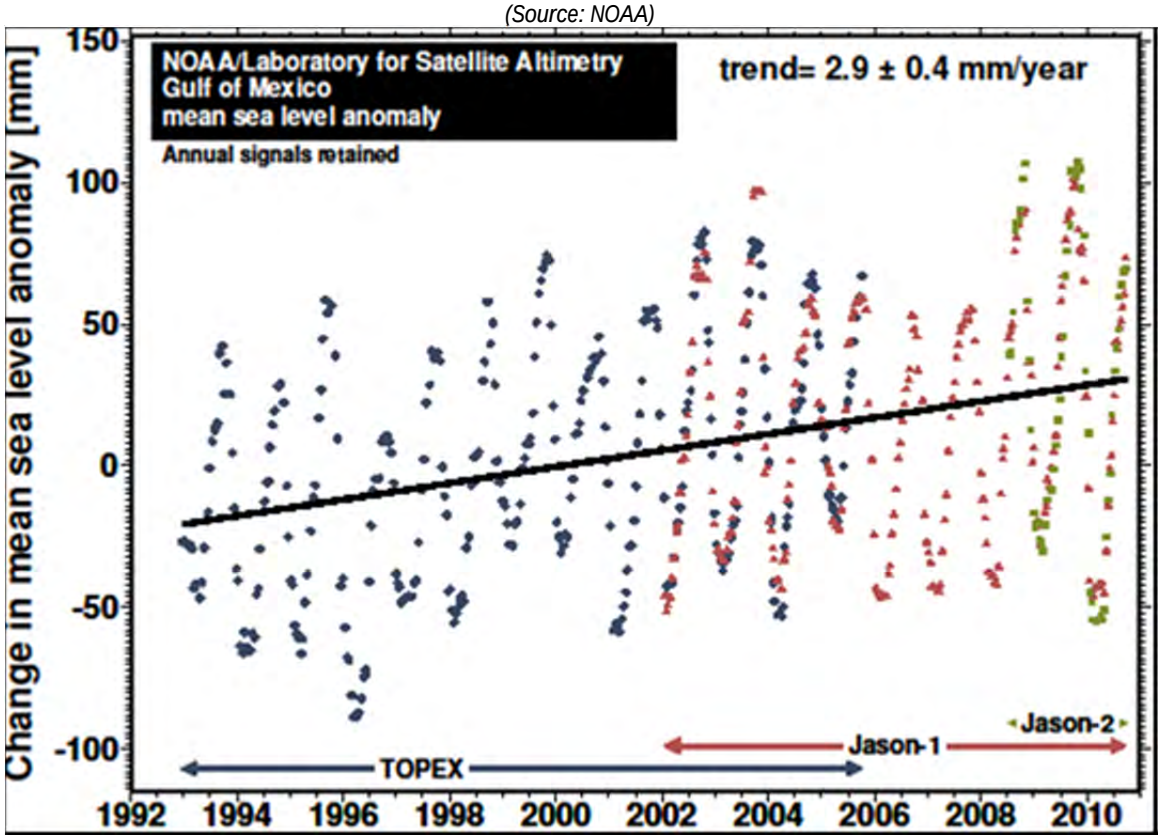
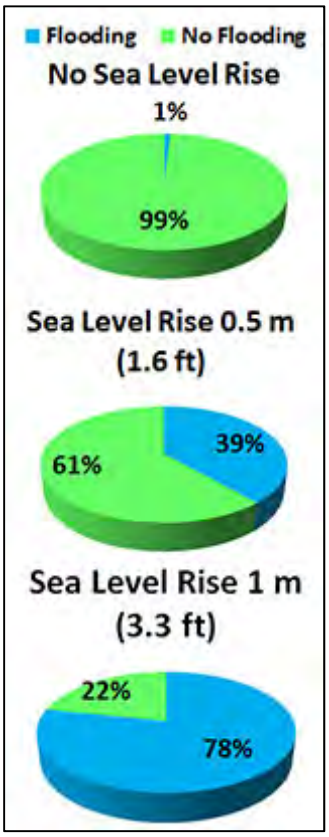


Figure 4.17



NOAA conducted a three year study (October 2007 to September 2010) of observed tides at Mobile, AL (L. Brown, NOAA Co-Op's written Communication, 2010) and provides the following data on the effects minor daily tidal flooding can have on sea level rise

Figure 4.17 - Percent of Time for High Tides with or without flooding during the year:

With no sea level rise (current conditions), only about 1% of time flooding occurs at Mobile, AL. About 1% or less of time, flooding occurs at Waveland, MS, and Pensacola, Panama City, and Apalachicola, FL.

With 0.5 m (1.6 ft.) sea level rise, about 39% of time flooding could occur at Mobile, AL. About 22% to 50% of time flooding could occur at Waveland, MS, and Pensacola, Panama City, and Apalachicola, FL.

With 1 m (3.3 ft.) sea level rise, about 78% of time flooding could occur at Mobile, AL. About 90% to 98% of time flooding could occur at Waveland, MS, and Pensacola, Panama City, and Apalachicola, FL.

Probability

The IPCC estimates global sea level will rise 9 to 88 centimeters during the 21stcentury. For the purposes of this plan update, the Hazard Mitigation Committee determined the sea level rise hazard to be a non-critical hazard pending the results of existing studies being conducted.

Vulnerability Assessment

Population—The entire city of Gulfport can be impacted by the hazard due to the proximity to the Gulf of Mexico and potential salt water intrusion into ground water sources. As coastal population densities increase, greater numbers of people and assets are at risk. Commercial, industrial, and residential properties along the coastline, currently at risk to flooding and storm surge, are also vulnerable to sea level rise. In future years, land use and urban planning in coastal areas must take into account the phenomenon of sea level rise.

Critical Facilities--Port facilities on the water's edge are particularly susceptible to sea level rise. Docks, jetties, and other facilities are deliberately set at an optimal elevation relative to the water level, and therefore a rise in sea level leaves them at a suboptimal elevation. However,

these facilities tend to be rebuilt frequently compared with the time it takes for a substantial rise in sea level.

Rising sea level affects the natural and the human-made environment. Future sea level rise could result in the disappearance of a large percentage of coastal wetlands, already stressed by development and other activities. Saltwater advancing upstream can alter the point at which flocculation leads to sedimentation and the creation of shoals. Storm surges from hurricanes can reach further inland as mean sea levels rise.

Essential Service: As sea level rises, drainage systems become less effective. Rainstorms will potentially cause greater flooding. As the sea level rises, these areas may experience increased flooding and slowed recovery from flood waters. According to the USGS, the most vulnerable structures and systems related to Salt Water Intrusion are water wells. Due to Salt Water Intrusion causing changes in water tables, wells have to be re-drilled thus making the extraction of fresh water more difficult and expensive.

Transportation System: Increased storm surges due to rising sea levels could impact low-lying roadways and inland marshes along the areas south of U.S. Highway 90.

Lifeline Utility Systems: Several critical facilities may be impacted. Storm surge and flooding are factors that could damage these lifeline utility systems. Among these systems are electric utilities, natural gas lines, water and sewer systems, and communications.

There are 86 sewer lift stations within the SFHA and 28 within the 0.2% Annual zone. This does not include water lines or land sanitary sewer lines located within flood districts. Two of the city's water wells are located within the SFHA and eight within the 0.2% district.

4.4.4 Severe Winter Weather

Hazard Description

The National Weather Service defines a winter storm as having three factors: cold air, moisture and lift. These three factors acting together create conditions suitable for a winter storm. Below is a listing of definitions for winter weather events that could impact the Mississippi Gulf Coast:

Snow Flurries: Light snow falling for short durations. No accumulation or light dusting is all that is expected.

SnowShowers: Snow falling at varying intensities for brief periods of time. Some accumulation is possible.

Sleet: Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects. However, it can accumulate like snow and cause a hazard to motorists.

Freezing Rain: Rain that falls onto a surface with a temperature below freezing. This causes it to freeze to surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Even small accumulations of ice can cause a significant hazard.

Wind Chill: The combination of wind and temperature that serves as an estimate of how cold it actually feels to exposed human skin. Wind chill values below -19 degrees are considered dangerous

The National Weather Service issues the following watches and warnings when impacts are suspected.

Winter Storm Warning: Issued when hazardous winter weather in the form of heavy snow, heavy freezing rain, or heavy sleet is imminent or occurring. Winter Storm Warnings are usually issued 12 to 24 hours before the event is expected to begin.

Winter Storm Watch: Alerts the public to the possibility of a blizzard, heavy snow, heavy freezing rain, or heavy sleet. Winter Storm Watches are usually issued 12 to 48 hours before the beginning of a Winter Storm.

Winter Storm Outlook: Issued prior to a Winter Storm Watch. The Outlook is given when forecasters believe winter storm conditions are possible and are usually issued 3 to 5 days in advance of a winter storm.

Wind Chill Warning: Issued when wind chill temperatures are expected to be hazardous to life within several minutes of exposure.

Wind Chill Advisory: Issued when wind chill temperatures are expected to be a significant inconvenience to life with prolonged exposure and, if caution is not exercised, could lead to hazardous exposure.

Winter Weather Advisories: Issued for accumulations of snow, freezing rain, freezing drizzle, and sleet which will cause significant inconveniences and, if caution is not exercised, could lead to life-threatening situations.

Winter storms in the south (including Gulfport) typically consist of light snow (snow flurries with little to no accumulation), freezing rain (rain that falls when ground temperatures are below freezing), or sleet (transparently frozen or partially frozen raindrops).

Location and Extent

Winter storms could have the potential to impact structures and infrastructure throughout the entire city. The city's electrical utility lines are located above ground, and, therefore, subject to falling limbs and are particularly susceptible to damage. Bridges are the most likely to become hazardous. Heat from the ground and the road melt the snow on roadways until accumulations become significant. Bridges do not have this heat source to keep the snow from accumulating.

Past Occurrences

The NCDC indicated two winter-like storms have struck the city of Gulfport since 1969. The most recent winter storm to affect Gulfport was Christmas Day 2004. Approximately one-quarter to one-half inch of frozen precipitation fell across the city, and stayed on the ground for less than 24 hours. It rained, sleeted, and snowed from about 11 a.m. until about 4 p.m.

A low pressure from the Gulf of Mexico produced snow accumulations of one to two inches in Harrison County on December 18, 1996. The snow started about 10 a.m. and ended about 4 p.m. Within the city of Gulfport, snow accumulations were limited to dusting on lawns.

Both events blanketed the entire city with frozen precipitation resulting in accumulation on power lines and trees but not significant enough to cause power outages.

Christmas 2004 snow – Source unknown

Probability of Future Occurrences

Based upon historical winter events within the city, there is a 4% chance each year that a winter storm might impact the city or one chance every ten years that a winter storm event will impact Gulfport. This is based upon the documentation of two winter storm events since 1969 (2 events/46 years) to determine a percentage chance of probability.

It is not unlikely snow and frozen participation will again occur within the city, although the frequency of the event has been slightly less than once a decade.

Vulnerability Assessment

Population: According to the Centers for Disease Control and Prevention, populations most at risk to extreme cold and heat events include the following: 1) the elderly, who are less able to withstand temperature extremes due to their age, health conditions and limited mobility to access shelters; 2) infants and children under 4 years of age; 3) individuals who are physically ill (e.g. heart disease or high blood pressure);, 4) low-income persons that cannot afford proper heating and cooling; and 5) the general public who may overexert during work or exercise during extreme heat events or experience hypothermia during extreme cold events.

Critical Facilities: Damage to larger buildings is not likely to occur; however, frozen pipes and fallen limbs could cause temporary cessation of services.

Essential Service: Essential services are not likely to be significantly impacted by winter storms; however, police and fire services may be compromised if freezing occurs on overpasses. Availability of alternative power sources such as generators, which the city has purchased for most of their critical facilities, will help ensure continuity of emergency services.

Transportation System: Temporary icing of roadways, bridges, and overpasses may occur.

Lifeline Utility Systems: Icing on trees can cause limb breakage that could fall on above ground electrical lines.

4.4.5 Tsunamis

Hazard Description

According to the USGS, tsunamis' are ocean waves caused by large earthquakes and landslides occurring near or under the ocean. Scientists do not use the term "tidal wave" because these waves are not caused by tides. Tsunami waves are unlike typical ocean waves generated by wind and storms. When tsunamis approach shore, they behave like a very fast moving tide that extends far inland. A rule of thumb is if you see the tsunami, it is too late to outrun it. Most tsunamis do not "break" like the curling, wind-generated waves popular with surfers. Even "small" tsunamis (for example, 6 feet in height) are associated with extremely strong currents capable of knocking someone off their feet. Because of complex interactions with the coast, tsunami waves can persist for many hours. As with many natural phenomena, tsunamis range in size from micro-tsunamis detectable only by sensitive instruments on the ocean floor to mega-tsunamis affecting the coastlines of entire oceans, as with the Indian Ocean tsunami of 2004. If you hear a tsunami warning or you feel strong shaking at the coast or very unusual wave activity (e.g., the sea withdrawing far from shore), it is important to move to high ground and stay away from the coast until wave activity has subsided (usually several hours to days).

In historic times, tsunami waves recorded along the Gulf Coast were less than one meter. Some reports are from the 1964 Gulf of Alaska earthquake recorded in Louisiana and Texas and are technically termed a seiche. A seiche is an oscillation of a body of water, typically caused by atmospheric disturbances, but in this case caused by the ground motion from the earthquake. Seiches can also occur in lakes from earthquake movements. There are a couple of early 20th-centutry reports of tsunami waves from Caribbean earthquakes along the Gulf Coast that are difficult to evaluate, but the wave heights all appear to be less than one meter.

Location and Extent

A tsunami would likely affect coastal Gulfport, travel as far as one half mile inland, and cause flooding of inland bays and bayous. Most of the wave action would be limited to the coastline, but flooding could occur as far as one half mile inland.

The Regional Assessment of Tsunami Potential in the Gulf of Mexico provides the following Figure 4.18 to demonstrate the locations of the landslides and their proximity to the Mississippi Gulf Coast.

Figure 4.18

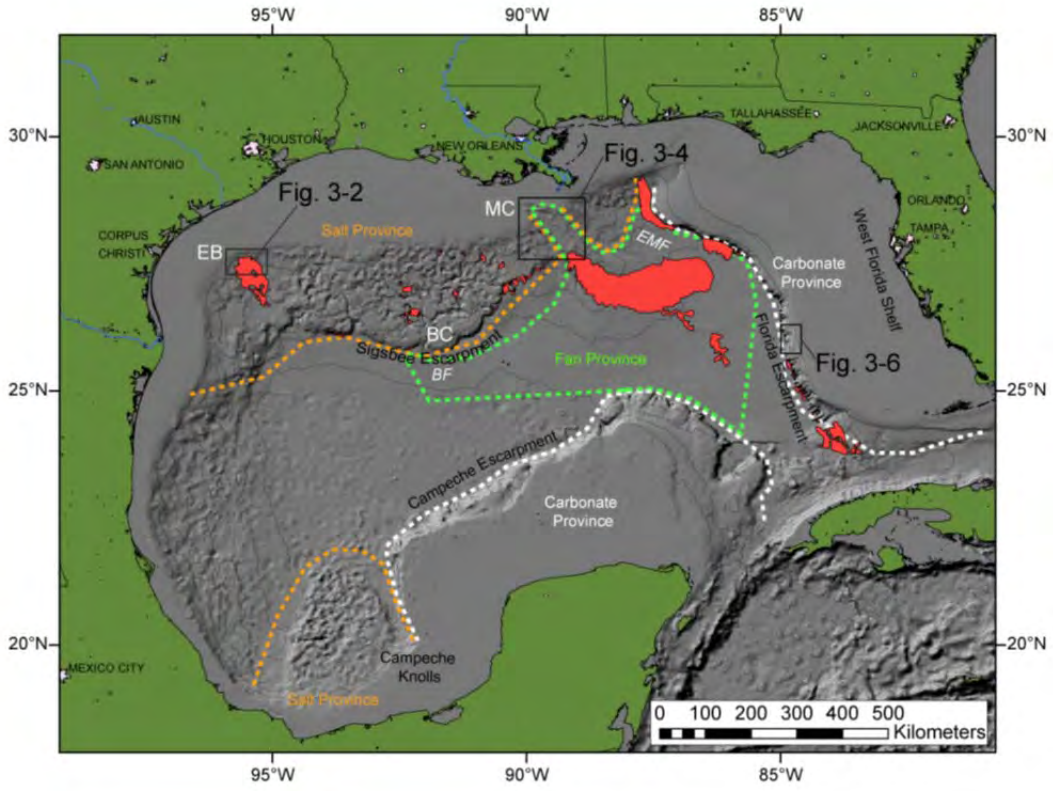


Figure 4.14 Shaded bathymetry of the Gulf of Mexico. Landslide deposits are marked in red. The three primary geologic provinces of the region are highlighted by the dashed lines. EB-East Breaks Landslide, MC-Mississippi Canyon, BC-Bryant Canyon, EMF-East Mississippi Fan, BF-Bryant Fan, MF-Mississippi Fan. Bathymetry derived from Armante and Eakins (2008)

Previous Occurrences

There are recorded occurrences of tsunamis in the Gulf of Mexico. According to the "Regional Assessment of Tsunami Potential in the Gulf of Mexico: U.S. Geological Survey Administrative Report" three recorded tsunami events occurred in the Gulf of Mexico in the past century. Of the recorded events, the highest wave action recorded was near Galveston, TX at .64 meters or just over two feet.

Probability of Future Occurrences

NOAA indicates the risk of tsunami in the Gulf of Mexico is relatively low within this region. However, in September of 2009 the United States Geological Survey (USGS) published the "Regional Assessment of Tsunami Potential in the Gulf of Mexico," which indicates there is *"sufficient evidence to consider submarine landslides in the Gulf of Mexico as a present-day tsunami hazard, as there are clear observations of large landslides along the continental margin of the gulf."* Furthermore, *"the gulf coast of the U.S. is highly vulnerable to tsunami damage*

because major population centers and industrial facilities are located near the shoreline at low-lying elevations."

Vulnerability Assessment

Population: Persons with property located within the high-risk flood areas, as shown in Map 4.10 (page 44), are most vulnerable to flooding caused by a potential tsunami.

Critical Facilities: As previously stated, Gulfport has a total of seven identified city-owned properties within the SFHA and 13 identified buildings within flood zones which have a 0.02% chance of flooding annually (see Map 4.7 page 70). Critical facilities listed in this plan and located within the Advisory Base Flood Elevation area are Fire Station #7 and the Charles Walker Senior Center.

Essential Services: While most of the city-owned buildings are located outside of the flood zones, several are vulnerable due to their proximity to major bodies of water. The following are non-city owned facilities providing essential services and located within the SFHA: Garden Park Medical Center; Carlow Manor Retirement Home; and a kidney dialysis facility.

Transportation Systems: Major roadways, such as U. S. Highway 90 and the southernmost portion of U. S. Highway 49, are subject to coastal storm impacts, such as tsunami and the associated flooding. Some water inundation can also be expected on many other arterials and collector roadways throughout the southern most areas of the city. With extreme events, transportation systems as far as Airport, Creosote and Rippy Roads outside the SHFA also become flooded.

Lifeline Utility Systems: Several critical facilities may be impacted by a potential tsunami. Wind, storm surge, and flooding are factors that could damage these lifeline utility systems. Among these systems are electric utilities, natural gas lines, water and sewer systems, and communications.

Among the existing infrastructure located in the city and within the Advisory Base Flood Elevation areas is the Plant Jack Watson electrical power generating plant. One of the Harrison County wastewater treatment plants is also located within the Advisory Base Flood Elevation area.

There are 86 sewer lift stations within the SFHA and 28 within the 0.2% Annual zone. This does not include water lines or land sanitary sewer lines that may be located within flood districts. Two of the city's water wells are located within the SFHA and eight within the 0.2% district.

4.5 Estimating Potential Losses

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

Loss estimates are based on city-owned facilities and infrastructure, because the city does not have sufficient property values for other public and private-owned facilities. Simple math was used to identify the potential percent of loss that could be experienced and is presented by potential hazard whenever feasible. GIS mapping tools provide a visual account for the location of assets to further identify how these losses could impact the city. Each of the loss calculations is based on the best available data, but should be considered estimates only, as highly detailed engineering studies would be required to produce more accurate information.

Building Ranking

In order to understand more clearly the possible vulnerability of city-owned facilities to future hazards, the Hazard Mitigation Committee looked at each facility and prioritized them based on a series of criteria from Level 1 to Level 5, with Level 1 being the most critical buildings. (The asset lists are provided in subsection 4.1.5 on pages 40 through 45. Property values are provided in Appendix 8.4-F) Table 4.31 lists the methodology and results for building ranking.

Table 4.31
City of Gulfport Building Ranking Methodology

Criticality Level	Description	Number of Buildings	Acquisition Cost
Level 1	Public safety buildings (Police, Fire, public works facilities, shelters) and other buildings that MUST remain operational during a disaster event.	16	$41,005,064
Level 2	Buildings that provide essential government services and must be operational within 12 to 24 hours of a disaster. These facilities include buildings used for response/recovery operations.	6	$5,352,764
Level 3	Buildings that must be functional during recovery operations such as government administrative buildings, courthouses and essential community centers.	16	$15,734,652
Level 4	Buildings that support normal day-to-day activities.	33	$6,559,151
Level 5	Support buildings and facilities that do not meet any of the other criteria such as pole barns, pavilions, piers, and storage sheds.	32	$704,680

4.5.1 Coastal Storm (Hurricane/Tropical Storm/Storm Surge)

Hurricane Wind Damage

Table 4.32
City of Gulfport Facilities and Building Stock
Category 5 Hurricane

Building Type	Number of Buildings Impacted	60% Estimated Loss
Level 1	16	$24,603,038
Level 2	6	$4,082,730
Level 3	16	$9,440,791
Level 4	33	$4,082,730
Level 5	32	$674,423

Storm Surge Damage

To clearly understand the risks and vulnerability to hurricanes, GIS data was used to identify facilities located south of the CSV Railroad track and/or within the Hurricane Katrina surge area. Damage estimates assumed 50% damage would occur from storm surge and winds in the event of a Category 5 storm. Acquisition cost of structures was used as a basis point.

Table 4.33
City of Gulfport Facilities and Building Stock
Category 5 Surge

Building Type	Number of Buildings Impacted	50% Estimated Loss
Level 1	6	$15,138,042
Level 2	4	$2,429,054
Level 3	8	$3,806,007
Level 4	3	$994,492
Level 5	Not Determined	Not Determined

Based on Category 5 Storm Surge Exposure scenario, two water tanks, ten water wells, and 86 lift stations fell within the storm surge exposure area with varying inundation depths.

4.5.2 Flood

The flood risk assessment for the city of Gulfport was developed by identifying facilities located within the .2% annual, A; AE; AO; D; and VE flood zones. The flood zones were intersected with existing critical facilities to determine the areas at risk from this hazard. Damage estimates assumed 20% damage would occur. The DFIRM map is shown on Map 4.5 on page 68.

Table 4.34
City of Gulfport Facilities and Building Stock

Building Type	Number of Buildings Impacted	20% Estimated Loss
Level 1	6	$8,201,013
Level 2	4	$1,070,553
Level 3	8	$3,146,930
Level 4	3	$1,234,451
Level 5	Not Determined	Not Determined

4.5.3 Tornado

To estimate vulnerability in the city of Gulfport, a worst-case tornado scenario was developed assuming an F3 tornado touched down and damaged 100% of the facilities.

Damage estimates were attained by assuming a 50% damage function to building stock throughout the city. This scenario shows one possibility, and is not all-inclusive of the risk to the city of Gulfport. The entire planning area is at an equal risk from potentially devastating effects of tornadoes. The path and strength of future tornadoes will vary.

Table 4.35
City of Gulfport Facilities and Building Stock
EF-3 Tornado

Building Type	Number of Buildings Impacted	50% Estimated Loss
Level 1	16	$20,502,532
Level 2	6	$2,676,382
Level 3	16	$7,867,326
Level 4	33	$3,086,126
Level 5	32	$352,340

Based on the proposed Tornado Exposure scenario, two water tanks, ten water wells, and 86 lift stations fell within the storm surge exposure area with varying inundation depths.

4.6 Analyzing Development Trends

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

Requirement 201.6(c)(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five years in order to continue to be eligible for mitigation project grant funding.

4.6.1 General Development Trends

Most coastal cities, including Gulfport, originally began in proximity to the Mississippi Sound and the rail system. U. S. Highway 90 provided the principal east-west transportation artery. Construction of I-10 opened up land for development in areas further north and Gulfport's land growth pattern began to change. It is expected the land use pattern will continue to change considerably. Availability of land in previously undeveloped areas, as well as cost of wind pool coverage and flood insurance, will greatly affect the residential development pattern.

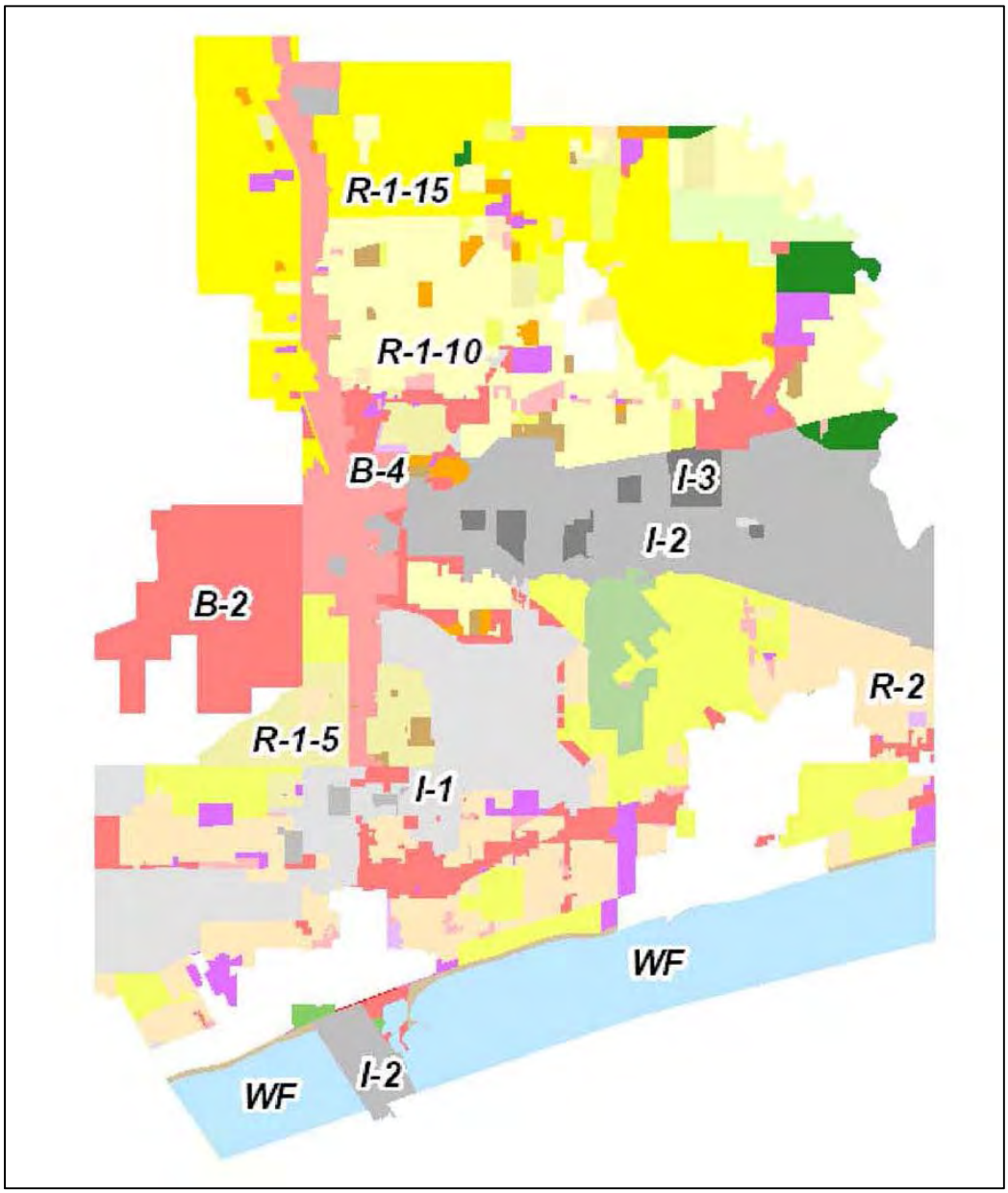
Existing and Future Land Use Maps are typically prepared during the Comprehensive Plan process to accurately map the types of uses and buildings in existence at the time of the survey and to prepare a guideline for what the city believes to be desirable in the future. The Existing Land Use map prepared for the 2002 Comprehensive Plan is included in Appendix 8.4-G. Although this land use survey is somewhat dated, it shows generalized areas where residential, commercial, and industrial uses are located.

A generalized Future Land Use Plan for the city was prepared in August 2012 providing major transportation routes and generalized expected land uses. This map is shown on the subsequent page.

Map 4.11
Future Land Use Map

The type and location of future development will be guided by development regulations such as zoning, environmental constrains, availability of infrastructure and land costs. While the Future Land Use map provides guidance, the Gulfport Official Zoning Map is part of the Zoning Ordinance and must be compliant in terms of land use, bulk regulations and other restrictions applicable to specific zoning districts. The 2007 Zoning Map for the city is shown below.

Map 4.13
Zoning Map



4.6.2 Land Available for Development

In 2000, approximately 38.5% of the total land area in the city of Gulfport was classified as undeveloped land. This figure does not include areas within waterways, the sand beach, or mineral extraction areas. The percentage of vacant land increased slightly in 2005 as structures were destroyed or removed. While this may seem like a large area, much of this land may contain sensitive environmental features, such as the revised 100-year and coastal flood zones, wetlands, or land otherwise unsuitable for development.

4.6.3 Population Growth

Population growth is an indicator of development trends. The last two decennial census counts in 2000 and 2010 indicate Gulfport experienced a 4.92% population loss during that 10 year period. The aftereffects of Hurricane Katrina essentially halted the previous trend of upward growth.

As shown in Table 3.1 in Chapter 3 Community Profile, the city experienced steady growth in the past with the decade between 1990 and 2000 showing a 42.7% increase. During this period the city annexed land contributing to this growth pattern.

Coastal areas including Gulfport are slowly returning to pre-Katrina conditions as new housing and employment centers are built. Slow but steady growth is predicted for the immediate future.

4.6.4 Land Use and Growth

The 2002 Comprehensive Plan documented existing land use patterns within the city and in a planning area located outside the city, plus the plan projected growth patterns to the year 2025. The plan estimated approximately 325 acres per year would be consumed by new development within Gulfport and would reach build-out by 2025. The plan also projected population for year 2010 would be 85,803 people. Obviously this was a very generous projection and not realized due to various factors including the Katrina event and subsequent economic downturns.

The Census Bureau's annual estimate of population shown in Table 4.36 shows population estimates from 2005 through 2012.

Table 4.36
Population Estimates 2005 - 2012

Year	Population	Percentage change from Previous Year Estimate
2005	73,299	
2006	67,597	-8.44%
2007	68,977	2.0%
2008	70,433	2.07%
2009	70,794	0.51%
*2010	68,060	-4.02%
2011	69,220	1.68%
2012	67793	-2.10%

**2010 Estimate of Population*
Source: U. S. Census Bureau

4.6.5 Housing Trends

According to the U. S. Census, building permits were issued for 795 residential buildings between 2007 and 2011. This represents 1610 housing units. Although permits were issued, this does not necessarily indicate the structure was built.

Table 4.37
Residential Building Permits Issued 2007 - 2011

Type of Housing	Buildings	Units	Construction cost
Single Family	719	719	$122,279,064
Two Family	14	26	$1,560,000
Three and Four Family	12	45	$5,274,862
Five or More Family	50	820	$61,899,000
Total	795	1610	$191,012,926

Source: U. S. Census Bureau

4.6.6 Specific Development Types and Areas

As the Future Land Use Map indicates, commercial areas are concentrated along major arterials such as U. S. Highway 90 and State Highway 49, as well as at exit points along I-10. Gaming facilities, small footprint commercial, motels, multi-family and institutional uses are located on or near the beach, with the downtown core area bringing together a mix of uses. The downtown area was largely restored and offers an opportunity for offices, banks, retail and residential uses on non-ground floors.

It is expected new construction of single-family residential land uses will continue to move northward with the availability of raw land offering the opportunity for larger lots and homes. These areas are also far enough removed from the waterfront to lessen the chances of damage from storm surge. Supportive commercial and service development will continue to evolve in the northern reaches of Gulfport to provide services and products for new residential development.

4.7 Technological, Health-Related and Man-Made Hazards

The 2007 plan included terrorism threat, hazardous material spill, pandemic and West Nile Virus plus natural hazards prone to the city of Gulfport. While reviewing the plan for the 2013 update, the Hazard Mitigation Committee elected to restructure these events into more appropriate categories, identified below. These hazards are referenced in this plan to allow for integration into other existing and future plans/studies. As with natural hazards, the information presented under these categories is based on best available data. The Hazard Mitigation Committee did not rank these hazards because data and knowledge of impacts is too limited to accurately define them. In general, they are considered as threats and relevant information is presented as appropriate to this plan update.

Technological Hazards: Include hazardous material incidents for transportation and fixed site locations.

Health-Related Hazards: Include pandemic and West Nile Virus

Man-Made Hazards: The information presented in the 2007 plan (Appendix A) for terrorism threat was brought forward into this plan update.

4.7.1 Technological Hazards

Transportation-Related Hazardous Material Incidents

Hazard Description

The location of the transportation hazard is best described as proximity to transportation corridors, be it railways or highways. For this plan update, the proximity used for analysis purposes was a half mile buffer zone around major transportation corridors. An analysis of all modes of transportation revealed rail and roadway transportation modes pose risks to the health, safety and welfare of citizens, as well as visitors or those traveling to and through the city. The level of risk and impact of hazards vary depending on conditions, such as location, time and size of the incident, direction of wind, and other factors. Hazardous materials related events seem to be more of a human-life issue than a property-damage issue, although some incidents could result in significant property damage.

Due to the large number and wide variety of hazardous material transportation corridors in the community, it is difficult to identify areas and populations vulnerable to the hazard. There are simply too many determinant factors of vulnerability.

Two rail lines, CSX and KCS, run through the Gulfport corporate limits from east/west and north/south directions. Both carry, among other things, large volumes of toxic chemicals and hazardous materials. By virtue of the fact that over 10,000 rail cars annually carry toxic chemicals or hazardous materials on the CSX Railroad, the track is designated a “key route” by

Federal railroad authorities. This designation requires daily track inspection and the highest level of regulation. The CSX Railroad runs 20 to 30 trains per day through Gulfport ranging from a mile to a mile and a half in length with speeds not exceeding 45 mph. The greatest risk of an incident is a derailment or damage to rail cars caused at a crossing accident involving motor vehicles.

Assessing Vulnerabilities

Location, magnitude, type of problem, wind velocity and direction, and weather conditions vary with each incident, thus making assessment of vulnerability difficult at best. For identification purposes, the rail line and roadway impacts are discussed in general terms.

In the case of an accident on the CSX or KCS Railroad, population and areas within a half mile on either side of the railroad are most vulnerable to hazardous materials. The number of cars involved in the accident, volume and type of materials carried, wind direction and velocity, and atmospheric conditions will dictate with more specificity vulnerable areas and the resultant need for evacuation or other actions.

Heavy trucks carrying hazardous chemicals on U.S. Highway 49 and 90 or I-10 pose the greatest risk to areas and populations within a half mile of the highway system. Variables, such as atmospheric conditions, wind direction and velocity, and type of chemical, will dictate with more specificity, vulnerable areas and populations

Previous Occurrences

According to the National Transportation Safety Board there were no reported hazardous materials incidents along the transportation corridors in the city of Gulfport.

Probability of Future Occurrences

Based upon the lack of previous occurrences of hazardous materials incidents along major transportation corridors within Gulfport, the likely hood of future occurrence is low. Although the probability of occurrence is low, due to the unpredictable nature of the hazard, the Hazard Mitigation Committee considers this a critical incident.

Hazardous Material Spill Incidents

Hazard Description

Hazardous materials are likely to be transported by truck or rail into, out of and through the city of Gulfport. Additionally, businesses and industries within Gulfport sell, manufacture, and utilize hazardous materials. The region is also fighting a growing number of methamphetamine labs using hazardous chemicals while making illegal drugs. In fact, city emergency responders evacuated and contained an anhydrous ammonia leak after people tried to access this material illegally from a legitimate business. The cloud formed from the leak caused a roadway closure, and several businesses and neighborhoods to be evacuated.

The U.S. EPA has a publicly-accessible Toxic Release Inventory (TRI) database containing information on disposal and other releases of over 650 toxic chemicals from more than 20,000 U.S. industrial facilities.

The goal of TRI is to provide communities with information about toxic chemical releases, waste management activities, and support informed decision-making by industry, government, non-government organizations and the public.

TRI provides the following:

- TRI covers an important subset of toxic chemicals managed at U.S. facilities, but TRI doesn't cover all chemicals or facilities.
- TRI data reflects annual emissions and doesn't indicate the frequency or duration of the emissions.
- Quantities reported by TRI facilities reflect chemicals released into the air and water and chemicals managed through recycling, energy recovery, treatment and disposal.
- The level of toxicity varies among the chemicals on the TRI list.
- TRI doesn't include information about public exposure to chemicals.
- TRI facility operations and releases are regulated under other EPA programs with requirements designed to limit human and environmental harm.

Location – Transportation Routes and Facilities

Hazardous material spills within the city of Gulfport are likely to occur in several locations. These include:

- Interstate 10
- U.S. Highway 49
- U.S. Highway 90
- Canal Road
- Lorraine Road
- Along CSX and KCS Rail Lines
- Seaway Road
- 34th Street

The city of Gulfport is home to numerous hazardous material suppliers/users. For planning purposes, a general identification (not a comprehensive list) of these facilities is provided in Tables 4.38 to 4.40 along with a complete listing of EPA regulated facilities in Appendix 8.4-B. Figure 4.17, to the right, provides a general location of the EPA regulated facilities within Gulfport.

Figure 4.17 – EPA Regulated Facility Map

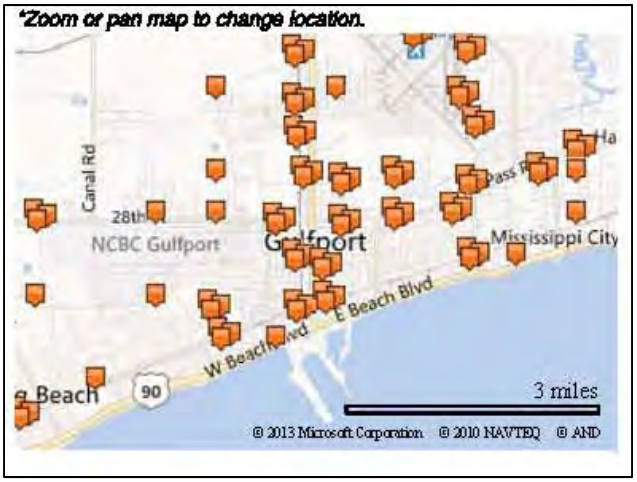


Table 4.38
EPA TRI Facilities

Tabor Extrusions LLC	Ingalls Shipbuilding – Gulfport Operations
Channel Chemical Corp	Gulf Ship LLC
Hydro Carbide Inc	Seemann Composites Inc.
Superior Asphalt – Gulfport Plant	Hartson Kennedy Cabinet Top Co.
United States Marine Inc	Mississippi Power Company – Plant Watson

Table 4.39
Manufacturing Facilities

Thermo-King	Struthers Industries	Masonite Corporation
Industrial Corrosion Control Inc.	Anchor Glass	Future Pipe Industries
Gulf States Ready-Mix	Keith Huber Inc.	McElroy Machine and Manufacturing
Team South Inc.	Reichhold Inc.	Avondale
Roy Anderson	Northrup Grumman	Treated Materials
J. Ray McDermott	Sunbelt Chemicals	Hewchem

Table 4.40
General Facilities

Gas stations	Hospitals/medical supply	Dry cleaners
Automobile dealers/repair and body shops	Heavy equipment dealers/repair shops	Building supply centers
Print shops	Commercial laundry services	Food/beverage facilities
Aviation facilities	Machine/welding facilities	Military installations
Trucking facilities		

Past Occurrences

The 2007 plan references a hazardous material spill wherein city responders found a tank of anhydrous ammonia leaking after a burglary attempt. The criminal action caused a chemical cloud to form and travel over a localized area. Emergency response actions included closing a major thoroughfare, evacuating several businesses and a neighborhood. The cost of the criminal action and ensuing emergency response actions cost several hundred thousand dollars.

The Gulfport Fire Department responded to numerous hazardous materials, chemical leaks, gasoline or fuel spills, or vehicle gas leak calls within the city. Detailed incident call reports are provided in Appendix 8.4-E.

Within the last 5 years the EPA issued four orders to regulated entities in Gulfport as shown in Table 4.41. (Full reports are provided in Appendix 8.4-H)

Table 4.41
U.E. EPA Enforcement and Compliance History Online (ECHO)
2009 to 2013

Company and Location	Incident Summary
Channel Chemical Company 14373 Seaway Road	March 15, 2013 – Emergency Planning and Community Right-to-Know Act (EPCRA) violation. Release of phosphoric acid above the reportable quantity that was not reported. Total penalty $8,850.
Superior Asphalt, Inc. Goldin Lane	August 31, 2010 – Emergency Planning and Community Right-to-Know Act (EPCRA) violation. Failed to submitted completed emergency and hazardous chemical inventory forms for asphalt cements, asphalt cements (tack), diesel fuel oil, diesel fuel oil (#4) and lime to the SERC, LEPC and Fire Department for the years of 2006, 2007 and 2008. Total penalty $57,600
Robbins Association/Irrigationmart, Inc. Hwy 90 and 30th Avenue	January 26, 2010 – Federal Insecticide, Fungicide, and Rodenticide (FIFRA) violation. Received tomato stakes treated with chromated cooper arsenate (CCA) and failed to register the stakes as a pesticide with the administrator prior to sale or distribution. Total penality $12,750.
Channel Chemical Company 14373 Seaway Road	March 30, 2009 – Emergency Planning and Community Right-to-Know Act (EPCRA) violation. Failed to submit a completed emergency and hazard chemical inventory form for anhydrous ammonia to the SERC, LEPC and fire department for the years of 2005 and 2007. Total penalty $17,000
Source: www.epa-echo.gov	

Since January 2011, the Mississippi Department of Environmental Quality (MDEQ) issued nine orders to regulated entities in Gulfport as shown in Table 4.42.

Table 4.42
MDEQ Commission Orders
January 2011 to April 2013

Agency	Issue Date	Order Type	Order Number
GCP Laboratories	November 30, 2012	Environmental Compliance and Enforcement Division	619812
Florence Gardens Subdivision	November 13, 2012	Environmental Compliance and Enforcement Division	619212
Trinity Yachts, LLC	May 21, 2012	Environmental Compliance and Enforcement Division	612012
Kansas City Southern Railway Company	May 7, 2012	Environmental Compliance and Enforcement Division	Not Available
Williams Paving Company	August 8, 2011	Environmental Compliance and Enforcement Division	600011
Bond Paving Company Inc.	June 21, 2011	Environmental Compliance and Enforcement Division	598611
Cavenham Forest Industries, LLC	June 15, 2011	Environmental Compliance and Enforcement Division	598211
GCP Laboratories	June 6, 2011	Environmental Compliance and Enforcement Division	597611
Harrison County Solid Waste Management Plan	April 28, 2011	Environmental Compliance and Enforcement Division	595511

Source: http://opc.deq.state.ms.us/report_orders

The U.S. EPA, through the Toxic Release Inventory, indicated there were eight actions or reports taken against businesses within the city of Gulfport since 2001. These actions included minor air releases, formal enforcement actions, and are presented in Table 4.43.

Table 4.43
EPA Toxic Release Inventory
2001 to 2006

Agency/Location	Date	Incident
Agency Unknown 25th Street/ 34th Street	November 15, 2006	Minor air release
Agencies Unknown Seaway Road Area	November 15, 2006	Minor air release
	November 15, 2006	Major Air Release
	June 23, 2005	Formal Enforcement Action
	February 06, 2002	Formal Enforcement Action
	September 19, 2001	Formal Enforcement Action
	August 31, 2001	Formal Enforcement Action
	August 23, 2001	Formal Enforcement Action

Source: 2007 city of Gulfport Hazard Mitigation Plan

As of 2011, Mississippi had a total of 300 TRI facilities and currently ranks 19th in the country for releases/transfers reported. During this timeframe, Gulfport accounted for 9.13% of the state's facilities for total TRI releases/transfers, but was as low as 1.96% in 2009. Table 4.44 provides TRI summary reports from 2007 to 2012. Mississippi Power Company contributes the most total releases and transfers in Gulfport. Detailed TRI reports are provided in Appendix 8.4-I.

Table 4.44
Summary of TRI Information for Gulfport
2007-2012

	2011	2010	2009	2008	2007
No. of TRI Facilities	9	10	10	6	8
On-Site Releases:					
Air	4,521,256 lbs	2,802,565 lbs	556,864 lbs	2,190,795 lbs	1,515,802 lbs
Water	2,966 lbs	2,446 lbs	1,668 lbs	5,998 lbs	5,998 lbs
Land	613,939 lbs	593,342 lbs	475,189 lbs	859,760 lbs	726,912 lbs
Total On-Site Releases[1]	5,138,161 lbs	3,398,352 lbs	1,033,721 lbs	3,056,553 lbs	2,248,712 lbs
Total Off-Site Transfers[2]	6,615 lbs	6,558 lbs	2,513 lbs	0 lbs	0 lbs

Source: www.epa.gov/triexplorer/tri_factsheet

[1]On-site disposal or other releases include emissions to the air, discharges to bodies of water, disposal at the facility to land, and disposal in underground injection wells. Disposal or other releases are reported to TRI by media type. On-site disposal or other releases are reported in Section 5 of the TRI Form R

[2]An off-site disposal or other release is a discharge of a toxic chemical to the environment that occurs as a result of a facility's transferring a waste containing a TRI chemical off-site for disposal or other release, as reported in Section 6 of the TRI Form R. Certain other types of transfers are also categorized as off-site disposal or other release because, except for location, the outcome of transferring the chemical off-site is the same as disposing of it or releasing it on-site. For each transfer, the amount of the chemical in the waste, type of management activity (chosen from a list of codes referred to as "M" codes) undertaken by the receiving facility, and the address of the receiving site is reported.

Probability of Future Occurrences

Based upon past occurrences, it is anticipated there will be calls for assistance related to hazardous materials spills within the city of Gulfport each year.

Vulnerability Assessment

Population: Persons with property located within a half mile buffer of a hazard material incident are most vulnerable to exposure. First responders are also at risk while containing the spill; however, safety equipment is required to prevent exposure.

Critical Facilities: Critical facilities and infrastructure within a half mile buffer are likely to be affected by a hazardous material incident. Equipment used for containment of the spill could be impacted but safety protocols are followed to reduce/eliminate unnecessary accidents.

Transportation Systems: Transportation systems are one of the most likely assets to be affected by a hazardous spill. An incident on Interstate 10, U.S. Highway 90 or U.S. Highway 49 could cause deaths, injuries, property damage, and traffic route disruptions. The significance could mean rerouting traffic along Interstate 10, with 45,000 vehicles traveling per day, and on U.S. Highway 49 near Swan, with 53,000 vehicles traveling per day.

Rail lines could also be affected by a hazardous spill resulting in very serious implications. The city's north and south bound rail lines serve the Port of Gulfport. A hazardous spill on this line could stop all rail transport into the Port until the spill is contained and removed. The east and west bound lines through Gulfport are the main rail transport lines between New Orleans and Jacksonville, and is heavily trafficked. Spill and ensuing closure of this line could cause a major inconvenience for rail transport.

Lifeline Utility Systems: Lifeline Utility Systems may be affected by hazardous materials spill and include the city's storm water systems, wastewater system or water systems. The city's storm water system may be contaminated by materials from the spill in the immediate aftermath of the spill. Leakage could be transported to the storm sewer system or the city's wastewater system until responders are able to contain the spill.

Estimating Potential Losses

Estimates of potential losses caused by hazardous spills are very difficult to determine.

4.7.2 Health-Related Hazards

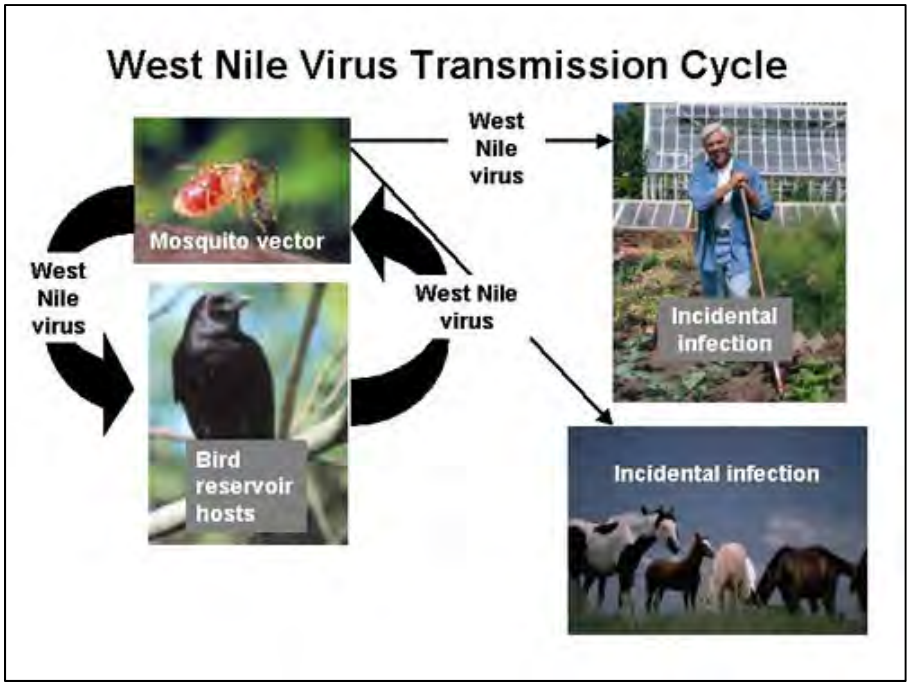
West Nile Virus

Hazard Description

West Nile Virus is one of several viruses spread by a bite from the Southern House Mosquito, Culex quinquefasciatus. The Mississippi State Department of Health determined "Since West Nile Virus has been shown to survive and multiply in several mosquitoes native to Mississippi; it is assumed West Nile Virus will be permanently established in Mississippi."

The virus can manifest in humans as either West Nile Fever or West Nile Meningoencephalitis. West Nile Fever is a severe flu-like illness affecting any age group, but is not likely to cause death. West Nile Meningoencephalitis is more severe and people can develop encephalitis or meningitis or both. The illness may cause long-term physical and cognitive impairments. And while infection does not always result from the illness, as many as 10% of the people infected with West Nile Virus can die. Figure 4.17 demonstrates the West Nile Virus Transmission Cycle.

Figure 4.17



The West Nile virus maintains itself in nature by cycling between mosquitoes and certain species of birds. A mosquito (the vector) bites an uninfected bird (the host), the virus amplifies within the bird, an uninfected mosquito bites the bird and is in turn infected. Other species such as humans and horses are incidental infections, as they are not the mosquitoes' preferred blood meal source. The virus does not amplify within these species and they are known as dead-end hosts.

Location and Extent

West Nile Virus could affect all of the Mississippi Gulf Coast. Information provided by the Mississippi State Department of Health indicates mosquitoes that tend to transmit West Nile Virus breed and lay eggs in water, catch basins, storage containers, and stagnant drainage areas. They lean toward stagnant water with organic debris, such as decaying plants, human, or animal wastes. Wet weather and unkempt areas with debris holding water contribute to the breeding of mosquitoes carrying West Nile Virus.

Areas are at greatest risk for the spread of the West Nile Virus during the summer months, particularly, July and August. Infection by the West Nile Virus usually causes mild, flu-like symptoms; however, in some cases, encephalitis can result in serious illness and death

Past Occurrence

Table 4.45 provides information on reported cases of West Nile Virus from 2002 through 2012.

Table 4.45
Reported Cases of West Nile Virus Harrison County
2002-2012

Year	Number of Reported Cases MS	Number of Reported Cases Harrison County	Number of Fatalities State of MS	Number of Fatalities Harrison County
2002	N/A	4	N/A	N/A
2003	N/A	17	N/A	N/A
2004	N/A	2	N/A	N/A
2005	N/A	N/A	N/A	N/A
2006	183	12	12	0
2007	136	6	4	0
2008	65	0	3	0
2009	53	7	5	0
2010	8	0	0	0
2011	52	0	0	0
2012	234	2	1	1

Note: N/A represents data not available for the identified year and location
Source: Centers for Disease Control and Prevention

Probability of Future Occurrences

With data available for occurrences of the West Nile Virus, 50 cases have been reported since 2002 making the probability of occurrence five cases per year on average; thus yielding a 100% probability of occurrence. Although the probability of occurrence was noted as high, for the purposes of this plan update the Planning Committee determined the hazard to be non-critical.

Pandemic Influenza

Hazard Description

The Center for Disease Control and Prevention (CDC) defines a pandemic as an epidemic occurring worldwide or over a very wide area, crossing international boundaries, and usually affecting a large number of people.

A pandemic influenza (PI) represents a public health emergency impacting all sectors of society. Its occurrence is also unique because it is considered inevitable. A PI occurs when a significant antigenic drift, or shift, occurs in an influenza virus, resulting in a novel strain spreading efficiently from person-to-person, to which the population has not been exposed and there is no underlying immunity. The severity of a PI event is generally variable and unpredictable. There were four PI events in the past century: 1918, 1957, 1968 and 2009. The PI event of 1918 is considered to be one of the most severe disease events in known history.

A large number of influenza cases will increase the burden to hospitals and other healthcare infrastructure. Morbidity and mortality may disproportionately impact younger and healthier people (as was experienced in 1918) and will reduce the availability of workers due to worker illness or workers caring for those who are ill. Limitation of social interactions will decrease opportunities for disease transmission. This and other mitigation strategies will likely create additional burdens upon the productivity and availability of the workforce.

Medical countermeasures emphasize prevention of influenza through immunization and targeted use of appropriate antivirals for treatment and limited use as prophylaxis for exposed high-risk populations. The anticipated time for vaccine development can be up to six months. Additional lag times associated with the development and availability of the vaccine in sufficient quantities for the total population must also be anticipated. Antivirals may be of limited value as resistance to these drugs has been noted in many previous seasonal and novel influenza cases.

Pandemic Influenza particularly “Bird Flu” and H1N1 are presented in this plan update.

H5N1 Virus or Avian Flu

The U.S. Department of Health and Human Services defines pandemic flu as a virulent flu causing a global outbreak, or pandemic, of serious illness. Because there is little natural immunity, the disease can spread easily from person to person. Currently, there is no pandemic flu. However, both the World Health Organization and the U.S. Department of Health and Human Services have indicated H5N1 Virus or Avian Flu may be a candidate.

Avian Flu is defined by the U.S. Department of Health and Human Services as “an influenza virus that occurs naturally among wild birds. The H5N1 variant is deadly to domestic fowl and can be transmitted from birds to humans. There is no human immunity and no vaccine is available.”

H1N1 Virus or Swine Flu

Swine Influenza (swine flu) is a respiratory disease of pigs caused by type A influenza virus regularly causing outbreaks of influenza in pigs. Swine flu viruses can cause high levels of illness in pig herds, but cause few deaths in pigs. Swine influenza viruses can circulate among swine throughout the year, but most outbreaks occur during the late fall and winter months similar to outbreaks of seasonal influenza in humans. The main swine flu viruses circulating in U.S. pigs in recent years are: swine triple reassortant (tr) H1N1, trH3N2 and trH1N2. With the exception of the 2009 H1N1 virus, influenza viruses that circulate in swine are very different from influenza viruses commonly circulating in people.

Location and Extent

A pandemic flu outbreak has the potential to affect the entire country. Communities along the Mississippi Gulf Coast would likely not be immune to the disease. With the interconnectedness of the country it is not reasonable to think any one location would be free from the threat of the pandemic. Locations within the city of Gulfport with high population concentrations, such as schools, casinos and retail locations are at the greatest risk of the pandemic hazard. Figure 4.18 on the subsequent page

Past Occurrence

There were three major flu outbreaks in the United States. In 1918, more than 500,000 people in the United States died from the flu. A second outbreak in 1957 led to the death of 70,000 people and third flu outbreak in 1968 led to 34,000 deaths. It was believed in each of these flu pandemics approximately 30% of the population of the United States developed the flu and about 50% of those people sought medical care.

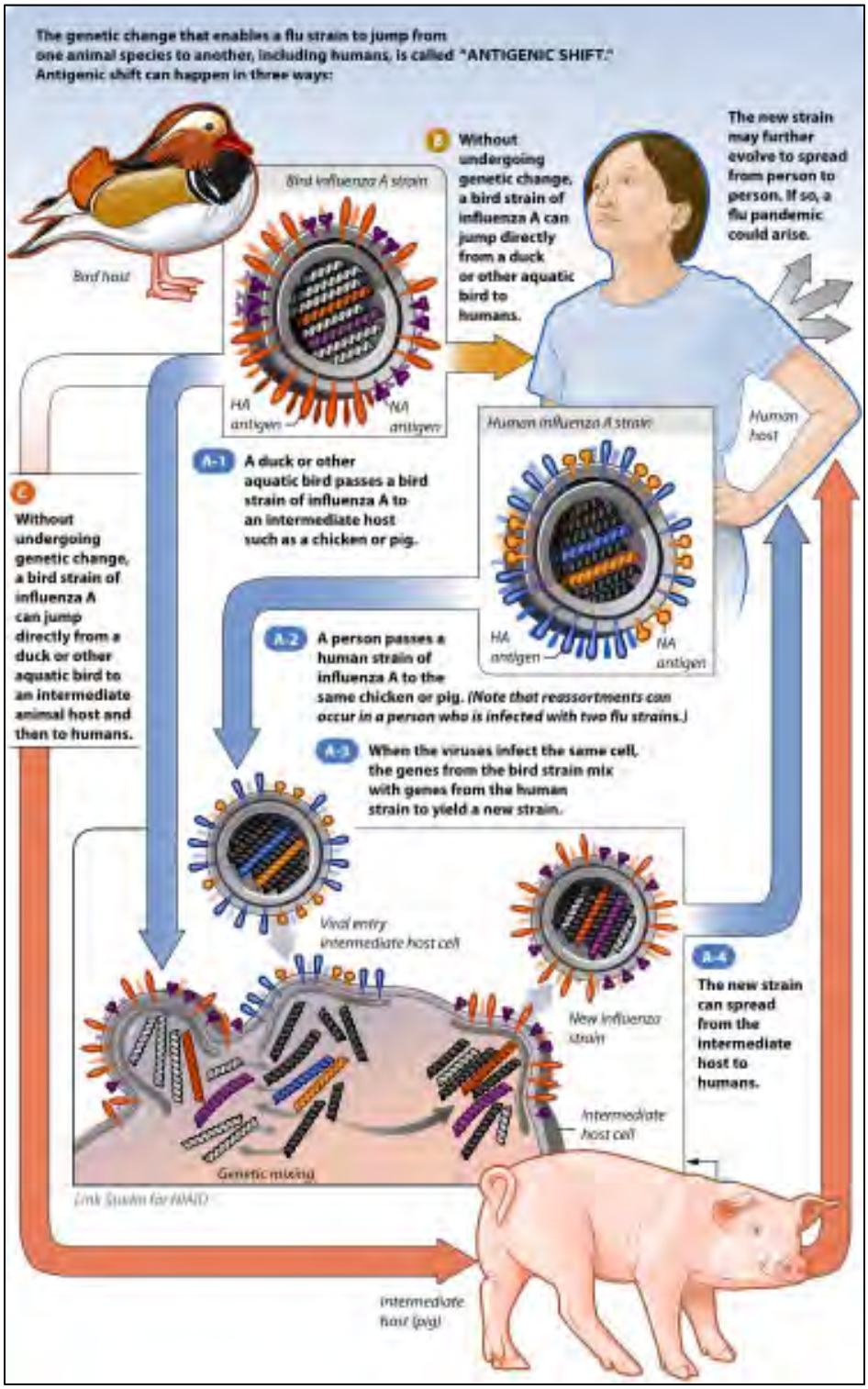
It was reported in 2006, 150 people died in Southeast Asia from the Avian or Bird Flu but none were reported in the United States.

In a press release dated September 22, 2009, the Mississippi State Department of Health reported 898 confirmed cases of Novel H1N1 (swine) flu in Mississippi with seven deaths reported in Jones, Jackson, Hancock, Washington and Tippah counties.

Probability of Future Occurrences

The probability of a pandemic influenza impacting the United States, and specifically Mississippi, is difficult to measure. We can assume the threat will continue to exist but the frequency of such global pandemic events will remain relatively low.

Figure 4.18
Antigenic Shift



4.7.3 Man-Made Hazards

Terrorism Threat (As presented in the 2007 Plan, Appendix A)

Hazard Description

The Federal Emergency Management Agency defines terrorism as "intentional, criminal, malicious acts." Through the State and Local Mitigation planning how-to-guide, Integrating Manmade Hazards Into Mitigation Planning. The guide further defines terrorism:

> *"For the purposes of this guide, "terrorism" refers to the use of Weapons of Mass Destruction (WMD), including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases, and "cyber-terrorism." Within these general categories, however, there are many variations. Particularly in the area of biological and chemical weapons, there are a wide variety of agents and ways for them to be disseminated (FEMA-September 2003, p. V)."*

FEMA further adds that man-made disasters, including terrorism,

> *"involve the application of one or more modes of harmful force to the built environment. For purposes of this how-to guide, these modes are defined as contamination (as in the case of chemical, biological, radiological, or nuclear hazards), energy (explosives, arson, and even electromagnetic waves), or failure or denial of service (sabotage, infrastructure breakdown, and transportation service disruption) (FEMA-September 2003, P. 2-3)."*

The city understands that a terrorist activity may be possible, and has identified possible targets and types of terrorist actions that may occur and the response that may be needed to address these potential actions.

Location

Within the City of Gulfport, there are many potential targets for terrorism activities. Specifically, the Emergency Response Staff with the City of Gulfport has identified the potential targets through their terrorism response planning efforts:

1) Soft targets

2) Port containers at the Port of Gulfport

3) Chemical companies

4) Transportation targets

Additionally, Emergency Response Staff with the City of Gulfport identified other possible targets within the City of Gulfport:

- Local, state and federal government offices
- Military installations
- Emergency services
- Politically or symbolically significant sites
- Transportation infrastructure components
- Energy, water and related utility systems
- Telecommunication and information systems
- Health care system components
- Financial services infrastructure and institutions
- Agricultural facilities
- Commercial/ manufacturing/ industrial facilities
- Mobile assets
- Recreational facilities
- Public/ private institutions
- Events and attractions

These sites exist throughout the City of Gulfport.

The Port of Gulfport established an aggressive terrorism plan. The Port's new renovations include secured perimeters. And the Port has implemented a national program for background checks. Customs provides checks for radioactivity and general inspections. The Port undertakes four drills per year and one exercise to train for a terrorist action.

Past Occurrence

In a meeting with city emergency responders, it was learned that there had been a criminal occurrence several years ago that may be reflective of a possible terrorist activity. City responders found a tank of anhydrous ammonia leaking after a burglary attempt. The criminal action caused a cloud of the chemical to form and travel over a localized area. Emergency response actions included closing a major thoroughfare and evacuating several businesses and a neighborhood. The cost of the criminal action and ensuing emergency response actions cost several hundred thousand dollars.

Additionally, the city fire department has responded to three bomb threats in the past three years.

Vulnerability Assessment for Terrorism

Types of Community Assets in Hazard Area

The community assets at risk from terrorist activities can include almost any target within the City of Gulfport. General information related by federal agencies to local governments infer that

likely targets could include (1) soft targets, (2) containerized shipments through the Port of Gulfport, (3) chemical companies and (4) transportation assets.

Among the transportation routes that may be affected by a terrorist action include Interstate 10 and its overpasses within the City of Gulfport, U.S. Highway 49 and U.S. Highway 90. Approximately 45,000 vehicles per day travel on Interstate 10. Additionally, if Highway 49 was closed due to terrorism in the City's northern limits, as many as 53,000 vehicles per day would need to be rerouted.

Telecommunications systems and electrical power systems may be disrupted during a terrorist incident.

Businesses within the city can be appealing soft targets. Therefore, the Committee suggested mitigation actions to reduce the potential damage and threat to business closure. These actions include developing good business continuity plans that include terrorism and establishing grant programs to help private sector businesses strengthen their buildings to reduce structural damages from terrorism or install security systems to prevent terrorist activities.

Community Assets

Critical Facilities- Among the essential services, critical facilities and infrastructure likely to be affected by a terrorist incident are infrastructure, public safety on roadways and electric power utility services. The city devised a worksheet that is part of their annual plan review which will document any new infrastructure or upgrades to infrastructure throughout the area.

Essential Services- Essential services may be affected or impacted by terrorist acts. These essential services include electrical power, phone and public roadways. The interruption of power can disrupt dispatch and other emergency services provision. It is important that the city establish redundant power sources to keep emergency services operational during power outages caused by terrorism.

Transportation Systems- Transportation systems are one of the most likely targets of terrorism in Gulfport. The Port of Gulfport implemented programs and policies to mitigate for terrorist actions, and has alerted emergency responders of response plans to various threats through the Port.

Interstate 10, U.S. Highway 90 and U.S. Highway 49 may be affected by a terrorist action. An incident on either of these roadways could cause death and injury, property damage and could cause traffic route disruptions for months or years, depending on the type of damage and the location of the damage. The significance could mean rerouting traffic along Interstate 10, on which 45,000 vehicles per day travel, and on U.S. Highway 49 near Swan, on which 53,000 vehicles per day travel.

Lifeline Utility Systems- Lifeline utility systems may be a target of terrorism. Systems that could be affected include electrical utility systems, water systems and emergency communications system.

Potential Losses

Estimates of potential losses caused by terrorism are very difficult to determine. The intent of most actions to is create fear and chaos, therefore property damage is not as much as a concern as the massive loss of life and the disruption of daily life and commerce.

Estimated Losses for Critical Facilities and Infrastructure

The City of Gulfport was unable to get an accurate estimate of loss for critical facilities and infrastructure within the city from a terrorist incident with data that is available. Due to the data limitation, the city must develop a method to determine the potential loss. The city developed a reporting worksheet to document all infrastructure and critical facilities within the City of Gulfport.

The worksheet allows city departments to document the types of critical facilities and infrastructure that exist in hazard areas and details the type of damage and cost of the damage to the critical facility and infrastructure during the year. Hazard Mitigation Committee members that are responsible for critical facilities and infrastructure will review and document the value and damage costs of critical facilities and infrastructure.

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5.0 Community Capability Assessment

Requirement 201.6(c)(C)(3): [The risk assessment should include a] mitigation strategy that provides the jurisdictions blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

The Gulfport Hazard Mitigation Committee reviewed the community capability assessment in the 2007 plan and added additional agencies having a coordination/regulatory role with the city. Planning and Regulatory Capability including additional plans, studies, and programs plus the identification of relevant goals were enhancements made to Section 5.2

The purpose of this assessment is to provide additional methods of evaluating potential hazards prone to the city through an inventory and analysis of existing mitigation capabilities. This type of assessment provides the community with an improved understanding of its preparedness levels and capabilities to mitigate natural hazards.

The Committee conducted the community capability assessment in two phases:

1) Assess the preparedness of the city's departments and state and local agencies
2) Identify existing policies, programs, plans, ordinances and codes supporting mitigation

5.1 Preparedness of State and Local Agencies

The following public entities were identified by the Gulfport Hazard Mitigation Committee as crucial in the assessment and enhancement of a community's capacity to deal with hazard mitigation, preparedness, response, and recovery:

- City of Gulfport
  - Gulfport Fire Department
  - Gulfport Police Department
  - Gulfport Urban Development (Planning & Building Division)
  - Gulfport Geographic Information Systems Division
  - Gulfport Public Works
  - Gulfport Engineering
  - Gulfport Public Schools
- Harrison County
  - Harrison County Emergency Management
  - Harrison County Sand Beach Authority
  - Harrison County Sheriff's Department
  - Harrison County School District
- Private/Public Entities
  - Public Utilities (Telephone, Electricity, Natural Gas)

  - American Medical Response (AMR)
  - Coastal Transit Authority (CTA)
  - American Red Cross
- State of Mississippi
  - Mississippi National Guard
  - Mississippi Highway Patrol
  - Mississippi Department of Marine Resources (MDMR)
  - Mississippi Department of Environmental Quality (MDEQ)
  - Mississippi Gaming Commission
  - Mississippi State Department of Health (MSDH)
  - Mississippi Emergency Management Agency (MEMA)
- Federal
  - U.S. Coast Guard
  - CNC Naval Construction Battalion
  - Federal Emergency Management Agency (FEMA)

Below is a brief description of essential services provided by each entity and an assessment of their capacity and preparedness for responding to the residents and business owners in Gulfport. Some of the capabilities for state and federal agencies provided in this section were acquired from the 2010 State of Mississippi's Standard Hazard Mitigation Plan.

City of Gulfport Departments

Gulfport Fire Department

The Gulfport Fire Department operates staff from twelve fire stations strategically located throughout the community, with the Central Fire Station located at 151 23rd Ave. The Fire Department is a mainstay in the event of emergency situations. The public protection rating for the City of Gulfport is 4, a rating maintained since May 30, 1980. Services provided by the Gulfport Fire Department include:

- Fire Suppression
- Basic and Advanced Life Support Emergency Medical Service
- Technical Rescue Teams
- Marine Response Units with Dive Rescue and Fire Suppression Capabilities
- Hazardous Materials Team
- Fire Prevention, Plan Review and Building Inspections
- Training
- Fire Investigation and Community Education

The Gulfport Hazardous Materials Response Team is a special operations unit of the Gulfport Fire Department. The Haz-Mat Team consists of 52 personnel trained to Hazardous Materials Technician I. All members of the Gulfport Fire Department are trained to Haz-Mat Awareness level and assist the Haz-Mat Team during an incident. The Gulfport Hazardous Materials

Response unit is housed in a central location within the city providing rapid response to any location in the city, as well as, the 6 coastal counties.

The Gulfport Hazardous Response Teams responsibilities are to mitigate incidents involving, chemicals, toxins, flammable materials, radiological, and biological agents. These incidents range from minor spills, to full scale, multi-agency incidents.

The Gulfport Dive Rescue and Recovery Team is a special operations unit of the Gulfport Fire Department. Responsibilities range from underwater rescue and recovery, any water related incident, and assisting the local law enforcement in underwater evidence recovery.

The Dive Team consists of 16 personnel trained at a minimum level of Dive Rescue 1, and has a support team of non-divers whose duties include boat operations, line tending, on-scene record keeping, and other related activities Two complete sets of dive gear are available for quick service, as well as an ocean reef wireless underwater communications system. Two 16-foot fiberglass boats provide a base of operations in open water.

Recognizing the threat from Weapons of Mass Destruction, the training division began sending firefighters and officers for specialized training to Fort McClellan located in Anniston, Alabama. . The training ranged from operational preparedness to hazardous material response, in which the students were introduced to live agents. The department continues to enroll students and has provided training to over 40 students accounting for 900+ classroom hours.

Gulfport Police Department

The Gulfport Police Department has police headquarters centrally located at 2220 15th Street, two substations, and a training facility. In addition to police protection provided to the citizens of Gulfport, MS., the department serves the beach area, casinos, University of Southern Mississippi, William Carey College and Mississippi Gulf Coast Community College. The department has 201 sworn personnel and 92 civilian staff to serve a population of 80,000, plus tourists creating a daily population of over 144,000.

Gulfport Department of Public Works

The Gulfport Department of Public Works maintains water, sewer, solid waste, storm collection, storm drainage, and flood control services. The department is comprised of four divisions plus administrative staff.

Public Works and the Building Official have enforcement authority for the Erosion, Sediment and Post-Construction Control Ordinance and the Flood Damage Prevention Ordinance. They work closely with the Engineering Department, including review of proposed new construction.

Gulfport Department of Engineering

The Gulfport Engineering Department works closely with Public Works and Planning to provide professional engineering oversight for infrastructure projects, site planning for new construction, and drainage and storm water facilities.

Gulfport Department of Urban Development

The Gulfport Department of Urban Development is staffed with professional urban planners, building code officials and support staff. This department is responsible for the creation and implementation of building codes and land-use standards, plus oversees housing development. The Planning and Zoning and Building Code divisions are housed within the Urban Development Department.

The Planning Division is responsible for implementation of the city's Comprehensive Plan and administration of the city's zoning ordinance and subdivision regulations. The planning division is responsible for promulgation and administration of codes and ordinances involving land use and land development.

The Building Division is responsibility for the enforcement of building, housing, plumbing, electrical, mechanical, gas, and other related codes and ordinances of the city. It is also responsible for enforcement of the Flood Damage Prevention Ordinance adopted to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas. This division has four certified floodplain managers, highly trained in their respective areas of expertise

Codes and ordinances currently adopted and implemented by the city of Gulfport focusing at least to some extent, on regulating development in flood hazard areas are listed below:

- Flood Damage Prevention Ordinance
- Zoning Ordinance
- Subdivision Regulations
- Building and Housing Codes
- Erosion, Sediment and Post-Construction Ordinance

Geographic Information Systems (GIS) Division

The GIS Division, housed within the Information Systems Department, plays a key role in the creation and maintenance of data systems used by other departments. The prevention of hazards, particularly those associated with flood plain management and storm water planning and management are reliant on GIS to maintain accurate maps and data.

Gulfport Public Schools

The Gulfport Public Schools system has eleven campus locations including seven elementary schools, two middle schools, one high school and a Learning Center.

Gulfport Public Schools are entrusted with the education and care of approximately 3,190 students and the school district is dedicated to providing a safe environment conducive to teaching and learning. The school district Crisis Management and Response Plan follows the Harrison County Plan and contains basic standards when responding to a crisis. It seeks to lessen the overall impact of a crisis on district students, parents, employees, property, equipment and visitors. The district also developed a comprehensive site-specific plan that considers the full spectrum of conditions of violent, technological and natural threats.

Many of Gulfport's public schools serve as emergency shelters for the community. While the listing of shelters can change with each emergency, in almost every instance some *schools could be used to shelter victims of disaster.*

Harrison County

Harrison County Emergency Management

Through Emergency Management, Harrison County and its political subdivisions have developed the *Comprehensive Emergency Management Plan (CEMP),* commonly referred to as the "All Hazard Disaster Plan." The purpose is to create mutual aid agreements to perform respective emergency functions before, during and after disasters or natural emergencies. While the large military installations, Keesler Air Force Base and Naval Construction Battalion, located in Harrison County, have their own disaster preparedness plans, they cooperate with the Harrison County Emergency Management when a disaster occurs and are included in drills and tests of the disaster response, recovery and mitigation activities. The Harrison County Emergency Management Director serves as a member of the Gulfport Hazard Mitigation Planning Committee.

As a coastal area, the threat of hurricanes is universally recognized as the primary threat to the community. A separate *Standard Operating Procedure for Hurricane Evacuation* (SOP) sets forth a procedure to implement evacuation in the event of hurricanes. The major goal of the SOP is to ensure a coordinated effort will exist and the jurisdictions involved will issue evacuation notifications simultaneously and in such a manner as to prevent chaos and confusion among the populace.

Harrison County Emergency Management provides technical support and expertise to monitor and activate flood and disaster warnings. Several computerized models determine hurricane and storm activities. The agency also maintains manual gauges along the rivers in the county and tide level data gauges in several locations along the shoreline. The data recorded by these

gauges is transferred to the National Weather Service, which depends upon this data to make flood predictions.

Prior to the tragic events at the World Trade Center and the Pentagon on September 11, 2001, the Harrison County Civil Defense Council prepared a Terrorism Counteraction Standard Operating Procedures Manual to aid in protection of life and property in the event of terrorist activities. In addition, training of emergency services was given and a training exercise conducted.

The promulgation of the Gulfport Hazard Mitigation and Floodplain Management Plan will aid Harrison County Emergency Management in performing its duties and functions. The comprehensive identification and assessment of hazards posing threats to the community is crucial to All Hazard preparedness. As a result of the Plan, the Harrison County Emergency Management will be more prepared to handle any disaster or emergency situation.

Harrison County Emergency Management serves as the centralized point for all information released to the public concerning disasters, along with decisions, suggestions and instructions. The agency is responsible for developing and maintaining a public information and education program. A briefing room within the Harrison County Courthouse is provided for news releases to mass media representatives in order to ensure accurate and consistent information flow. Telephone numbers for the public to obtain official disaster information are also published in telephone books.

Educational brochures and hurricane tracking maps are distributed to the general public and area organizations. Emergency Management routinely participates in Hurricane Fairs with emergency information distributed to the media, as necessary. In addition, television and radio stations maintain a selection of public service announcements related to emergency operations. The local media (radio, print and television) is included within the Emergency Management Agency chain of command to disseminate information about weather systems having the potential to cause flooding, tornado activity and hurricanes. Information includes:

Television and Radio Stations

Residents of the Mississippi Gulf Coast and Harrison County are provided hurricane, flood awareness and other disaster information via local and regional television affiliates. Included are WLOX (ABC/CBS Gulfport/Gulfport), WXXV (FOX/NBC Gulfport/Gulfport), WMAH (PBS Gulfport), WPMI (NBC Mobile), WWL (CBS New Orleans), WKRG (CBS Mobile), WGNO (Independent New Orleans) and WYES (PBS New Orleans). Throughout the year, and especially at the onset of hurricane season, stations present frequent educational programs about hurricane preparedness. Most stations produce at least one documentary feature each year on the subject which is aired during prime time.

Many, including local WLOX Channel 13, designate the week of June 1 as Hurricane Preparedness Week. Several times daily special programs focusing on hurricanes and the

problems they present to the area are presented during the regular newscast. Topics include descriptions of the hazards, safety, property protection, flood insurance and warnings. Near the anniversary of major storms, such as Hurricane Camille and Katrina which occurred in the month of August, the public awareness campaign is renewed. Channel 13 has the most sophisticated, up to date equipment for forecasting and predicting severe weather, including a pinpoint Doppler Radar System. The Doppler System is particularly important in warning the public when tornadoes and severe thunderstorms threaten. Up to the minute reporting is provided any time of the day or night when the National Weather Service issues severe weather warnings.

Public service announcements produced by the Federal Emergency Management Agency (FEMA) and National Flood Insurance Program (NFIP) air during prime time on virtually every major television network. The announcements stress the importance of flood insurance, even for those who never had flooding or do not live in high-risk areas.

Local radio stations play a vital role in dissemination of information during an emergency, especially during the evacuation process when residents are likely to be on the road attempting to flee or return to the area. Information broadcast by radio stations at the height of a storm and in the early days after a storm, with electric power and cable service interrupted, is essential to the community attempting to survive and recover from a major storm. An Emergency Information Network is established in Harrison County and includes a number of local FM and AM radio stations. During an emergency, normal programming is suspended and public service announcements are broadcast until the emergency subsides or is over.

Print News Media

The Sun Herald is a daily publication and the most widely read newspaper in Harrison County. The Sun Herald publishes numerous in-depth, feature articles on the subjects of storm preparedness, survival, flooding and recovery before and during the hurricane season. At the onset of the hurricane season each year, the paper publishes a booklet insert entitled “Hurricane Survival Guide.” The guide addresses the following subjects: preparedness, storm prediction, storm categories, what to do during the hurricane should one strike, whether or not to evacuate, evacuation routes, the history of storms affecting the coast, and how hurricanes form. Also included is a map for tracking hurricanes with instructions for use and suggestions for protection of personal property.

Harrison County Sheriff’s Department

The Harrison County Sheriff’s Department is responsible for law and order throughout the county and is prepared to respond and assist the city of Gulfport in any emergency situation, be it a natural disaster or any law enforcement event requiring additional manpower and equipment.

Harrison County Schools

The city of Gulfport is served by the Gulfport School District and Harrison County Public Schools. The Harrison County School system serves portions of the city annexed after 1993. Ten of the Harrison County Schools are located within the incorporated boundaries of Gulfport.

The Harrison County School District is dedicated to providing a safe school environment conducive to teaching and learning. During times of disaster, the Harrison County School District works closely with Gulfport City Schools and Harrison County Emergency Management to determine which schools will open as pre-storm shelters. Harrison County Schools also assist the city and county with evacuations by staging school buses to transport residents out of the area if necessary.

Harrison County Sand Beach Authority

The Harrison County Sand Beach Authority develops and implements policies to maintain and preserve the sand beach. In the mid 1980's, the Sand Beach Authority began encouraging dune development in test areas on the beach by planting vegetation such as sea oats and other grasses native to shorelines. The goal behind dune development was twofold: (1) prevent wind-borne sand erosion and (2) provide sand to replenish the beach when sand is lost to natural littoral drift. The first test dune was planted on the beach in west Long Beach in a Velocity Zone near Pitcher Point.

Over time, the test dune became well established and has pine trees reaching more than 20 feet in height that have sprouted voluntarily. Since planting the first experimental dune, dunes have been established along most of the length of the sand beach. The dunes are recognized for their potential to mitigate wave action during major and severe storms.

The dunes also provide an added bonus. Wind-borne sand has long been a major public safety problem on coastal U.S. Highway 90. Wind driven sand drifts across the highway and piles up on road surfaces, creating a severe driving hazard. The sand is expensive to remove and because of highway debris and pollution, is usually not suitable for return to the beach. By trapping wind-borne sand behind the dunes before it reaches the highway, very little sand accumulates on the highway right-of-way.

The Mississippi Gulf Coast is also protected from storms by a series of barrier islands. The islands mitigate the wave action of storm surge before the waves enter the Mississippi Sound. Once in the Sound, the shallow water dissipates wave action by preventing waves from regaining energy. The manmade beach, dunes, seawall and Highway 90 further dissipate the energy associated with storm surge.

Public/Private Entities

Public Utilities

The city of Gulfport receives electricity and natural gas service from the following suppliers who are regulated by the Mississippi Public Service Commission and are members of the Mississippi 811 System for locating underground lines.

Electricity:	Mississippi Power Coastal Electric Power Association
Natural Gas:	CenterPoint Energy

Telephone and cellular services are provided by numerous carriers throughout the city. Propane gas is also available as an alternative fuel through Ferrell Gas and AmeriGas.

The public utility companies have disaster response plans and are responsible for their distribution system and facilities, ensuring services are restored as quickly as possible after a disaster occurs. In addition, they provide educational information on their web sites to residents and business owners on storm preparedness

American Medical Response (AMR)

AMR is a private ambulance company licensed by the Mississippi State Department of Health, Division of Emergency Medical Services. They provide basic and advanced life support to the citizens of Harrison County, including the areas serviced by the Gulfport Fire Department. The Gulfport Fire Department has resources available to supplement and enhance the system of emergency medical services in Gulfport. AMR is the Emergency Medical Services (EMS) Authority for Harrison County. As the County's EMS authority, AMR provides a liaison at the Harrison County EOC to coordinate county medical needs during a disaster.

The Gulfport Fire Department and AMR have an agreement of mutual aid clearly outlining the duties and responsibilities of each entity in connection with emergency medical services. AMR provides EMS training, as needed and within its established authority, to Gulfport firefighters.

As Mississippi's largest provider of EMS, AMR has regional and national resources available to mitigate large scale disasters that may occur in Gulfport. In addition, AMR has a mobile command post with extensive communication resources that can be deployed to Gulfport for use in any disaster situation.

American Red Cross

The American Red Cross is the only disaster relief agency chartered by the United States Congress to perform disaster relief operations. The agency plays a key role in creating and preparing a fully trained volunteer base of people to assist in disaster relief. Preparedness for a

disaster on the local level is vital since the local chapter is responsible for conducting the operation for the first 72 hours after a disaster.

The American Red Cross plays a crucial role in coordination and management of emergency shelters and has a liaison person stationed at the Harrison County Emergency Operations Center during disasters.

Within 24 hours after a disaster, American Red Cross damage assessment teams conduct a preliminary damage assessment. This preliminary assessment includes a drive-by overview of damaged areas to determine the extent and severity of damage. The preliminary damage assessment determines staff and equipment needs and aids in establishing the number and location of shelters needed. Disaster relief operations requires the preliminary assessment data be provided to state and national headquarters, so post-disaster staffing can be determined and assigned from the national level.

The American Red Cross determines the type and magnitude of family services required to assist those in need. The basis for determining the need for family services is a detailed damage assessment. This damage assessment is completed by using street sheets and a street by street drive-by survey. The survey is a structure by structure determination of severity of damage, using a rating of "0" where structures receive no damage, "1" where minor damage occurred, "2" where major damage resulted from the disaster and "3" where the structure was destroyed.

The American Red Cross then provides service centers for disaster relief personnel to interact with those in need of relief. The number and location of service centers is determined after the detailed assessment is complete. Service centers remain open until most cases are closed.

The American Red Cross also assists families in returning to normal using recovery mechanisms of the agency.

Coastal Transit Authority (CTA)

CTA is a non-profit provider of public transportation for the three coastal counties of Mississippi. It is an independently managed public utility governed by a Board of Commissioners. It is the designated recipient of state and federal funding for urban transportation on the Mississippi Gulf Coast.

CTA has a mutual aid agreement with Harrison County to assist the Gulf Coast area, including Gulfport, with the evacuation of residents and visitors due to an impending disaster. Residents can pre-register for hurricane evacuation services at their web site or at one of their transit facilities. Applications for transportation services are also accepted for persons with physical disabilities and senior citizens.

State Agencies

Mississippi Emergency Management Agency (MEMA)

Authority for mitigation: Miss. Code 1972, Annotated. 33-15-7 Et. Seq.

The Office of Mitigation is responsible for coordinating disaster loss reduction programs, initiatives, and policies throughout the state of Mississippi. Disaster loss reduction measures are performed using disaster reduction programs, initiatives, and policies through the development of state and local Hazard Mitigation plans and the implementation of strategies identified in the plans.

The Office of Mitigation administers the Hazard Mitigation Grant Program, the National Flood Insurance Program's Community Assistance Program and Map Modernization Program, the Flood Mitigation Assistance Program, the Pre-Disaster Mitigation Program, and Severe Repetitive Loss Program. Floodplain Management, Grants, and Planning Staff are assigned to all nine districts in the state. Mitigation Bureau Staff are extensively trained in Benefit Cost Analysis, Grants Management, National Flood Insurance Program, Plan Review, CAV, CAC, environmental, project application review, HAZUS and NEMIS Entry.

The Mitigation Grants Management Bureau administers hazard mitigation grants to state and local governments. These grants include mitigation planning grants, drainage projects, acquisition of high-risk flood structures, retrofitting critical facilities, warning systems, safe rooms, storm shelters, and other cost-effective measures identified in the state and local government's Hazard Mitigation Plan. The Mitigation Grants Management Bureau developed a web site, www.MitigationMS.org that allows local governments/eligible applicants to submit applications online.

The Floodplain Management Bureau manages the National Flood Insurance Program's Community Assistance Program for the 276 participating communities. Bureau staff provides compliance visits, workshops, and technical assistance to local communities. The Map Modernization Program is a joint federal-state effort to provide funding and technical assistance to local communities seeking updated flood maps in order to better plan and regulate development in identified special flood hazard areas.

The Mitigation Planning Bureau is responsible for maintaining and updating the State of Mississippi Standard Mitigation Plan, which documents statewide hazard risk and the capability to mitigate the risk. The Planning Bureau works with other state agencies, regional planning authorities and local governments in the development of mitigation plans and strategies. State funding capabilities for hazard mitigation projects: It is the policy of the State of Mississippi to provide technical assistance, and administer federally funded mitigation programs.

Mississippi Department of Archives And History (MDAH)

The authority for mitigation is Miss. Code 1972, Annotated. 39-5-1

This agency has custody of and maintains care of all state records and material pertaining to the history of Mississippi. It administers the State Records Management Program and aids mitigation by supplying information on the frequency and severity of past disasters and the effectiveness of recovery efforts. It also supplies historical information on sites of proposed mitigation projects. Archives and History is a first response agency and is responsible for responding after a disaster to retrieve and stabilize record recovery for government offices. According to Federal Section 106 Review – Archives and History is required to make comment on debris removal on any project involving federal funding.

Mississippi Department Of Environmental Quality (MDEQ)

Authority for mitigation: Miss. Code 1972, Annotated. 49-2-9 Et. Seq.

The Department of Environmental Quality promulgates rules and regulations; receives and expends state and federal funds, conducts studies on alternate uses of natural resources; and responds to incidents that threaten them. It aids mitigation by protecting the state's natural resources and regulating their use. The Dam Safety Division is housed in the agency. MDEQ and MEMA serve as State Technical Partners in the Map Modernization Program and are active participants in the Mississippi Digital Earth Model and Remote Sensing Initiative.

MDEQ in collaboration with MDA, is administering the use of HUD CDBG funds designated for the development and enhancement of new water, wastewater and storm water infrastructure on the Gulf Coast. Key in the development of the Master Plan for this program was providing infrastructure in areas less likely to be impacted by storms. Additionally, MDEQ has expanded ability to respond and collaborate with our State and Federal Partners in natural disaster related impacts such has debris disposal management, hazardous material management and wastewater treatment system recovery.

Mississippi Department Of Marine Resources (MDMR)

Authority for Mitigation: Miss Code 1972, Annotated. 49-15-11 (1972)

This agency aids hazard mitigation through (1) buyout programs, (2) preservation, creation, restoration, and enhancement activities, (3) education and outreach programs, and (4) our Mississippi Coastal Preserves Program. The agency partners with federal and state agencies, environmental organizations, and the private sector to identify susceptible, repetitive-loss properties and move them into public ownership through donation, purchase, or other means. These partnerships facilitate preservation, creation, restoration, and enhancement programs. DMRs current plan, which has been endorsed by former Governor Barbour, is to preserve, create, restore, or enhance over 15,000 acres of coastal marsh, wetlands, or forests, to double the footprint of Deer Island, and to restore our offshore barrier islands (Petit Bois, Horn, Ship, and Cat Islands) to their pre-Camille footprint and functionality. Educational and outreach

programs are conducted through partnerships with local academic institutions, other state and federal agencies, and the private sector.

MDMR focuses on environmental conservation, principles and practices of smart growth and smart code, sustainable development, and sound environmental stewardship. The Coastal Preserves Program is a partnership with the MS Secretary of State and the MS Legislature through which parcels of land are identified as complimentary to increased environmental protection and conservation. These parcels are acquired through purchase, donation, or other means, and funds are provided to manage and enhance these properties.

The Marine Patrol Branch of the Department of Marine Resources is an agency of the State of Mississippi with offices in the Dr. Eldon Bolton State Office Building on Bayview Avenue and offices and boat facilities on Oak Street in east Gulfport. Marine patrol officers enforce fisheries laws, assist and support U.S. Customs, the U.S. Coast Guard and the U.S. Fish and Wildlife Service. Additionally, the Marine Patrol Branch responds to calls from the Mississippi Department of Environmental Quality to check hazardous materials spills along with the U.S. Coast Guard. Typically, MDMR evaluates incidences and call in the Coast Guard when necessary and appropriate. The agency also responds to emergency situations on boats and has limited firefighting capabilities. During hurricanes the marine patrol oversees and coordinates evacuation of vessels from the gulf into protected areas of the bay.

Mississippi Department Of Public Safety (DPS)

Authority for mitigation: Miss. Code 1972, Annotated. 45-1-1 Et. Seq.

The Department of Public Safety (DPS) aids mitigation by enforcing traffic laws and regulations on Mississippi highways and roads. It issues and renews driver's licenses, furnishes qualified personnel to take part in investigations, and provides assistance to communities during emergencies and disasters.

In the event of a haz-mat incident on a state or federal highway, the highway patrol will respond, contact other local authorities, secure the area and reroute traffic accordingly. The Highway Patrol responds to incidents with regularity and therefore has tried and tested response operations in place.

In the event of hurricanes, the highway patrol places all Troop K units on alert, cancels all leave and stands ready to patrol federal and state highways before, during and after a hurricane to ensure that traffic remains open. The patrol assists disabled vehicles and people on the highways in need of assistance.

This department also houses the Office of Homeland Security. The Mississippi Office of Homeland Security assists by providing funding to state and local agencies. This funding is used to purchase preparedness equipment, provide training and certification to first responders, develop plans and standard operating guidelines for agencies and response teams, and to exercise and evaluate these response plans.

DPS also works with MDOT and Louisiana State Police during emergencies to provide logistical and security support consistent with contraflow operations on our Interstates. DPS also now has the capability to feed and fully support our first responders when deployed to a disaster area. DPS has also added an additional helicopter designated to assist in search and rescue operations as well as having a heavy lift capability.

Mississippi Department Of Wildlife, Fisheries, And Parks

Authority for mitigation: Miss. Code 1972, Annotated. 49-4-1 Et. Seq.

The Department of Wildlife, Fisheries and Parks aids in hazard mitigation through its conservation and protection of wildlife and marine habitats.

Mississippi Insurance Department (MID)

Authority for mitigation: Miss. Code 1972, Annotated. 83-1-1 Et. Seq.

The Insurance Department executes all laws relative to insurance companies, corporations, associations, and their agents and adjusters. It aids mitigation by licensing and regulating manufacturers and dealers of mobile homes; enforcing the LP gas inspection program; and administering the Standard Fire Code. The State Fire Marshal's office is located in the Department of Insurance.

Mississippi Department Of Transportation (MDOT)

Authority for mitigation: Miss. Code 1972, Annotated. 65-1-13.

The following is a brief description of the Mississippi Department of Transportation's (MDOT) on-going hazard mitigation capabilities.

- Construction, reconstruction and maintenance of transportation facilities vital to evacuation, response, and re-entry. This includes but is not limited to seismic retrofitting of bridges, the upgrading of traffic control devices after destruction, construction of transportation facilities to avoid flood prone areas whenever possible, and other precautionary design work – including wetlands mitigation – which reduces risk before, during and after an emergency.
- Education and communication outreach programs to include information provided to the general public concerning Contraflow, pet evacuation, and general preparedness.
- Training for MDOT response personnel at all levels for a wide range of natural and man-made hazards.
- In-house emergency coordination staff is MDOT's ESF-1 representative at the State Emergency Operations Center.
- Maintenance of a Comprehensive Emergency Transportation Response Plan which is updated regularly.

- Emergency preparedness for a 72-hour window of self-sufficient after a disaster. This is accomplished through improvements made to emergency supplies, storage facilities, acquiring sufficient fuel reserves, as well as housing, food and water for transportation emergency workers.
- Improvements in communication capabilities through the purchase of additional satellite radio units to serve as redundant communications backup. In addition, a mobile communications platform and a command/control center may be deployed.
- Evaluation of standard operating procedures in all areas, but specifically within procurement to enable the agency to function more efficiently and quickly in the purchase of emergency supplies.
- Provision of remote traffic sensing, which will aid in traffic management during evacuations and re-entries.
- Development of partnerships with various state, federal and/or local agencies to save lives and reduce future losses. These include:
- The GIS Coordinating Council in the development of the Mississippi Digital Earth Mapping Initiative.
- Key emergency response agencies to aid in providing fuel. These agencies include the Mississippi Emergency Management Agency, Mississippi Department of Health, and Wildlife, Fisheries and Parks.
- Acquiring travel trailers to provide housing accommodations for transportation emergency workers during extended events.
- Placement of three Mobilization Centers in northwest Mississippi to provide for command/control and serve as a base of operations to support earthquake emergency response activities.

Mississippi Authority for Educational Television (d/b/a Mississippi Public Broadcasting)

Authority for mitigation: Miss. Code 1972, Annotated. 37-63-1 Et. Seq.

Mississippi Public Broadcasting (MPB) is a public service agency, providing the citizens of the state with educational, public service and informative programming. Mississippi Public Broadcasting aids mitigation by serving as the primary source for statewide Emergency information utilizing its network of Radio and Television transmitters and towers. MPB supports MEMA with technical and production staff and broadcast equipment to offer video and audio to all outside news organizations from MEMA's Press Room and aids in the operation of the Joint Information Center. The Mississippi Department of Transportation, in partnership with MPB, has identified MPB FM frequencies on evacuation route signs. When a mandatory evacuation is ordered, MPB is required to provide updates every 15 minutes via its statewide Radio network. In the event of a state of emergency, MPB Radio l broadcasts crucial information as long as a need for information exists.

Mississippi State Department Of Health (MSDH)

Authority for Mitigation: Miss. Code 1972, Annotated. 41-3-15 (1972).

MSDH provides protection to the public from threats to health and safety from unsanitary conditions relating to food, drinking water and sewage, unnecessary exposure to radiation and unhealthy and unsafe conditions in health care facilities, childcare facilities, and the workplace. The agency also helps identify threats to potable water supply caused by natural hazards.

Mississippi National Guard (MSNG)

The Mississippi National Guard stands ready to help local governments with manpower, equipment, and expertise upon receipt of authorization from the Governor of the State of Mississippi or the President of the United States. In rare instances where life, limb or eyesight are at risk, the National Guard can assist without authorization from the Governor however, every effort must be made to contact the Mississippi National Guard Emergency Operations Center before responding.

The Operations Plan for Military Support to Civil Authorities dated August 2000 governs the Mississippi National Guard's activities in response to requests for assistance received from civil authorities within the state of Mississippi. The Plan is applicable to all elements of the Mississippi National Guard, including Army, Air and the Mississippi State Guard when operating as a non-federalized National Guard entity.

The types of disasters to which the National Guard typically responds are listed below:

- Earthquakes
- Floods
- Winter Storms
- Hurricanes
- Weapons of Mass Destruction/Terrorism
- Civil Disturbances
- Search & Rescue
- Tornadoes
- Wild Fire Support
- Nuclear (Chemical Accident and Incident)
- Emergency Shelters
- Correctional Facility Support

The resources of the National Guard are available to Gulfport upon receipt of a request from Harrison County Emergency Management and authorization from the Mississippi Emergency Management Agency.

The National Guard armory at Hiller Park serves as an operations center in the event of a disaster.

Mississippi Gaming Commission (MGC)

During the hurricane season, a designated MGC agent monitors and tracks all developing storms and maintains contact with the Harrison and Hancock County emergency management directors.

In case of EOC activation, a representative of the MGC sits as a member of the Harrison County EOC and functions as a coordinator. MGC gives and receives information from the MGC agents at the respective casinos, as well as provides the Executive Director in Jackson with periodic reports.

If required, MGC issues an emergency closure order under the provisions of the Mississippi Gaming Control Act.

After landfall, MGC coordinates with municipal, county, and state agencies to determine a safe time for casino reopening. When deemed safe, MGC grants permission for casino reopening and monitors the opening process.

Federal Agencies

Federal Emergency Management Agency (FEMA)

As of October 8, 2011, FEMA has 7,474 employees across the country – at Headquarters, the ten regional offices, the National Emergency Training Center, Center for Domestic Preparedness/Noble Training Center and other locations. These employees function as a part of a team that includes federal partners, state, tribal and local officials, the private sector, non-profits and faith-based groups.

On March 1, 2003, FEMA became part of the U.S. Department of Homeland Security (DHS). Their primary mission is to reduce the loss of life and property; protect the nation from all hazards, including natural disasters, acts of terrorism, and other man-made disasters; and by leading and supporting the Nation in a risk-based, comprehensive emergency management system of preparedness, protection, response, recovery, and mitigation.

FEMA Region IV serves Mississippi and the southeastern states of Alabama, Florida, Georgia, Kentucky, North Carolina, South Carolina and Tennessee. The Regional Office is located in Atlanta, Ga., and the Federal Regional Center is located in Thomasville, Georgia. Region IV currently has Recovery Offices in Florida and Mississippi.

Region IV has a skilled workforce to support citizens and first responders working together to build, sustain and improve capabilities to prevent, prepare for, protect against, respond to, recover from, and mitigate all hazards. The regional team works hand-in-hand with federal, state, tribal, local and private sector partners to meet the needs of state emergency management agencies.

Region IV's natural risks include hurricanes, tornadoes, flooding, droughts, ice storms, earthquakes, wildfires, and tropical storms. Six of eight states are hurricane-prone and Federal Coordinating Officers are pre-designated to plan for hurricane response issues and work closely with state emergency management agencies.

Because Region IV houses both nuclear power facilities and chemical weapons stockpiles, there is an increased risk for a manmade disaster. Currently, there are 17 nuclear power facilities with applications for nine new sites. Those facilities supply 29 percent of the nation's electrical power output, and the addition of the new sites will increase that capacity by 51 percent. There are two chemical weapons stockpiles within Region IV.

U.S. Coast Guard (USCG)

The U.S. Coast Guard Marine Safety Office, located in Mobile, Alabama, regulates events requiring safety or security on navigable waterways and tributaries on the Gulf Coast and in Gulfport. This agency is on call with local authorities when incidents on waterways require response. The USCG issues notices to mariners to insure safety on the waterways.

The Environmental Response Branch handles responses to hazardous materials spills on navigable waterways and tributaries. In the event of a spill, the USCG serves as the on-scene federal coordinator for activities with local port authorities and assists during hurricane disasters.

Naval Construction Battalion Center (NCBC)

NCBC exists to maintain and operate facilities; provide services and material in support of Naval Construction Force Units, including Amphibious Construction Fleet Units, the Maritime Prepositioning Force (Enhanced), other fleet, and assigned organizational units deployed from or home ported at NCBC Gulfport; and to perform other functions and tasks assigned by higher authority. This facility located approximately one mile from the beach area and within the city of Gulfport, serves as an important partner during and after disaster events.

Operations and Management

The Operations and Management Department is responsible for numerous functions including emergency management, fire and emergency services, and safety. Base operations include an ADHOC notification system for active military, military dependents, civilian federal employees and contractors.

Disaster Response

The men and women of the Center were honored for their distinguished community service and awarded the prestigious Laurel Wreath Award for significant contributions to local communities. The award traditionally honors individuals who contribute to quality of life along the Gulf Coast, but went collectively to the Seabees for their hurricane relief, disaster assistance, and community project support. A partial list of post-Katrina disaster response projects include:

- Flint Creek Camp Ground cleanup. Personnel cleared a 25-site campground enabling the area to receive FEMA trailers.
- Installation of new playground equipment at a KaBoom Playground construction site in Bay St. Louis.
- Great American Clean Up for moving large piles of debris and clearing miles of the Katrina-littered beachfront.
- Construction of six South East Asia Huts (SEAHUTS) to provide shelter for volunteers in Pearlington.
- Clearing of a 2,000 foot fire break along the Camp Wilkes Boy Scout Facility perimeter fence.

5.2 Planning and Regulatory Capability

Requirement 201.6(b)(3): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

The planning and regulatory capability section describes the preparation of plans and studies and effective implementation strategy through ordinances, policies and programs. The commitment of the community to guide and manage growth, development, and redevelopment is often demonstrated through the preparation and use of such documents. In addition to emergency response and mitigation planning, other planning initiatives present significant opportunities to integrate comprehensive hazard mitigation principles and practices into the local decision-making process. Implementation of plans is achieved through capital improvement projects, ordinances and land development.

The Gulfport Hazard Mitigation/Floodplain Management Plan will become a link to updates of plans and ordinances outlined within this section. This is accomplished by providing a copy of the approved plan to each city department and to consultants contracted by the city to assist with the development and/or update of relevant plans and studies.

Summary of Existing Plans, Ordinances and Programs

Table 5.1 provides a summary of relevant local and regional plans, ordinances and programs in place or under development. A checkmark indicates the given item is currently in place and being implemented or is being developed for future implementation. As these are updated, the Gulfport Hazard Mitigation Plan will be consulted so the goals and strategies identified are integrated where applicable.

Mitigation actions are identified in Chapter Six to integrate the programs, policies and planning initiatives listed in Table 5.1 that promote public education/awareness, compliance of the city's regulations/ordinances, and transportation/structural projects noted in the Comprehensive Plan.

Table No. 5.1
Applicable Plans, Ordinances and Programs

Plan Category/Name	City of Gulfport	Harrison County*	Regional/ State
Emergency Management Plans			
Comprehensive Emergency Management Plan (CEMP)	✓	✓	
Hazard Mitigation Plans	✓	✓	✓
Evacuation Plans		✓	✓
Harrison County Wildfire Protection Plan		✓	
Local General Plans			
Comprehensive Plan	✓	✓	
Local Codes and Regulations			
Building & Fire Codes	✓	✓	
Erosion, Sediment, and Post-Construction Control	✓	✓	
Flood Damage Prevention	✓	✓	
National Flood Insurance Program	✓	✓	
NFIP Community Rating System	✓	✓	
Petroleum Products Code	✓		
Sand Beach Ordinance	✓		
Smartcode	✓		
Subdivision Ordinance	✓	✓	
Tire Disposal Ordinance	✓		
Tree Protection Ordinance	✓		
Zoning Ordinance	✓	✓	
Other Plans and Programs			
Coastal Resource Management Plan (CRMP)			✓
Coastal Retrofit Program			✓
Pandemic Influenza Incident Annex			✓
Transportation Plan, MPO			✓

**Certain county plans and codes are relevant to the city of Gulfport in terms of standards in future annexation areas. Flooding, wildfire and emergency management plans affect larger areas than the specific governmental entity.*

Emergency Management Plans

The emergency management cycle is an evaluation theory of a situation. These cycles can be moments or years in length. Each phase does not have a specific beginning and end, but the ideas behind them are representative of our natural reactions. Emergency management planning includes the four primary phases of the cycle described as mitigation, preparedness, response and recovery.

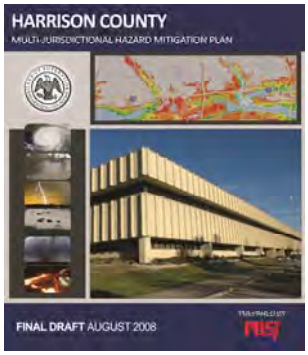
1. **Mitigation:** reduction of vulnerabilities
2. **Preparedness**: planning and training
3. **Response**: initial response
4. **Recovery**: short-term recovery includes reentry to impacted areas and restoration of essential services. Long-term recovery includes the return of normalcy and rebuilding process.

At the present time, the city has plans and training programs addressing each of the emergency management phases. They also utilize county and state plans integrated with the city's capabilities allowing for seamless response and recovery efforts.

City of Gulfport Hazard Mitigation and Flood Protection Plan

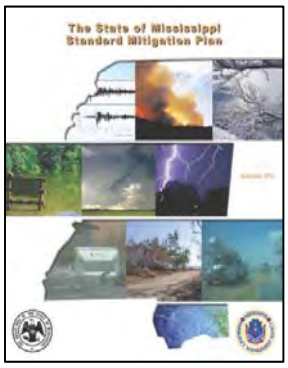
Hazard mitigation planning is a tool or blueprint for ways the community can reduce the impact of future hazards. The city updates this plan every five years and includes the following essential elements: risk assessment, capability assessment and a mitigation strategy.

Harrison County Multi-Jurisdictional Hazard Mitigation Plan, 2008



The Harrison County Multi-Jurisdictional Plan was developed to address the unincorporated jurisdiction of Harrison County. Harrison County government and the Harrison County School District are the two jurisdictions who officially adopted this plan. This plan will be updated in 2013. A copy of the Gulfport plan will be provided to the plan developers allowing for integration of mitigation strategies.

State of Mississippi Standard Hazard Mitigation Plan, 2010



Developed by the Mississippi Emergency Management Agency, the State Hazard Mitigation Plan outlines risks, mitigation capabilities, strategies and actions on a state-wide level and is updated every three years. The state plan is currently in process of being updated in 2013. The Gulfport plan will roll up to revisions of the state plan ensuring their mitigation needs are addressed in future planning initiatives.

City of Gulfport Comprehensive Emergency Management Plan (CEMP)

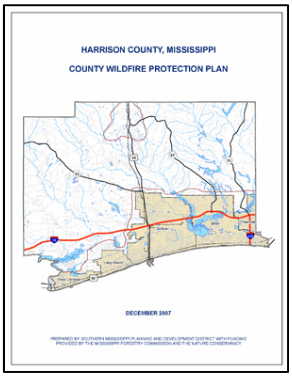
The CEMP provides a framework in which the city of Gulfport and its political subdivisions can plan and perform their respective emergency functions before, during, and after disasters or a national emergency.

Harrison County Comprehensive Emergency Management Plan (CEMP)

In order to provide an effective response to emergency situations, the federal, state, local, and tribal governments must plan and prepare together. The concept and assignment of responsibilities outlined in this plan shall serve as the basis of the conduct of emergency operations by the Harrison County Office of Emergency Management. It shall be the responsibility of all local agencies and organizations to perform their functional tasks and to prepare and maintain Standard Operating Procedures. All responsible parties shall provide notice of revisions and improvements to the Comprehensive Emergency Management Plan (CEMP) and support it through training and exercises.

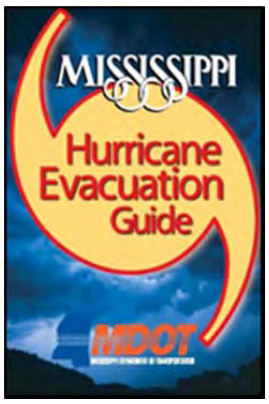
This plan is in accordance with existing federal and state statutes, in coordination with the National Response Plan (NRP) and is National Incident Management System (NIMS) compliant. It will be revised and updated at biannually, or more frequently as warranted.

Harrison County Wildfire Protection Plan, 2007



In late 2006, the Mississippi Forestry Commission and The Nature Conservancy commissioned the preparation of wildfire protection plans for a fifteen-county south Mississippi region. The plan addressed changes to the Wildland-Urban Interface (WUI) brought about by Hurricane Katrina, as well as from increased development in many parts of the region. The Plan includes several components: Geographic Information System (GIS) produced maps, County Risk Assessment, Mitigation Projects List, Structure Ignitability Recommendations and an Action Plan and Assessment Strategy.

Mississippi Hurricane Evacuation Plan



The Mississippi Department of Transportation (MDOT) developed hurricane evacuation plans including provisions for contra-flow of traffic lanes during evacuation procedures. MDOT works with the states of Louisiana and Alabama to coordinate this plan.

City of Gulfport and Harrison County Hurricane Evacuation Routes/Zones

Evacuation zones/routes have been established by the City of Gulfport and Harrison County in cooperation with adjacent counties and the state. The maps are published on the city and county's websites.

Local General Plans

Comprehensive Plan

Comprehensive Plans are long-range plans that include the entire geographical area of the county or municipality and all elements of the built environment. State enabling legislation requires the following component parts or elements are included: Goals and Objectives, Land Use, Transportation and Community Facilities (including housing). Goals and Objectives are formulated through interactive dialogue with public officials and residents. Gulfport's Community Facility element including drainage, water, and sewer utilities were presented in separate documents.

Gulfport's plan, adopted in 2004, serves as a policy guide for the physical and economic development of the city. Desired policies are implemented by city ordinances and public and private development. Since the plan provides general guidelines, more detailed documents are developed such as Zoning, Subdivision, Drainage and Flood Ordinances. The city is in the process of updating this plan.

The Comprehensive Plan and its component parts set forth goals and objectives clearly supportive of mitigation planning. In fact, it is highly desirable that comprehensive plans articulate and reinforce hazard mitigation goals. This provides decision makers with cohesive and unified standards, plus increases the probability of successful implementation.

There are common themes in Hazard Mitigation Plans and Comprehensive Plans including appropriate use of land in relation to natural barriers such as flood areas; protection of natural and historic resources; adequate transportation; community facilities; and infrastructure. Goals and objectives correlating with hazard mitigation planning are discussed in the following section.

General Goals for the Comprehensive Plan

CP-3: To provide a basis for public decisions about the city's future population and economy, land use, transportation, community facilities, development regulations and requirements, and necessary infrastructure investments.

- To provide for those areas which have environmental suitability, good accessibility, and adequate utility and storm water management infrastructure and lie in the path of identifiable development trends.
- To continue to preserve and improve the overall ambiance of the city's natural and man-made environment.

Land Use Element Goals

LU-2: To strive for an orderly development pattern and land use compatibility.

- To preserve, manage and conserve natural and historic resources as an element of the city's ambiance and environmental character.

LU-3: To identify a complementary and proportionally appropriate mixture of land uses throughout the city that will preserve its environments and support its continued growth and economic vitality.

- To require all new homes of all types within the city be sited on fully improved individual lots or sites of a size and situation consistent with the Comprehensive Plan and all related codes and ordinances.
- To require all residential units be connected to all utilities and be on a properly engineered foundation.
- To require all new manufactured and mobile homes be located on fully improved sites adequately designed sized and configured to accommodate the individual units.

Transportation Element Goals

TR-2: To provide a safe, convenient and efficient circulation system within the city which includes all modes of travel with sufficient capacity to accommodate present and expected future movement needs of all residents and visitors.

TR-28: To provide an adequate, integrated and uniform citywide system of street lighting, street signs, and traffic control devises to enhance the roadway system's convenience, safety, and visibility.

TR-32: To provide at least one grade separation for east/west access traversing the KCS Railroad corridor.

TR-36: To strive to improve the safety of all railroad crossings and primary arterial intersections through use of traffic control methods, improved intersection designs, and reduction of potential points of conflict.

Community Facilities Element Goals

CF-1: To provide an official legislatively adopted basis for the city's use of regulation, dedication, investment, assessment, and intergovernmental cooperation to provide necessary community facilities.

CF-2: To provide or facilitate provision of adequate and efficient water, sewer, electrical, natural gas and telecommunication services throughout the city and its utility service areas to accommodate all development.

CF-3: To acquire sufficient land for community facilities, parks and open space and the preservation of environmentally sensitive areas in the city in advance of their need, or require their reservation as part of the development permitting process.

CF-7: To encourage conservation of natural resources, including preservation and improvement of the water bodies and wetlands within the city of Gulfport.

Drainage Element Goals

CFD-1: Minimize potential flood damage to existing and future development

- Support and implement local projects for flood control to accommodate existing development and its surface water runoff.
- Utilize the Comprehensive Drainage Study component of the Comprehensive Plan to estimate and accommodate surface water runoff associated with new development.
- Allow development or redevelopment in floodplain or wetland areas only when impacts are adequately considered and properly mitigated.

CFD-2: Minimize the drainage related impacts of development on upstream and downstream properties.

- Support and implement local projects for drainage enhancements intended to accommodate new development.
- Allow development or redevelopment only when surface water impacts are adequately considered and properly mitigated.
- Encourage sustainable development practices.
- Implement effective erosion protection and sediment control measures.

CFD-3: Implement the Comprehensive Drainage Study to promote future storm water management and flood control.

- Upgrade the city's Storm Water Management Program to address EPA Phase II Storm Water Regulations.
- Establish a pilot program for storm water management in high priority basins.
- Update the city's development ordinances to address recommended storm water management practices.
- Consider establishment of a watershed development permit process
- Support a regional storm water management approach for high priority basins.

Water Element Goals

CFW-1: Provide an adequate water system for the entire City of Gulfport.

- Acquire all certificated water systems within the presently configured city and any added areas necessarily associated with acquisitions outside the city limits.
- Interconnect all existing and acquired water systems.
- Extend water distribution lines into development areas presently served by individual wells.
- Upgrade all water utility infrastructures to applicable standards for consumption and municipal fire protection.
- Upgrade and/or replace all portions of the existing systems that are substandard.
- Extend, as needed by additional development, the city's water system into the balance of the Planning Area.
- Add wells and storage tanks as required by the hydraulic analysis of the system.
- Install fire hydrants based on requirements of the Mississippi Rating Bureau.

Sewer Utilities Element Goals

SU-1: Provide municipal quality sewage service to all potential customers within the city of Gulfport.

- Systematically upgrade existing and acquired sewage systems to minimize infiltration, inflow, and optimize capabilities.
- Systematically replace older inadequate pump stations and collection systems.

SU-2: Protect the quality of surface water and groundwater resources.

- Support environmental programs and projects that promote water quality.
- Implement an on-site wastewater management program
- Strive to reduce the number of wastewater discharges.
- Strive to reduce non-point source pollution

Local Codes, Ordinances and Regulations

Building and Fire Codes

The purpose of building codes is to provide minimum standards to safeguard life, health, property and public welfare by controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings, structures and certain equipment. The city Building Code Official reviews and approves building plans, makes subsequent inspections and issues a Certificate of Occupancy upon satisfactory completion of construction.

The Fire Code of the city of Gulfport provides minimum standards for design of all buildings. Buildings for use by the public have additional standards including use of fire-resistant building materials, fire extinguishers, sprinklers for certain sizes and types of buildings, spacing between buildings, and adequate ingress and egress routes.

The Fire Code also regulates potential hazards associated with fire, explosion and hazardous materials. The Code establishes a fire prevention official who enforces the code governing, among other things, storage of explosives or blasting agents; storage of flammable liquids; designation of routes for vehicles transporting explosives or blasting agents; and routes for transporting hazardous materials.

The following codes have been adopted by the city of Gulfport:

- One- and two-family dwellings: International Residential Code, 2006 edition, including appendix chapters E, G, H, M, and O, as published by the International Code Council, Incorporated.
- Other Buildings: International Building Code, 2006 edition, including appendix chapters B, D, E,F,G, I, J, and K, as published by the International Code Council.
- Housing Code: Standard Housing Code, 1994 Edition, published by the Southern Building Code Congress International, Inc.
- Unsafe Building Abatement Code: Unsafe Building Abatement Code, 1985 Edition.
- Hurricane Residential Construction Manual SSTD 10-93 Resistant Code
- International Property Maintenance Code, 2006 edition, as published by the International Code Council.
- Plumbing Code: International Plumbing Code, 2006, including appendix chapters B, C, D, E, E, F, and G, as published by the International Code Council.
- Gas Code: International Fuel Gas Code, 2006 edition, including appendix chapters A, B. C, and D, as published by the International Code Council.
- Mechanical Code: International Mechanical Code, 2006 edition, including appendix chapter A, as published by the International Code Council.
- Electrical Code: National Electric Code (NFA 70), 2002 edition.

Erosion, Sediment, and Post-Construction Control Ordinance

The Erosion, Sediment and Post-Construction Control Ordinance seek to prevent excessive storm water runoff resulting from new development and other land disturbances. By requiring best management practices before, during and after construction or disturbance, erosion of soil resulting in siltation in gutters, streams and waterways is controlled. This not only protects adjoining property owners, but helps prevent flash flooding and infill of waterways.

Principal Objectives of Storm water Management Ordinance

- Minimize increase in storm water runoff from any development to reduce siltation, increases in stream temperature, stream bank erosion, and maintain the integrity of stream channels.
- Minimize increase in nonpoint source pollution caused by storm water runoff from development which otherwise degrades local water quality.

- Minimize the annual volume of surface water runoff flowing from any specific site during and following development to not exceed the pre-development hydrologic regime to the maximum extent practicable.
- Reduce storm water runoff rates and volumes, soil erosion, and nonpoint source pollution, whenever possible, through storm water management controls and ensure these management controls are properly maintained and pose no threat to public safety.

General Requirements of Erosion, Sediment, and Post-Construction Control Ordinance

Any construction, development or clearing of land of ten thousand (10,000) square feet or more requires a permit from the city outlining best management practices to be used for storm water control. Development of one (1) or more acres requires a post-construction storm water management plan (SWPP). As-built plans are required for drainage facilities maintained by the city as part of a storm water maintenance agreement.

Disturbance of smaller areas are approved by the Building Official and all new development, including subdivision of land, is reviewed by the site plan committee.

Flood Damage Prevention Ordinance

The purpose of the flood prevention ordinance is to minimize public and private losses due to flood conditions using provisions designed to:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards.
- Require uses vulnerable to floods are protected against flood damage at the time of initial construction.
- Control the alteration of natural floodplains, stream channels, and natural protective barriers involved in the accommodation of flood waters.
- Control filling, grading, dredging and other development which may increase erosion of flood damage.
- Prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or may increase flood hazards to other lands.

General Standards of the Flood Damage Prevention Management Ordinance

The city of Gulfport participates in the NFIP program and adopted post-Hurricane Katrina Flood Insurance Maps (FIRMs) that govern development in flood zones in conjunction with the ordinance. Construction and substantial improvements to buildings located in certain flood zones are required to have the lowest floor, including basement, at a minimum of one foot above the base flood elevation. Other requirements include anchoring of manufactured homes and accessory buildings.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a federal program enabling property owners and renters to purchase flood insurance. It is based on an agreement between communities and the federal government whereby a community adopts and enforces certain floodplain regulations so the federal government will make flood insurance available in that community.

NFIP Community Rating System

The CRS is an incentive-based program encouraging pre-defined flood mitigation activities that go beyond the minimum requirements of the NFIP. The city of Gulfport participates in this program.

The city of Gulfport is a participant in the National Flood Insurance Program and the Community Rating System, illustrating the city's commitment to flood hazard mitigation. The CRS program encourages cities to go beyond the minimum requirements of the flood insurance program and rewards communities implementing various flood mitigation measures by reducing flood insurance rates to constituents. Gulfport's current CRS rating is 6.

Sand Beach Ordinance

The land situated within the incorporated limits of the city of Gulfport bounded on the east by the centerline of Debuys Road, on the west by Lewis Avenue, on the north by the northern edge of the right-of-way of U. S. Highway 90, and on the south by mean high tideline of the Mississippi Sound is regulated by this ordinance. Except for sanctuary areas reserved for least tern nesting, the sand beach area, with certain restrictions, is intended for use by the general public.

Prohibited activities include but are not limited to: lighting of fires or fireworks without a proper permit; prohibition of certain types of containers, motor vehicles, horses, tents, firearms or air guns; and vendor sales without a proper permit. The city may close the beach due to hurricane warnings and all vendors' merchandise, vehicles, and other property or movable structures must be removed from the beach.

Petroleum Products Code

The city requires a permit for the construction, reconstruction or modification of automobile service stations, marine filling stations, bulk plants and other businesses handling, storing or dispensing petroleum products, plus, all relevant safety standards are applicable

No service station, bulk plant or other business handling, storing or dispensing petroleum products is allowed to abandon any premises without first removing tanks or other containers where such products have been stored, unless such tanks or other containers have been treated to prevent fire or explosion to the satisfaction of the city plumbing inspector.

Smartcode Ordinance

The Smartcode Ordinance was adopted as a part of, and in addition to, the Comprehensive Zoning and Planning and Development codes of the city. Areas approved to be "Smartcode" developments enjoy relaxation of certain bulk requirements for placement of buildings; but, must adhere to additional restrictions for urban and architectural design. Incentives for "Smartcode" developments include density bonuses that allow higher density development.

In addition to other purposes, the code is designed to assist in retention of natural infrastructure and visual character derived from topography, woodlands, farmland, riparian corridors and coastlines. A prototypical American rural-to-urban transect was designed which divides the city into six Transect Zones, or T-zones, for application on zoning maps. Standards were written for the first transect-based codes, eventually to become the Smartcode, which was released in 2003 by Duany Plater-Zyberk & Company. One of the main purposes of the code is to help eliminate suburban sprawl by concentrating higher development areas within the core of the city, while preserving rural areas with cluster development.

Subdivision Ordinance

The Subdivision Ordinance regulates the division of land by requiring specific standards for the following:

- Legal Platting and Recording Process.
- Standards for layout of lots and streets including survey and monuments.
- Storm water pollution prevention and drainage.
- Infrastructure including streets, sanitary sewer, storm water facilities and other utilities.
- Inspection and permitting.
- Administration and enforcement including remedy for non-conformance.

General Standards for Subdivision Requirements

The subdivision of land must conform to the city's master plan, the zoning ordinance, and other applicable ordinances and regulations including the Erosion, Sediment, and Post-Construction Control Ordinance and the Flood Prevention Ordinance. Land subject to flooding may not be platted for residential occupancy nor for any use that may increase danger to health, life or property or aggravate the flood hazard. If land is located in an area having poor drainage or other physical impairments, it may be approved subject to the subdivider making needed improvements to render the area safe.

Protection of natural scenic features, bayous and trees is required. Drainage easements for watercourses, drainage ways or streams are required to substantially conform to the lines of such watercourses and shall have width or construction adequate for maintenance.

Tire Disposal Ordinance

Regulations for proper storage, transportation, collection, processing and disposal of tires are included in the Tire Disposal Ordinance. Such an ordinance is needed to avoid waste management problems that can become a fire hazard, add to infestation of rodents, mosquitoes, and provide collection points for stagnant water.

Permits are required for all businesses located within the city engaging in the resale of tires or the generation of waste tires. Tire Hauler permits are required for haulers, not affiliated with a tire business. Such businesses must exhibit conformance with the regulations of the Tire Disposal Ordinance plus all applicable state and federal regulations.

Tree Protection Ordinance

The purpose of the Tree Protection Ordinance is to regulate, control and promote the planting of trees;, encourage the protection of existing trees in the streets and public grounds within the city;, and regulate the preservation, replacement and indiscriminate removal of trees on private property. The intent is to protect existing trees and promote planting of additional trees for soil conservation, control air pollution, manage on-site storm water runoff, enhance water quality, preserve wooded wetlands and enhance the beauty, health and safety of the city.

General Standards for Tree Protection Ordinance

It is unlawful to remove, destroy, or cause irreparable damage to certain protected trees without a permit. Protected trees include certain species with a total caliper trunk of eight (8) inches or a circumference of twenty-five (25) inches or more. Examples of protected species include live oak, southern magnolia, sweet bay, bald cypress, chestnut oak and others.

Site plans for development or redevelopment must be submitted showing trees will be protected during construction, the means of protection, as well as new and replacement trees to be planted. Trees damaged, diseased, or presenting a possible danger to life and property may be removed after approval.

Zoning Ordinance

The purpose of the Zoning Ordinance is to provide regulations designed to lessen congestion; secure safety from fire, panic and other dangers; promote health and general welfare; provide adequate light and air; prevent the overcrowding of land; avoid undue concentration of population; facilitate the adequate provision of transportation, water, sewerage, schools, parks and other public requirements.

General Regulations

- Use of land by zoning district.
- Intensity and Dimensional Standards (Minimum lot area, width and depth, structure height and required setbacks, maximum lot coverage).
- Development Standards (Access and circulation; off-street parking and loading; landscaping for commercial and multi-family development; required vegetated buffers).
- Administration and enforcement procedures including remedy for non-conformance.

Certain Specific Districts

In addition to establishment of various types of residential, commercial and industrial districts, the ordinance contains requirements for the Waterfront District (WF) and the Gulfport-Gulfport Regional Airport Environs and Airspace Zoning District (AEAZD). A Beach Shoreline District is established with regulations in the Beach Shoreline Ordinance and a Flood Hazard Overlay District is established with boundaries to be determined by the most recent FIRM and Floodway maps and regulations in the Flood Prevention Ordinance.

The AEAZD district applies a Land Use Compatibility Overlay and a Height/Airspace Overlay which are further subdivided into three (3) sub districts representing differing levels of noise impact. The purpose of this district is to insure adequate airway approach paths and control surrounding development in a manner protecting the public from excessive light and noise.

General Standards for Landscaping

The Zoning Ordinance requires landscaping on commercial, industrial and multi-family sites. Credit is given for existing vegetation retained and protected during construction. Protection of certain types of trees, including disturbance of tree canopy area, is mandatory. Vegetated buffers are required between certain uses to mitigate noise or other f disturbances. These standards enhance the ability of the city to prevent excessive runoff from altering existing ground cover.

5.3 Other Plans and Programs

Coastal Resource Management Plan (CRMP)

The mission of Comprehensive Resource Management Plan (CRMP) is to sustain Mississippi's coastal resources and provide a healthy economy in the coastal area.

The overall objective of the Office of Coastal Management and Planning is to build the capacity of state and local governments to manage and protect coastal wetlands and marine resources in Mississippi. This objective is accomplished through coordinating agency efforts, developing necessary partnerships between public and private entities, and integrating wetland protection and management into the lifestyle of the coastal community.

There are four programs within the Office of Coastal Management and Planning. The first is a planning assistance program to support the 11 coastal cities and six coastal counties with planning needs for their regions. The second is a smart growth program, which began with the Storm Water Toolbox, and is designed to assist the six-county region with education on smart growth. The third program is the Mississippi Gulf Coast National Heritage Area (NHA). Their mission is to continue growth of the economy by using natural resources, heritage, recreational, and historical assets in the six-county region. The fourth program is the Coastal Impact Assistance Program (CIAP). Grants from CIAP total $120 million for the six coastal counties of Mississippi.

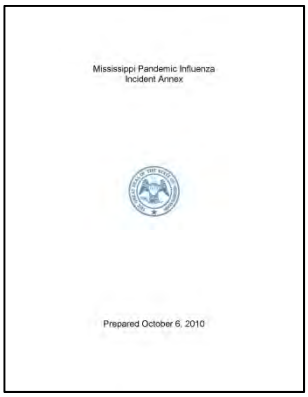
Coastal Retrofit Program

The Coastal Retrofit Program is a $27 million grant project funded by FEMA to help homeowners strengthen their homes against wind damage. Retrofitting projects may include installation of roof retrofits in the attic and opening retrofits around windows and doors, as well as other techniques determined to be beneficial. Wind engineering analysis helps determine the type of retrofitting needed for each home.

The Mississippi Emergency Management Agency manages a Hazard Mitigation Grant Program that funds up to 90 percent of the cost of the standard retrofit package(s) for individual grants to homeowners residing in Mississippi's three coastal counties of Hancock, Harrison and Jackson and minimally meet the following qualifications:

- Owner-occupied single family structures.
- Owners have a current homestead exemption.
- Homes meet or exceed FEMA's required Benefit Cost Analysis ratio.
- Homes are site built and mounted on a secure foundation.

Mississippi Pandemic Influenza Incident Annex

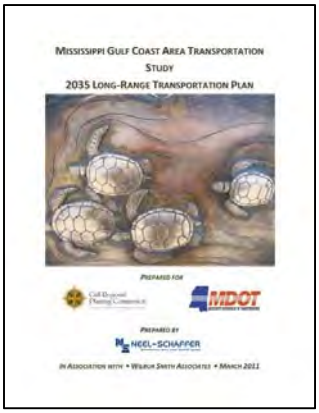


The Pandemic Influenza Annex, prepared by the state of Mississippi in 2010 provides a framework for the management of statewide operations in response to a Pandemic Influenza (PI). Policies and procedures for maximum preparedness, response, and recovery efforts are established for state agencies, and county and local governments.

The initial responsibility for the first level of Pandemic Influenza response, emergency actions, direction, control and coordination rests with the local government through its elected and appointed officials. County and municipal governments will function in accordance with local laws and community requirements.

During a Pandemic Influenza, local jurisdictions and public health entities are responsible for coordinating healthcare activities within the community and should work with local health departments and hospitals to accomplish this mission. Local government officials, through the emergency management director or designee, coordinate with MEMA and remain consistent with the Mississippi Comprehensive Emergency Management Plan (CEMP) and the Mississippi State Department of Health (MSDH) ES-8 Concept of Operations for Public Health Plan.

Long-Range Transportation Plan (Metropolitan Planning Organization)



Long-range planning for major transportation routes is required by federal statute for urbanized areas with a population greater than 50,000. The Gulf Regional Planning Commission coordinates the preparation of this plan for the Gulfport-Biloxi and the Pascagoula-Moss Point urbanized areas.

5.4 Warning Systems, Public Outreach and Information Systems

Effective pre-event public warning systems and outreach is of upmost importance in hazard mitigation planning. The ability to maintain current and up-to-date data on the location and type of structures is also vital. The city of Gulfport has numerous methods for each area itemized in Table 5.2 and followed by a brief discussion.

Table 5.2
Warning Systems, Public Outreach Programs and Information Systems

Warning Systems	
NOAA Weather Radio Reception	✓
Reverse 911	✓
Alert FM	
Public Outreach Programs	
C-Host	✓
Storm Smart Network	✓
Local Outreach Programs	✓
Information Systems	
GIS Data	✓
Building Footprint	✓
Assessor Data with land use data	✓

Public Warning Systems

Residents of the city of Gulfport are notified of imminent hazards in a variety of ways. Dependent upon the type of situation NOAA Weather Radio Reception, Cable Over-ride, Reverse 911, Alert FM and other methods may be utilized.

Coastal Hazard Outreach Strategy Team (C-HOST)

The C-HOST regional outreach team, established in 2008, helps educate residents about flood hazards, flood insurance, flood protection measures, and the NFIP.

The Team consists of Building Officials, Certified Floodplain Managers, NFIP CRS Coordinators, Planning & Zoning Officials and others who serve the CRS communities of Bay St Louis, Gulfport, D'Iberville, Gautier, Gulfport, Harrison County, Long Beach, Ocean Springs, Pascagoula, Pass Christian, and Waveland. It is supported by FEMA, MEMA, and the Insurance

Services Office (ISO). Local residents, business people and other stakeholders are also a part of the team.

C-HOST Goals are as follows:

- Goal 1: To make the public aware of the flood threat the communities may be susceptible to.
- Goal 2: To promote an all-hazard approach to public outreach.
- Goal 3: To educate local officials as to the importance of making the public aware of flood threats and other hazards.
- Goal 4: To provide a level of consistency in the public message disseminated from the various public entities participating in this strategy.
- Goal 5: To provide for the most comprehensive coverage for public outreach using the most cost effective means, including the pooling of resources and seeking of private sector sponsors.
- Goal 6: To promote the public awareness of the DFIRMS to the community.

Through dissemination of information and working together, the team seeks to ultimately improve the overall rating in the CRS program for each community represented.

StormSmart Coasts Network

The StormSmart Coasts Network is a web resource dedicated to helping decision makers in coastal communities address the challenges of storms, flooding, sea level rise, and climate change. In addition to the website, it includes a network of state and local sites gives coastal decision makers who interact to provide tools and collaborative efforts.

The StormSmart Coasts began with a NOAA Coastal Services Center Coastal Management Fellowship in the Massachusetts Office of Coastal Zone Management. National Sponsors include FEMA and EPA. The Gulf of Mexico Alliance is a regional sponsor.

Local Outreach Programs

In addition to providing information through organized networks, local officials and staff workers provide information to residents through internet, day-to-day interaction and as a part of community meetings.

Information Systems

In order to maintain accurate data bases and maps for local decision makers and the public, Geographic Information Systems (GIS) are maintained by the city and accessible online through a geo-portal. Zoning and DFIRM maps are also provided online in pdf format. The city's mapping department is responsible for categorizing land use, building footprints, and property owner and tax assessor data.

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6.0 Mitigation Strategies Overview

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

The purpose of Gulfport's mitigation strategy is to avoid, minimize and mitigate the impacts of natural and manmade disasters on both people and property within the city. Activities to achieve this goal are currently reached through established building and zoning codes plus other regulations and activities. As the city continues to grow and develop/ update plans, ordinances and regulations, a careful review of the city's mitigation strategy should be conducted and incorporated into any future changes/additions to policies. This ensures the goals of providing a safe and livable community will continue in the face of hazards.

To facilitate future incorporation of the mitigation strategies outlined in this plan, a copy will be distributed to each applicable city department. The approved plan will also be available to any consultants contracted to assist the city with future studies and plans being developed or updated.

6.1 Priorities and Progress Made Since 2007 Plan

Priorities

Through the rebuilding process following Katrina, Gulfport has integrated mitigation strategies in their regulations/ordinances to promote sustainability. The commitment of the city remains a high priority in reducing vulnerabilities articulated throughout this plan. The hazard identification and risk assessment, mitigation strategies and plan maintenance chapters provide specific information identifying areas of concern and procedures to implement continued commitment in reducing or eliminating those vulnerabilities.

Progress Made on Mitigation Strategies

Since Hurricane Katrina in 2005, Gulfport continues to progress in completing recovery and mitigation projects to lessen their vulnerabilities from natural disasters. Even though eight years have passed, there is still much to do. A representative list of completed and/or ongoing accomplishments of actions identified in the 2007 plan is provided in Tables 6.1 Examples and specific details regarding some of these actions, public outreach information posted on the city's web page, and a list of HMGP grant applications since 2007 is provided in Appendix 8.6-A.

Table 6.1
Accomplishments Achieved on 2007 Mitigation Actions

Action Number and Description	Progress Made
6. Retrofit existing public critical facilities to be more resistant to all hazards	Charles Walker Community Center/FEMA 361 Shelter Upgrade Gulfport Municipal Complex (Downtown)
7. Establish backup emergency operations centers within the city of Gulfport, and make these structures resistant to all hazards	Police Department is designated as backup EOC and has been hardened to withstand all hazards.
9. Work with community members to identify illegal tire dumps to reduce threat of mosquito breeding.	New ordinance in place regarding tire disposal.
13. Continue to assist homeowners living in SFHA to mitigate their properties by elevating structures or by removing the structure from the floodplain	Several properties have been mitigated through elevation/removal.
42. Coordinate with Harrison County and MEMA to establish shelters in Harrison County.	Ten shelters are completed within the county - no more planned
53. Secure generators for sewer lift stations	Two generators have been purchased
54. Establish generators for critical city operations	Generator installed at the Municipal Complex
61. Work with SMPDD and MFC to implement wildfire mitigation measures.	SMPDD has developed a Wildfire Protection Plan for Harrison County in December 2007
H. Raise sewer manholes within the Advisory Base Flood Elevation areas and outside the Advisory Base Flood Elevation areas that may be subject to the overflow threat from flooding, and install sewer manhole lockdown lids where elevating manholes would be cost prohibitive.	All sewer manholes have been mitigated
J. Elevate traffic control boxes located within flood prone areas.	Traffic control boxes have been mitigated
K. Dry or wet flood proof flood prone water and sewer station buildings.	All facilities have been mitigated with flood protection
N. Construct a levee or dike system to protect Floral Estates.	A levee system was developed in 2009 for Flora Estates
U. Elevate/relocate bridges that provide access to neighborhoods to protect residents	Tara Hills Bridge widened and elevated
Enforcement of the city's ordinances and regulations (numerous actions)	Ongoing
Public education and awareness actions (numerous actions)	Ongoing

6.2 National Flood Insurance Program Compliance

Requirement §201.6(c)(2)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

The city of Gulfport has participated in the National Flood Insurance Program (NFIP) since 1996 and is proactive in mitigating properties classified as Repetitive Flood Claim (RFC) or Severe Repetitive Loss (SRL). A list of properties mitigated through elevation, acquisition and/or demolition and those properties remaining on the RFC/SRL list are maintained by the city's CRS Coordinator.

Table 6.2 provides a summary of the status of properties and the progress made by the city on mitigating RFC/SRL properties (by structure type) as of the May 2011 NFIP report. A generalized table of mitigated and non-mitigated properties (without address/owner information) is provided in Appendix 8.6-B.

Table 6.2
2011 Flood Claim Property Summary

Mitigated Properties			
Occupancy	No. of Properties	Total Losses	Total Paid (Building and Contents)
2-4 Family	1	2	150,211.72
Assmd Condo	9	35	1,362,757.90
Non Resident	8	26	1,113,261.60
Other Resident	1	10	190,541.99
Single Family	145	522	13,268,453.40
Sub Total Mitigated	164	595	16,085,226.61
Non-Mitigated Properties			
2-4 Family	11	35	$2,392,082.27
Assmd Condo	5	13	$1,591,397.53
Non Resident	38	124	$8,435,406.05
Other Resident	5	12	$5,973,053.75
Single Family	236	629	$28,164,147.67
Sub Total Non-Mitigated	295	813	$46,556,087.27
Total Flood Properties/Claims	459	1,408	$62,641,313.88

Source: State of Mississippi NFIP Report May 2011

Remaining properties will continue to be mitigated as opportunities and funding become available. Chapter Six - Capabilities Assessment contains information on the city's Flood Damage Prevention Ordinances to prevent future RFC/SRL properties from occurring. The city

also participates in the Coast Hazard Outreach Strategy (C-HOST) regional outreach program. The C-HOST partners work together to obtain and improve each community's current CRS classifications. Public outreach messaging is available at http://chost.stormsmart.org.

The city continues to educate homeowners about grant programs available to mitigate their homes from future losses through elevation, acquisition or demolition activities. Flood safety information is available on the city's web page under the Flood Information Quick Link (http://www.gulfport-ms.gov/flood-info.shtml) and C-HOST web page (http://chost.stormsmart.org). The city publishes information in the Yellow Pages for the Mississippi Gulf Coast and launched an advertising campaign for flood insurance airing on local radio and television stations.

The Deputy Building Official serves as Gulfport's Floodplain Manager and enforces existing and future development within the floodplain, complies with floodplain regulations/ordinances adopted by the city, serves on the C-HOST Committee and provides frequent flood safety educational awareness campaigns to the public. The city has four (4) Certified Floodplain Managers (CFM) on staff.

Community Rating System

The Community Rating System (CRS) is a voluntary program for National Flood Insurance Program (NFIP) participating communities. The goals of the CRS are to reduce flood damages to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management.

The CRS was developed to provide incentives in the form of premium discounts for communities, to go beyond the minimum floodplain management requirements, and to develop extra measures for protection from flooding. Gulfport is proactive in improving their CRS rating by continually providing public information and conducting floodplain management activities as described in the CRS Coordinator's Manual. As a result of their dedication, the CRS rating dropped from 8 to 6 since the 2007 plan.

Community Number:	285253	Current Class:	6
CRS Entry Date:	10/01/1996	% Discount for SFHA:	20%
Current Effective Date:	10/01/2011	% Discount for Non-SFHA:	10%
Effective October 2012			

Documentation of the public outreach strategies for C-HOST, information for the Yellow Pages, public information presented on the city's web page, and documentation of notification and public meetings in the CRS verification reports are included in Appendix 8.6-C.

6.3 Mitigation Goals and Objectives

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

The Gulfport Hazard Mitigation Planning Committee reviewed the mitigation strategies outlined in the 2007 plan ensuring the city's plans for reducing potential losses is still effective. In general, the Committee determined the goals should be restructured into a broad-based approach. The twelve goals were reduced to three and a layer of objectives (Table 6.3) were added to develop strategies to reach the goals.

The Committee analyzed loss estimates in the risk assessment from information gathered during the community capability assessment (relevant plans, studies and ordinances), and public input determining additional goals, objectives and actions to be added. This ensures the city is addressing all potential hazard impacts appropriately to advance their strategies in reducing potential loss.

The mitigation goals for natural and technological/man-made/health-related hazards are designed to serve as general guidelines explaining what the city hopes to achieve. The goals are long-term, broad policy-type statements representing the overall vision of the mitigation plan. Objectives define the strategies and implementation steps used in attaining the identified goals, and are specific and measurable. Finally, actions are specific tasks aimed to help the city achieve its mitigation goals and objectives. Action items were prioritized and assigned to an appropriate department/agency to assure implementation.

Tables 6.3 and 6.4 provide a listing of the revised goals and objectives for the 2013 plan. Since many changes occurred in the wording and organization of the goals from the 2007 plan, a copy of the mitigation goals and actions from this plan are provided in Appendix 8-6.D for historic reference.

Table 6.3
2013 Revise Goals and Objectives
Natural Hazards

Goal 1: Minimize loss of life, injury, damage to property and natural systems from natural hazards
Objective 1.1: Protect the life, health and safety of residents
Objective 1.2: Protect existing/new critical facilities and infrastructure
Objective 1.3: Provide protection for future/existing developments to the extent possible
Objective 1.4: Provide backup power to critical facilities/infrastructure
Objective 1.5: Preserve, create and restore natural systems to serve natural mitigation functions
Objective 1.6: Minimize flood loss and coastal storm impacts
Objective 1.7: Minimize wildfire impacts
Objective 1.8: Minimize severe storm impacts
Objective 1.9: Explore impacts to natural hazards prone to Gulfport
Goal 2: Maintain and enhance the city's emergency management/mitigation capabilities
Objective 2.1: Update/develop plans/studies for all hazards
Objective 2.2: Incorporate/improve mitigation strategies into the city's ordinances, plans and polices
Objective 2.3: Conduct/develop drills/training for all hazards
Objective 2.4: Implement and maintain the city's mitigation plan
Goal 3: Maintain public education and awareness activities
Objective 3.1: Expand the city's Public Outreach Campaigns
Objective 3.2: Promote disaster preparedness planning for families and area businesses

Table 6.4
2013 Goals
Technological/Man-made/Health-Related Hazards

Goal A: Enhance public education and awareness of technological, man-made and health-related hazards
Goal B: Enhance the city's emergency management capabilities for technological, man-made and health-related hazards

6.4 Identification and Analysis of Mitigation Actions

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

With the revised goals and objectives in place, the Gulfport Hazard Mitigation Council conducted an exhaustive review of the 2007 mitigation actions to determine changes needed to accomplish the city's overall mitigation strategies. Table 6.5 provides a summary of the projects identified in the 2003 and 2007 plans completed or determined not suitable for inclusion in the 2013 plan. Details for these projects are included in Appendix 8.6-D for future reference.

Table 6.5
Mitigation Actions Removed

3	17	24	30	45	51	58	L
8	19	25	37	46	53	64	M
10	20	26	40	47	55	A	T
11	22	27	43	48	56	E	
12	23	29	44	49	57	G	

Particular attention will be paid to the identified actions designed to reduce the effects of hazards on new buildings and infrastructure. The city will refer to the data presented in Chapter Four of this plan and utilize current technology and/or products for future changes/additions throughout its jurisdiction.

Furthermore, the city will strive to reduce the effects of natural hazards on existing buildings and infrastructure. For example, retrofitting a safe room within an existing building can provide increased protection to those seeking shelter. City leaders will utilize the best approach for improving existing conditions of buildings and infrastructure where practical.

The projects identified for this plan are provided in Tables 6.6 and 6.7 and include projects that may require substantial funding and may be difficult for the city's commitment due to tight budget constraints caused by the current economy. All of the mitigation actions identified in this plan may not be implemented, but merely represent actions the city of Gulfport has deemed as potentially viable. Details regarding infrastructure projects referenced in several mitigation actions in Table 6.6 are provided in Appendix 8.6-E. Documentation includes the following:

- Section 6 – Streets and Drainage Projects (Capital and In-House)
- Section 7 – Water and Sewer Projects (Capital and In-House)
- Status of surge protection of city stations, county interceptor statins and wells and tanks
- SCADA priority list
- Water well generator needs

Classification of Mitigation Actions

Numbering of Actions: Numeric and alpha sequencing was used to identify the mitigation actions in the previous plans. Since many changes were made to the overall organization of this section, it was determined the projects should be renumbered using numeric values for natural hazards and alpha/numeric values for the technological/man-made/health-related actions.

Responsible and Support Agency/Department: To be successful in implementing and tracking mitigation actions, ownership must be given to the appropriate agency/department responsible for the activity. The identifications made in the actions outlined in this plan were based on current conditions and may require modification upon implementation. A designation of "to be determined" was applied when the actions may have varying degrees of activation and the responsible and/or support group will be dependent upon the phase being implemented.

Background and Next Steps: Each action includes background information identifying the need and the next steps provide the potential implementation measures desired.

Priorities: The Committee assessed the goals of this plan, the requirements of the NFIP, other relevant plans and studies, capabilities outlined in Chapter 5 and determined the following factors were consistent in each of these initiatives. A scale of 1 to 5 was used to rank the actions as either a high, medium or low priority. (The completed ranking worksheet is provided in Appendix 8-6.F)

- Risk to people
- Risk to facilities/infrastructure (loss of function)
- Level of need and severity of the problem
- Benefit(s) from completion of the project
- Ease of implementation
- Availability of resources to complete the project.

The factors above were combined with an overall priority ranking for the action with the highest possible score of 30 as defined below:

Low – score of 6-14 Moderate – score of 15-22 High – score of 23-30

Date of Origin: To improve the tracking of mitigation actions for implementation, a date of origin field was added. Projects brought forward from previous years will be dated 2007 and new projects identified during the development of this plan will be dated 2013.

Timeline and Potential Funding: In addition to the prioritization criteria listed above, project timelines and potential funding sources were discussed and annotated.

Hazard Type and Mitigation Groups: Each mitigation action was identified for the natural hazard it addresses and sorted into a mitigation group as defined below:

Prevention: Government, administrative, and regulatory actions or processes influencing the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations.

Property Protection: Actions involving the modification of existing buildings or infrastructure to protect them from a hazard or remove them from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, flood proofing, storm shutters, and shatter-resistant glass.

Public Education and Awareness: Actions that inform and educate citizens, elected officials, and property owners about potential risks from hazards and potential ways to mitigate these risks. Actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

Natural Resource Protection: Actions that not only minimize hazard losses but also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.

Emergency Services: Actions protecting people before, during, and after a hazard event. Administrative and emergency operations offices that provide critical and vital services, coordinate warnings, responses, and recovery from a disaster are identified. Actions include protection of warning system capabilities, protection or hardening of critical facilities, protection of infrastructure needed for emergency response and training.

Structural Projects: Actions involving the construction of structures to reduce the impact of a hazard include storm water controls. *(e.g.* culverts, floodwalls, seawalls, retaining walls, and safe rooms.)

Technical Assistant Projects: Actions that involve required support/education from federal, state and local agencies, data collection for GIS mapping, utilization of technology, and upgrades as products are developed.

Table 6.6
2013 Natural Hazard Mitigation Actions

Goal 1: Minimize loss of life, injury, damage to property and natural systems from natural hazards	
Objective 1.1: Protect the life, health and safety of residents	
Action 1 - Install severe weather warning systems across the city	
Plan Year Identified	2007
Hazard Type	Severe Weather, Tornado
Mitigation Strategy	Emergency Services
Priority	Medium
Background/Next Steps	Install tornado warning system(s) in the City of Gulfport to complement the methods of warning already used by the Harrison County Emergency Operations Center, the National Weather Service and the City of Gulfport. Identify site locations and develop cost estimates. Complete HMGP applications when funding cycle opens.
Responsible Agency	Mayor, City Council, Engineering
Support Agency	MEMA
Estimated Timeline	2018
Potential Funding Source(s)	HMGP
Action 2 - Install electronic information alert signs over major evacuation routes to alert residents and travelers of threat conditions	
Plan Year Identified	2007
Hazard Type	All
Mitigation Strategy	Emergency Services
Priority	High
Background/Next Steps	Permanent and portable message boards have been installed throughout on state of key transportation routes. More systems will be installed as funding becomes available. A project for a permanent sign has been identified for the Gulfport area but is waiting on funding. Until then, portable units will be made available as needed.
Responsible Agency	Mississippi Department of Transportation
Estimated Timeline	2018
Potential Funding Source(s)	FHWA
Action 3 - Continue to work with CTA and other transportation providers to evacuate people that do not have transportation	
Plan Year Identified	2007
Hazard Type	Hurricanes and Flooding
Mitigation Strategy	Emergency Services
Priority	High
Background/Next Steps	Harrison County maintains an MOU with CTA to provide transportation services for planned evacuations. The city will continue to communicate evacuation needs to the County and applicable state agencies.

Responsible Agency	Harrison County, MEMA
Support Agency	CTA
Estimated Timeline	Ongoing
Potential Funding Source(s)	FEMA
Action 4 - Continue participation in C-HOST Program	
Plan Year Identified	2013
Hazard Type	Flood and Coastal Storms
Mitigation Strategy	Prevention
Priority	High
Background/Next Steps	The city of Gulfport is a member of the Coastal Hazard Outreach Strategy Team (C-HOST). The purpose of this team is to share resources and capitalize on what is being done, coordinate messages, and develop new projects to fill any identified gaps left by existing programs. Educational materials are provided to the public.
Responsible Agency	Building Department
Support Agency	Mayor and City Council
Estimated Timeline	Ongoing
Potential Funding Source(s)	General budget
Objective 1.2: Protect existing/new critical facilities and infrastructure	
Action 5 - Storm proof new critical facilities and infrastructure	
Plan Year Identified	2007
Hazard Type	Multi-Hazard
Mitigation Strategy	Property Protection
Priority	High
Background/Next Steps	New construction of public buildings/infrastructure within the City should include advanced mitigation techniques when practical. Measures may include roof and foundation supports, shutters, shatter-proof windows/doors, etc.
Responsible Agency	Mayor and City Council
Hazard Type	All Hazards
Mitigation Group	Structural
Estimated Timeline	Ongoing
Potential Funding Source(s)	HMGP, CDBG
Action 6 - Retrofit existing critical facilities and infrastructure to be more resistant to all hazards	
Plan Year Identified	2007
Hazard Type	Multi-Hazard
Mitigation Strategy	Property Protection
Priority	High

Background	The City of Gulfport seeks to ensure continuity of emergency services and general governmental operations, to protect staff and city property, by mitigating city buildings/infrastructure. These mitigation options will include the provision of shutters to all city buildings, shatterproof glass for windows and doors, frame enhancements, strengthening roofs to withstand hurricane force winds, as well as elevating or flood proofing city buildings. The city also promotes the improvements to all critical facilities and infrastructure within the city so that essential services are not interrupted.
Next Steps	Install shatter-proof windows and high-wind resistant doors at the Main Fire House. Harden the Public Works building. Continue structural retrofits and applicable upgrades for equipment to serve facilities for Memorial Hospital and other critical facilities/infrastructure as projects are identified.
Responsible Agency	City of Gulfport Comptroller
Support Agency	MEMA
Estimated Timeline	Ongoing
Potential Funding Source(s)	HMGP, CDBG
Action 7 - Replace cable hung traffic signals with mast arm signals along major highways	
Plan Year Identified	2007
Hazard Type	Coastal Storms, Severe Storms and Tornados
Mitigation Strategy	Emergency Services
Priority	High
Background/Next Steps	The City seeks to reduce the amount of time that traffic signals are not functional after a hurricane or wind storm by replacing cable hung traffic signals with mast arm signals. It is believed that mast arm signals are more stable and less likely to be destroyed in a major wind event. As funding becomes available or roadways are upgraded, the city should encourage the installation of mast arms. The city could establish a priority list for intersections that are most in need of the upgrades.
Responsible Agency	MDOT, FHWA
Support Agency	Engineering
Estimated Timeline	Ongoing
Potential Funding Source(s)	FHWA, CDBG
Action 8 - Relocate/Retrofit Gulfport's south wastewater treatment plant	
Plan Year Identified	2007
Hazard Type	Hurricanes and Flooding
Mitigation Strategy	Property Protection
Priority	High
Background	The Committee proposed relocating the wastewater treatment facility located within the City to a location outside of the SFHA. The current facility is under capacity and a new facility could be built to higher environmental standards and could make treatment more cost efficient.

Next Steps	Two options have been proposed in order to complete this action. One option is to raise everything necessary at the south wastewater plant to above flood elevation in order to prevent any further inflow and infiltration into the plant. The second option is to eliminate the south wastewater plant and use only the City's north plant to treat wastewater.
Responsible Agency	City of Gulfport
Support Agency	Harrison County Utility Authority
Timeline	2013
Funding	HMGP, MDEQ, CDBG, Restore/recovery programs
Action 9 - Complete the installation of Supervisory Control and Data Acquisition (SCADA) units	
Plan Year Identified	2007
Hazard Type	All Hazards
Mitigation Strategy	Property Protection
Priority	High
Background/Next Steps	The city has nine lift stations remaining for SCADA installations. A list of the stations and estimated cost is attached in the appendix.
Responsible Agency	Public Works Department
Estimated Timeline	2018
Potential Funding Source(s)	General funds
Action 10 - Elevate/relocate bridges that provide access to neighborhoods to protect residents	
Plan Year Identified	2007
Hazard Type	Flood, Coastal Storms
Mitigation Strategy	Property Protection
Priority	Medium
Background/Next Steps	The Committee recommended elevating and relocating bridges within the city that provide access to neighborhoods and that were either heavily used or could leave a neighborhood isolated if the bridge was flooded or damaged. Washington Ave and relocating Old Highway 49 bridge are remaining mitigation.
Responsible Agency	Engineering
Support Agency	Mayor and City Council
Estimated Timeline	Ongoing
Potential Funding Source(s)	406, HMA, other federal/state transportation programs
Action 11 - Armor bridge approaches and abutments to prevent washouts	
Plan Year Identified	2007
Hazard Type	Coastal Storms and Flooding
Mitigation Strategy	Property Protection
Priority	Medium
Background/Next Steps	The Committee proposed armoring bridge approaches and abutments to protect bridges throughout the community. Bridges remaining include Coffee Creek and Gulf Avenue.
Responsible Agency	Mayor and City Council

Support Agency	Applicable city, county, state, federal agencies
Estimated Timeline	Ongoing
Potential Funding Source(s)	406, HMA, other federal/state transportation programs
Action 12 - Conduct a feasibility Study to mitigate sewer and water lines that cross streams	
Plan Year Identified	2007
Hazard Type	Coastal Storms and Flooding
Mitigation Strategy	Prevention
Priority	Low
Background/Next Steps	The city has approximately 28 mains that cross streams. A feasibility study would benefit the city to identify a priority and cost estimate to relocate/retrofit the identified mains out of the drainage areas that can become impacted. Flooding from coastal storms and heavy rainfalls can cause debris to damage the utility lines, in some cases causing breaks leading to sewage spills. The action name was modified to a feasibility study rather than a relocation action. This will assist the city to determine suitable priorities and funding sources
Responsible Agency	Public Works, Engineering
Support Agency	Mayor and City Council
Estimated Timeline	2018
Potential Funding Source(s)	General funds
Action 13 - Upgrade the North Wastewater Treatment Plant to eliminate need for the South Plant	
Plan Year Identified	2013
Hazard Type	All Hazards
Mitigation Strategy	Property Protection
Priority	High
Background/Next Steps	In the event the City decides to go with the option of taking the south wastewater plant off line, the city will only use the north plant. The south plant will become a large pumping station to pump all current flow from the south plant to the north plant. Also, with the added flow to the north plant, necessary upgrades and expansions will be made to north wastewater treatment plant.
Responsible Agency	Public Works, Engineering, Harrison County Wastewater
Support Agency	Applicable state and federal agencies
Estimated Timeline	Undetermined
Potential Funding Source(s)	HMGP, MDEQ, restore program
Action 14 - Retrofit city-owned piers/pavilions	
Plan Year Identified	2013
Hazard Type	Coastal Storm, Flooding and Severe Weather
Mitigation Strategy	Property Protection
Priority	Low
Background/Next Steps	Utilize screws and concrete pilings for the replacement/upgrades to existing city-owned piers/pavilions to reduce future damages caused by multiple hazards
Responsible Agency	Public Works

Support Agency	MEMA
Estimated Timeline	Undetermined
Potential Funding Source(s)	HMGP, general funds
Objective 1.3: Provide protection for future/existing developments	
Action 15 - Require concurrence from all departments on projects through site plan	
Plan Year Identified	2007
Hazard Type	All Hazards
Mitigation Strategy	Property Protection
Priority	High
Background/Next Steps	The City of Gulfport requires that all public and private projects submitted to the city through the site plan process must receive concurrence from each city department. This action insures that the infrastructure needed by a new project is available and will not jeopardize the existing capacity. Continue existing procedures for site plan review.
Responsible Agency	Gulfport Building Department
Support Agency	Public Works and Planning and Zoning Departments
Estimated Timeline	On going
Potential Funding Source(s)	General Funds
Action 16 - Promote/Build detention ponds when appropriate	
Plan Year Identified	2007
Hazard Type	Flooding
Mitigation Strategy	Structural
Priority	High
Background/Next Steps	Requirement for detention ponds will be included in the city's Master Drainage Plan according to MDOT standards. Implement when applicable
Responsible Agency	Engineering Department
Support Agency	Developers
Estimated Timeline	On going
Potential Funding Source(s)	CDBG, included in new development funding
Objective 1.4: Provide backup power to critical facilities/infrastructure	
Action 17 - Secure generators for existing and new critical facilities and infrastructure	
Plan Year Identified	2007
Hazard Type	All Hazards
Mitigation Strategy	Emergency Services
Priority	High

Background/Next Steps	Generators are essential for providing continual operations in the event of a disaster. As funding becomes available, the city will apply for grants to install generators to support existing or new facilities/infrastructure. Apply for grant(s) to install generator(s) to support GIS Department and four wells (28th St, Oakleigh Ave, Mills Ave, and Township Rd. details provided in appendix) and any other critical facility/infrastructure (new and existing) that provide a valuable function for response and recovery.
Responsible Agency	City of Gulfport Comptroller/Public Works Director
Support Agency	MEMA
Estimated Timeline	Ongoing
Potential Funding Source(s)	HMGP
Objective 1.5: Preserve, create and restore natural systems to serve natural mitigation functions	
Action 18 - Support Harrison County's efforts to re-nourish the beach and implement beach protection measures	
Plan Year Identified	2007
Hazard Type	Coastal Storms, Coastal Erosion and Flooding
Mitigation Strategy	Natural Resource Protection
Priority	High
Background	The City of Gulfport will continue to support the Harrison County Board of Supervisors in their efforts to renourish the sand beach and adopt additional protection measures as needed to ensure that this critical infrastructure, which protects U.S. Highway 90 is maintained.
Next Steps	The Harrison County Sand Beach would like to concrete the boardwalk along the beach to be continuous within the City of Gulfport. Three sections between Armed Forces Retirement Home and DeBuys Road are currently not constructed and they are seeking funding for this initiative. Some dune vegetation was lost during Hurricane Isaac, and FEMA is paying 75% of replacement cost for the revegetation project.
Responsible Agency	Harrison Co Sand Beach Department and Board of Supervisors
Support Agency	Mayor and City Council
Estimated Timeline	Ongoing
Potential Funding Source(s)	Seawall Tax, local funds and funding through NOAA
Action 19 - Support marsh restoration efforts	
Plan Year Identified	2007
Hazard Type	Coastal Storms and Coastal Erosion
Mitigation Strategy	Natural Resource Protection
Priority	High
Background/Next Steps	Scientists believe that for every mile of wetland a hurricane crosses, storm surge is reduced by about one foot. Properties along the Mississippi Gulf Coast may be protected by coastal marshes and barrier islands. Continue to support efforts by federal/state agencies and non-profit organizations to replenish, renourish and restore coastal wetlands.
Responsible Agency	Harrison County Sand Beach

Support Agency	EPA Gulf of Mexico Program
Estimated Timeline	Ongoing
Potential Funding Source(s)	Tidelands Funds, foundation funds, and funding from NOAA, EPA, and CIAP
Action 20 - Support the restoration of the barrier islands	
Plan Year Identified	2007
Hazard Type	Coastal Storms, Coastal erosion
Mitigation Strategy	Natural Systems
Priority	High
Background	The coast's barrier islands, including Ship Island, Cat Island, Horn Island, Petit Bois Island and Deer Island provide a measure of protection to the Mississippi Gulf Coast from coastal storms. The Committee recommended that these islands be protected and restored so that the islands continue to serve a protective function.
Next Steps	Deer Island Restoration Project involves the placement of 160 core logs and 3,000 bags of oyster shell to create a living shoreline on the north side of the island, which is instrumental in reducing marsh and shoreline erosion for this area of the island. The Ship Island Restoration Project's first phase is underway with the placement of 500,000 cubic yards of sand planting of several species of flowering plants and marsh grasses for shoreline stabilization along the north shore of West Ship Island. Monitoring of these plants has shown this phase of the project to be successful. The second phase involves the placement of 8.7 million cubic yards of sand through Camille Cut with the intention of restoring East and West Ship Islands to pre-Hurricane Camille conditions.
Responsible Agency	Department of Marine Resources
Support Agency	Applicable city, county, state and federal agencies
Estimated Timeline	On-going
Potential Funding Source(s)	Coastal Impact Assistance Program, Tidelands Funds
Action 21 - Continue to enforce no wake zones and water speed limits	
Plan Year Identified	2007
Hazard Type	Flooding and Coastal Erosion
Mitigation Strategy	Natural Systems
Priority	High
Background/Next Steps	The continued enforcement of water speed limits and no wake zones protect coastal wetlands areas and riparian areas on upland waterways that may be subject to streambank erosion.
Responsible Agency	MDMR, Harrison County Sheriff, MDWFP
Estimated Timeline	On going
Potential Funding Source(s)	Not applicable
Action 22 - Partner with the Land Trust for the Coastal Mississippi Plain to preserve open space	
Plan Year Identified	2007
Hazard Type	Flooding and Coastal Erosion
Mitigation Strategy	Natural Systems

Priority	High
Background	The Land Trust for the Coastal Mississippi Plain assists individuals and communities in the six southern counties of South Mississippi to preserve and conserve lands that are valuable, when preserved in their natural state. These values may be emotional values or these values may include ecological values. The Land Trust works with the landowner to purchase the property or to secure an easement on the property so that the property remains undeveloped. The Land Trust also works with the landowner to establish a maintenance endowment to pay taxes on the property and to maintain the property. Open space within a community, like that the Land Trust maintains, is important to the safety of the community. Open space can preserve critical drainage ways and wetlands or can maintain easements adjacent to rivers, streams and bayous which are the floodways of the system. Leaving this property undeveloped allows the natural drainage system to continue to provide a function to the community
Next Steps	The Land Trust for the Mississippi Coastal Plain received 186.57 acres along Turkey Creek in 2008 and 19.44 acres along East Taylor Road in 2010 thanks to a donation from the City of Gulfport, which acquired the property with funding provided by the Mississippi Coastal Impact Assistance Program (CIAP), administered by the National Oceanic and Atmospheric Administration, MS Department of Environmental Quality, and the Harrison County Board of Supervisors. The LTMCP will continue to seek properties for acquisition and conservation easement with the goal of creating and preserving a community greenway along Turkey Creek. Additional acreage off Rippy Road and Forest Heights has also been acquired and transferred to the Secretary of State and MDMR for Coastal Preservation Programs. These properties tie into the proposed Turkey Creek Greenway.
Responsible Agency	The Land Trust for the Coastal Mississippi Plain
Support Agency	Secretary of State, MDMR
Estimated Timeline	On going
Potential Funding Source(s)	The Land Trust secures grants and private funding to purchase properties and easements to preserve open space.
Objective 1.6: Minimize flood loss and coastal storm impacts	
Action 23 - Promote elevation/acquisition activities to residents/commercial owners located in the SFHA	
Plan Year Identified	2007
Hazard Type	Coastal Storms and Flooding
Mitigation Strategy	Structural
Priority	High
Background	Grant funding through the FEMA-Hazard Mitigation Grant Program may be used to purchase the properties that repeatedly flood, or to elevate these properties above the base flood elevation. The city continues to show progress in mitigation RFC/SRL properties.
Next Steps	Matching the funding share is difficult for the city to participate in the buyout program - explore local match funding sources

Responsible Agency	City of Gulfport Planning Department
Support Agency	MEMA, City Building Official
Estimated Timeline	Ongoing
Potential Funding Source(s)	Flood Mitigation Assistance
Action 24 - Upgrade drainage systems and culverts	
Plan Year Identified	2007
Hazard Type	Flooding
Mitigation Strategy	Property Protection
Priority	High
Background	The Master Drainage Plan is a guide to help the city make unified decisions for improved drainage throughout the City. The Plan should be a guide for developers, utilized by city staff for during site plan review. The revised Master Drainage Plan is scheduled to be completed at the end of 2013.
Next Steps	Numerous projects have been identified in Section 6 of the city's capital improvements plan and is included in the appendix of the city's mitigation plan.
Responsible Agency	Engineering Department
Support Agency	MEMA
Estimated Timeline	Ongoing
Potential Funding Source(s)	HMGP, CDBG, CIAP funding or as part of a developer agreement
Action 25 - Continue to implement drainage standard operating procedure	
Plan Year Identified	2007
Hazard Type	Flooding
Mitigation Strategy	Prevention
Priority	High
Background/Next Steps	The City of Gulfport adopted a standard operating procedure (SOP) for the maintenance of drainage ways within the city. The SOP requires the Public Works Department to visually inspect each drainage way in the county at least once a year and take action to maintain the system. The SOP also requires drainage ways are inspected 24 hours before major storm events to ensure that there are no potential blockages within the drainage systems.
Responsible Agency	Public Works Director
Estimated Timeline	Ongoing
Potential Funding Source(s)	General funds
Action 26 - Implement maintenance program for storm water conveyance and detention structures dedicated to the city	
Plan Year Identified	2007
Hazard Type	Flooding
Mitigation Strategy	Prevention
Priority	High
Background	Implement the preventive maintenance program for the city maintained storm water conveyance system.
Responsible Agency	City Public Works Department

Support Agency	City Engineering
Estimated Timeline	Ongoing
Potential Funding Source(s)	CDBG, CIAP
Action 27 - Work with County to determine long-term solutions to flooding along the Flat Branch, Turkey Creek and Brickyard Bayou	
Plan Year Identified	2007
Hazard Type	Flooding
Mitigation Strategy	Property Protection
Priority	High
Background/Next Steps	The City has worked continuously to upgrade drainage within this drainage way; however, with additional development to the north of the city in the unincorporated area, along the Flat Branch and Turkey Bayou, the city will need to consider additional actions on these waterways to accommodate the land changes up stream. The Committee proposed working with the county to proactively reduces the potential erosion and flooding conditions that may arise due to increased development north of the City on the waterways.
Next Steps	Explore FMA buyout program or other viable options to mitigate impacts
Responsible Agency	Building Office
Support Agency	Mayor and City Council
Estimated Timeline	Ongoing
Potential Funding Source(s)	US Army Corps of Engineers, US Environmental Protection Agency, HMGP
Action 28 - Improve/maintain CRS rating and the NFIP Program	
Plan Year Identified	2013
Hazard Type	Flood
Mitigation Strategy	Prevention
Priority	High
Background/Next Steps	Continue to seek opportunities to reduce CRS rating through activities and projects
Responsible Agency	Building official
Support Agency	C-HOST
Estimated Timeline	Ongoing
Potential Funding Source(s)	General budget
Objective 1.7: Minimize wildfire impacts	
Action 29 - Become a Firewise Community	
Plan Year Identified	2013
Hazard Type	Wildfire
Mitigation Strategy	Prevention
Priority	High

Background	Firewise program encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from wildfire risks. The benefits of the program include: a framework for action, community building, citizen pride, publicity and access to funding.
Next Steps	Obtain a wildfire risk assessment from state Firewise liaison, form a committee and create an action plan based on assessment, conduct a firewise day event, invest a minimum of $2/capita in local firewise actions for a year, submit application to State Firewise liaison
Responsible Agency	Fire Department
Support Agency	Mayor and City Council
Estimated Timeline	2015
Potential Funding Source(s)	MFC, General funds
Action 30 - Continue to enforce the city burn ban	
Plan Year Identified	2007
Hazard Type	Wildfire
Mitigation Strategy	Prevention
Priority	High
Background/Next Steps	The City of Gulfport restricts outside burning within the city. This burn ban effectively reduces the number of outside vegetation fires that city firefighters must respond to. The Committee recommended maintaining this restriction to protect the safety of residents, businesses, tourists and travelers within the city
Responsible Agency	City Fire Chief
Estimated Timeline	Ongoing
Potential Funding Source(s)	City currently funds staff to implement this action
Action 31 - Create defensible space around structures and infrastructure	
Plan Year Identified	2013
Hazard Type	Wildfire
Mitigation Strategy	Property Protection
Priority	High
Background/Next Steps	Implement defensible space programs to reduce risk to structures and infrastructure such as replacing flammable vegetation with less fammable species, continue to provide defensible zones around power and gas lines and other infrastructure
Responsible Agency	Public Works
Estimated Timeline	Ongoing
Potential Funding Source(s)	General Funds
Objective 1.8: Minimize severe storm impacts	
Action 32 - Install lightning grounding systems and lightning protection devices on critical sewer and water systems and city buildings	
Plan Year Identified	2007
Hazard Type	Coastal Storms and Severe Weather

Mitigation Strategy	Property Protection
Priority	Medium
Background/Next Steps	Lightning strikes have caused the city to lose essential city water and sewer services. The city has begun a program to establish lightning grounding systems on critical water and sewer system elements to ensure that essential city services continue. The Public Works Department believes that the continuation of this program is very important to maintaining services during moderate hazards and speeding recovery after major hazard events. A list of the stations is included in the appendix that provides detail as to the location, condition of surge protection, and identification of systems that still need protection added.
Responsible Agency	Public Works Department
Estimated Timeline	Ongoing
Potential Funding Source(s)	General Funds
Objective 1.9: Explore impacts to natural hazards prone to Gulfport	
Action 33 - Participate in local and statewide studies, workshops and committees that address the all hazards prone to the Mississippi Coast	
Plan Year Identified	2013
Hazard Type	Multi-Hazards
Mitigation Strategy	Prevention
Priority	High
Background/Next Steps	New hazards were added to the 2013 plan that will require further education to determine how they can potentially impact the city. Identify opportunities to join committees and planning studies to learn about these hazards in an effort to integrate them into future planning and regulatory initiatives
Responsible Agency	Planning Department, Building Official, Emergency Manager
Support Agency	Mayor and City Council
Estimated Timeline	Ongoing
Potential Funding Source(s)	General budget
Action 34 - Monitor Water Supply and Establish Conservation Regulations	
Plan Year Identified	2013
Hazard Type	Drought
Mitigation Strategy	Prevention
Priority	Medium
Background/Next Steps	Monitoring the water supply and its functions can save water in the long run. The city can begin to implement water conservation techniques by regularly checking for leaks to minimize water supply loss. The City should also consider establishing water conservation ordinances.
Responsible Agency	Public Works
Estimated Timeline	Ongoing
Potential Funding Source(s)	general budget

Goal 2: Maintain and enhance the city's emergency management/mitigation capabilities	
Objective 2.1 Update/develop plans/studies for all hazards	
Action 35 - Update the City's Comprehensive Emergency Management Plan (CEMP)	
Plan Year Identified	2007
Hazard Type	All Hazards
Mitigation Strategy	Prevention
Priority	High
Background/Next Steps	Update the CEMP to follow a department-based approach to better align the plan integration to the County and State CEMP and their ESF format. The updated plan should also address the hazards and vulnerabilities identified in the hazard mitigation plan.
Responsible Agency	Police/Fire Departments
Support Agency	MEMA, Harrison County EMA
Estimated Timeline	Ongoing
Potential Funding Source(s)	Homeland Security, EMPG
Action 36 - Update and implement the Master Drainage Plan	
Plan Year Identified	2007
Hazard Type	Flooding
Mitigation Strategy	Prevention
Priority	High
Background/Next Steps	The master drainage plan for the city is utilize to guide their decisions regarding the size and placement of culverts and major structural drainage infrastructure, like detention ponds. The city utilizes this plan in decisions that are made regarding public and private improvements and new developments. The revised Master Drainage Plan is scheduled to be completed by the end of 2013. Several drainage projects have been identified by the city in their streets and drainage plan that will work towards improving the city's systems as they are funded and constructed.
Responsible Agency	City Engineer
Estimated Timeline	Ongoing
Potential Funding Source(s)	General budget
Objective 2.2 Incorporate/improve mitigation strategies into the city's ordinances, plans and polices	
Action 37 - Continue to enforce/improve as needed the city's ordinances and regulations for all hazards	
Plan Year Identified	2007
Hazard Type	All Hazards
Mitigation Strategy	Prevention
Priority	High

Background/Next Steps	Ordinances and regulations include but are not limited to: building codes, flood damage prevention, freeboard, stormwater, coastal erosion, fire, tire, etc. Continue efforts for enforcement and improve when necessary. The city should also consider developing a water conservation ordinance to address future drought conditions.
Responsible Agency	Gulfport Building Office
Support Agency	Applicable city departments
Estimated Timeline	Ongoing
Potential Funding Source(s)	General funds
Action 38 - Enforce the city's substantial damage and substantial improvement rule	
Plan Year Identified	2007
Hazard Type	Flooding and Hurricanes
Mitigation Strategy	Prevention
Priority	High
Background	The City of Gulfport is empowered by ordinance to implement a substantial damage and substantial improvement rule within the Special Flood Hazard Area (SFHA) within the City. This ordinance requires that a building must be rebuilt in compliance with current building codes and floodplain management ordinance if the building is located within a Special Flood Hazard Area and sustains damage equaling 50% or more of the market value of the building. This rule also applies to cumulative renovations, repairs and additions that equal 50% of the market value of the building, over a ten-year period. Continued enforcement will bring many pre-FIRM homes into compliance within the Special Flood Hazard Area and the Velocity Zone in Gulfport.
Responsible Agency	Building Official
Estimated Timeline	Ongoing
Potential Funding Source(s)	General Funds
Action 39 - Require non-conversion agreements for enclosures below the base flood elevation	
Plan Year Identified	2007
Hazard Type	Hurricanes and Flooding
Mitigation Strategy	Prevention
Priority	High
Background	The City of Gulfport requires that property owners within the SFHA place a deed restriction on their property which restricts the conversion for areas below the base flood elevation. Often times the area underneath the first finished floor of structures located within a flood hazard area are used for utilities, storage and to park vehicles. When property owners convert these areas, they can put themselves at risk and the community at risk for the loss of flood insurance coverage. The City of Gulfport requires property owners in SFHA to sign a binding non-conversion agreement. This agreement is kept on file with the building department and the property owners file the agreement as a deed restriction.
Responsible Agency	Building Official
Estimated Timeline	Ongoing

Potential Funding Source(s)	General Funds
Action 40 - Integrate mitigation into local planning	
Plan Year Identified	2013
Hazard Type	Multi-Hazard
Mitigation Strategy	Prevention
Priority	High
Background/Next Steps	Hazard mitigation can be integrated into local planning efforts through incorporating risk assessment and hazard mitigation principles into the comprehensive plan, local development and subdivision review process, land suitability analyses, etc.
Responsible Agency	Planning and Zoning
Estimated Timeline	Ongoing
Potential Funding Source(s)	general budget
Objective 2.3 Conduct/develop drills/training for all hazards	
Action 41 - Conduct annual first responder training for all hazards	
Plan Year Identified	2007
Hazard Type	All
Mitigation Strategy	Emergency Services
Priority	High
Background/Next Steps	First responders participate in various training programs for all hazards on an annual basis. Lessons learned during the drills should be captured and addressed in applicable plans and SOPs to improve preparedness and response procedures carried out by the city.
Responsible Agency	Emergency Manager
Estimated Timeline	Ongoing
Potential Funding Source(s)	General Funds
Action 42 - Conduct annual NIMS training for first responders, city officials and critical employees	
Plan Year Identified	2013
Hazard Type	All Hazards
Mitigation Strategy	Prevention
Priority	High
Background/Next Steps	National Incident Management System (NIMS) is essential and required for coordinating efforts from a federal, state and local agency level. Conduct training and verify new employees are integrated into the training programs as necessary
Responsible Agency	Fire and Police Departments
Support Agency	Mayor and City Council
Estimated Timeline	Ongoing
Potential Funding Source(s)	General budget

Objective 2.4 Implement and maintain the city's mitigation plan	
Action 43 - Conduct post disaster Hazard Mitigation Committee meetings for declared events to assess the city's impacts to people and property	
Plan Year Identified	2007
Hazard Type	All Hazards
Mitigation Strategy	Emergency Services
Priority	High
Background/Next Steps	Each disaster presents varying degrees of impacts - no two storms are alike. The city can gain valuable data and insight into impacts as they occur to assess and define appropriate actions in the way of implementing an existing mitigation action or identifying a new need. The committee should convene as soon as appropriate after an event to conduct an after action report and document this in the appendix of the mitigation plan.
Responsible Agency	Deputy Building Official and City Emergency Manager
Support Agency	Hazard Mitigation Committee
Estimated Timeline	Ongoing
Potential Funding Source(s)	General Funds
Action 44 - Conduct annual reviews of the hazard mitigation and flood protection plan	
Plan Year Identified	2007
Hazard Type	All Hazards
Mitigation Strategy	Emergency Services
Priority	High
Background/Next Steps	As defined in the plan maintenance section of this plan, the chairman of the hazard mitigation committee will schedule a meeting with the committee to review progress made on mitigation actions and identify needs. A worksheet has been developed to facilitate this process and should be inserted into the appendix of this plan once completed.
Responsible Agency	Deputy Building Office and City Emergency Manager
Support Agency	Mayor and City Council
Estimated Timeline	Ongoing
Potential Funding Source(s)	General funds
Action 45 - Pursue funding for mitigation actions	
Plan Year Identified	2007
Hazard Type	All Hazards
Mitigation Strategy	Prevention
Priority	High

Background/Next Steps	Funding options for actions identified in this plan should be explored and pursued. Coordination with public works, engineering, planning and the building official on anticipated projects should be evaluated for mitigation funding when appropriate. In the past, the local cost share has not been available and may have prevented the city from obtaining grants through the HMA. MEMA on occasion providing workshops on HMA funding that would be useful for the city to attend for further education/information.
Responsible Agency	Comptroller
Support Agency	MEMA
Estimated Timeline	Ongoing
Potential Funding Source(s)	General budget
Goal 3: Maintain public education and awareness activities	
Objective 3.1 Expand the city's Public Outreach Campaigns	
Action 46 - Establish and maintain a hazard preparedness link on the city's web page	
Plan Year Identified	2013
Hazard Type	All Hazards
Mitigation Group	Education and Awareness
Priority	High
Background/Next Steps	The city has several outreach initiatives to communicate hazard preparedness information to the general public and visitors to the area. This action will allow for a centralized place on the city's web page dedicated to hazard preparedness. Information that can be uploaded to this site will include, but not be limited to specific hazard educational information; evacuation routes/procedures; useful resources (County EMA, MEMA, FEMA, Red Cross etc.; workshop/training programs; alert systems; and the like. The city can update the hazard mitigation link established during the development of the 2013 plan update and begin to populate information.
Responsible Agency	Public Affairs
Support Agency	Applicable city, county, state and federal agencies
Estimated Timeline	Ongoing
Potential Funding Source(s)	General funds
Objective 3.2 Promote disaster preparedness planning for families and area businesses	
Action 47 - Promote workshops for emergency preparedness plans	
Plan Year Identified	2007
Hazard Type	All Hazards
Mitigation Strategy	Prevention
Priority	High
Background/Next Steps	Provide applicable support to non-profit agencies, Coast Chamber, GRPC and other organizations that assist families and business owners with the development of disaster plans.

Responsible Agency	Emergency Manager
Estimated Timeline	On going
Potential Funding Source(s)	Undetermined

Table 6.7
2013 Technological/Man-Made and Health-Related Actions

Goal A: Enhance public education and awareness of technological, man-made and health-related hazards	
Action A - Work with applicable agencies to identify high risk areas and distribute educational information	
Plan Year Identified	2013
Hazard Type	West Nile, Pandemic, Hazardous Materials
Priority	High
Background/Next Steps	Identify areas/groups within Gulfport that are prone to technological, man-made and health-related hazards. Develop or acquire suitable materials and disseminate at public meetings and on the city's web page.
Responsible Agency	Emergency manager, public affairs
Support Agency	Applicable state, federal and non-profit organizations
Estimated Timeline	Ongoing
Potential Funding Source(s)	MSDH, EMGP, Homeland Security, city general funds
Goal B: Enhance the city's emergency management capabilities for technological, man-made and health-related hazards	
Action B - Continue to participate with state and federal agencies in training and educational programs for technological, man-made and health-related hazards	
Plan Year Identified	2007
Hazard Type	Hazardous Spills, Pandemic, West Nile
Priority	High
Background/Next Steps	Various departments within the city participate in annual training and educational programs for technological, man-made and health-related hazards. Continuing participation will increase the city's preparedness and response and also foster strengthened relationships with multiple states, federal and local agencies. Procedures for various events should be incorporated into plans such as the CEMP, SOPs and development of a Continuity of Operation Plan (COOP) is also encouraged.
Responsible Agency	City Emergency Manager, Key Staff
Support Agency	Mayor and City Council
Estimated Timeline	Ongoing
Potential Funding Source(s)	General budget
Action C - Encourage the development of training and emergency planning for private companies that handle hazardous materials	
Plan Year Identified	2007
Hazard Type	Hazardous Spills
Priority	High

Background/Next Steps	In the past, the city's Hazardous Spill team responded to an incident caused by an interrupted burglary of a facility with hazardous chemicals. The spill created the need to evacuate several neighborhoods and facilities. It is recommended that the city fire and police officials coordinate educational programs to improve onsite hazardous material safety and increase awareness of chemical issues and reporting procedures.
Responsible Agency	Emergency Manager, Police and Fire officials
Estimated Timeline	Ongoing
Potential Funding Source(s)	General budget
Action D. Continue to mitigate/educate mosquito control procedures	
Plan Year Identified	2007
Hazard Type	West Nile Virus
Priority	High
Background/Next Steps	The City of Gulfport participates with Harrison County and cities in Harrison County to contract for mosquito control services. Information regarding West Nile and the vector program could be included on the city's website to further educate the general public on the potential effects of West Nile.
Responsible Agency	Harrison County
Support Agency	Public Affairs, Public Works
Estimated Timeline	On going
Potential Funding Source(s)	General budget
Action E – Develop a Commodity Flow Study	
Plan Year Identified	2013
Hazard Type	Technological/Man-Made Hazards
Priority	High
Background/Next Steps	Hazardous materials are transported through and to various locations in Gulfport. These routes include rail, air and roadway. This study will provide valuable data in the way of what chemicals are being transported to confirm that the city has appropriate response procedures and equipment needed.
Responsible Agency	Fire Department
Support Agency	MEMA, MDOT
Estimated Timeline	2018
Potential Funding Source(s)	HMEP

6.5 Implementation of Mitigation Actions

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

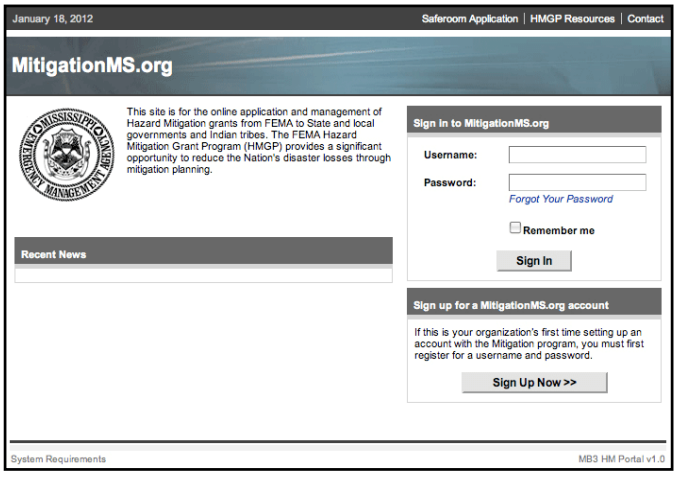
As funding is identified and justification determined, the mitigation actions will be developed into projects. For projects eligible for mitigation funding, cost-benefit analyses will be used. The cost of the proposed projects (money, time, etc.) will be weighed against the potential benefits (reduced losses, improved safety, etc.) in order for the city to determine the appropriate action required. Special priorities will be given to initiatives addressing critical facilities and infrastructure required to carry out their mission and provide safety to the population served.

While cost-benefit analyses are fundamental to the decision-making process for Gulfport, project cost is an overriding factor when determining which projects should be pursued. The city operates under tight budget constraints and must use prudence in the allocation of funds. They will strive to justify implementation based on long-term financial implications regarding potential mitigation projects.

Once mitigation actions are identified and resources secured, Gulfport will implement and administer their projects. Some projects may be coordinated with a support agency such as the Mississippi Emergency Management Agency (MEMA) through the Unified Hazard Mitigation Assistance program. Gulfport will coordinate with MEMA and refer to the FEMA Hazard Mitigation Assistance Unified Guidance (June 2010) for development of applications for identified mitigation actions eligible under the program in this plan.

Administration

The city of Gulfport is responsible for the administration of mitigation actions when implemented. Administration includes completion of grant applications and applicable quarterly progress reports. MEMA established a web site to document grants under the HMGP at www.mitigationms.org. Provided in Appendix 8.6-G is a sample *Notice of Intent* commonly used by MEMA to identify actions communities are interested in implementing. (This is included in the plan appendix to assist the city in preparing for the submittal of future projects.)



6.6 Grant Sources

Federal Hazard Mitigation Assistance Grants

The Federal Emergency Management Agency (FEMA) provides funding for five Hazard Mitigation Assistance Grant Programs. These programs, described in detail in FEMA's *Hazard Mitigation Assistance Unified Guidance, June 1, 2010,* are summarized for future reference when mitigation activities are implemented. The grant programs are administered within the State of Mississippi by the Mississippi Emergency Management Agency, Office of Mitigation. A brief description of each program follows:

Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The key purpose of HMGP is to ensure critical mitigation measures, reducing loss of life and property from future disasters, are not lost during the reconstruction process following a disaster. *(HMGP funds are available when authorized under a Presidential disaster declaration in the areas of the State requested by the Governor.)*

Pre-Disaster Mitigation Program (PDM) is authorized by Section 203 of the Stafford Act to assist States, Indian Tribal Governments, and local communities in implementing a sustained pre-disaster natural hazard mitigation program reducing risk to the population and structures from future hazard events and to reduce reliance on Federal funding from future disasters. *(Funds provided annually subject to the availability of appropriation funding)*

Flood Mitigation Assistance (FMA) is authorized by Section 1366 of the National Flood Insurance Act of 1968 (NFIA) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). *(Funds provided annually subject to the availability of appropriation funding)*

Repetitive Flood Claims Program (RFC) is authorized by Section 1323 of the NFIA with the goal of reducing flood damages to individual properties with one or more claim payments for losses made under flood insurance coverage, and resulting in the greatest savings to the National Flood Insurance Fund (NFIF) in the shortest period of time. *(Funds provided annually subject to the availability of appropriation funding)*

Severe Repetitive Loss Pilot Program (SRL) is authorized by Section 1361 of the NFIA with the goal of reducing flood damage to residential properties experiencing severe repetitive losses under flood insurance coverage and resulting in the greatest savings to the NFIF in the shortest period of time. *(Funds provided annually subject to the availability of appropriation funding.)*

Eligibility

The Table 6.10 lists activities eligible in each Program listed above.

Table No. 6.10
Eligible Activities by Program

Eligible Activities	HMGP	PDM	FMA	RFC	SRL
1. Mitigation Projects	X	X	X	X	X
Property Acquisition and Structure Demolition	X	X	X	X	X
Property Acquisition and Structure Relocation	X	X	X	X	X
Structure Evaluation	X	X	X	X	X
Mitigation Reconstruction					X
Dry Floodproofing of Historic Residential Structures	X	X	X	X	X
Dry Floodproofing of Non-Residential Structures	X	X	X	X	
Minor Localized Flood Reduction Projects	X	X	X	X	X
Structural Retrofitting of Existing Buildings	X	X			
Non-Structural Retrofitting of Existing Buildings and Facilities	X	X			
Safe Room Construction	X				
Infrastructure Retrofit	X	X			
Soil Stabilization	X	X			
Wildfire Mitigation	X	X			
Post-Disaster Code Enforcement	X				
5% Initiative Projects	X				
2. Hazard Mitigation Planning	X	X	X		
3. Management Costs	X	X	X	X	X

Source: FEMA Hazard Mitigation Assistance Unified Guidance, June 1, 2010

Examples of Eligible Mitigation Projects:

Property Acquisition and Structure Demolition – Voluntary acquisition of an existing at-risk structure and conversion of the land to open space through demolition of the structure.

Property Acquisition and Structure Relocation – Voluntary physical relocation of an existing structure to an area outside of a hazard-prone area.

Structure Elevation – Physically raising an existing structure to the Base Flood Elevation (BFE) or higher, if required by FEMA or local ordinance.

Mitigation Reconstruction – Construction of an improved elevated building on the same site where an existing building and/or foundation has been partially or completely demolished or destroyed.

Dry Floodproofing – Techniques applied to keep structures dry by sealing the structure to keep floodwaters out.

Dry Floodproofing of Historic Residential Structures – Permissible only when other techniques that would mitigate to the BFE causing the structure to lose its status as a Historic Structure.

Dry Floodproofing of Non-residential Structures – must be performed in accordance with NFIP Technical Bulletin (TB) 3-93, *Non-Residential Floodproofing—Requirements and Certification*, and the requirements pertaining to dry floodproofing of non-residential structures found in 44 CFR Sections 60.3(b)(5) and (c)(4).

Minor Localized Flood Reduction Projects – Projects to lessen the frequency or severity of flooding and decrease predicted flood damages, such as the installation or modification of culverts and storm water management activities like creating retention and detention basins.

Structural Retrofitting of Existing Buildings – Modifications to the structural elements of a building to reduce or eliminate the risk of future damage and to protect inhabitants.

Non-structural Retrofitting of Existing Buildings and Facilities – Modifications to the non-structural elements of a building or facility to reduce or eliminate the risk of future damage and to protect inhabitants.

Safe Room Construction – Safe room construction projects are designed to provide immediate life-safety protection for people in public and private structures from tornado and severe wind events, including hurricanes.

Infrastructure Retrofit – Measures to reduce risk to existing utility systems, roads, and bridges.

Soil Stabilization – Projects to reduce risk to structures or infrastructure from erosion and landslides, including installing geo-textiles, stabilizing sod, installing vegetative buffer strips, preserving mature vegetation, decreasing slope angles, and stabilizing with rip rap and other means of slope anchoring.

Wildfire Mitigation – Projects to mitigate the vulnerability of at-risk structures and associated loss of life from the threat of future wildfire.

Post-Disaster Code Enforcement – Projects designed to support the post-disaster rebuilding effort by ensuring sufficient expertise is on hand ensuring appropriate codes and standards, including NFIP local ordinance requirements, are utilized and enforced.

5% Initiative Projects – Provide an opportunity to fund mitigation actions consistent with the goals and objectives of the State or Tribal (Standard or Enhanced), local mitigation plans and meets all HMGP program requirements, but may be difficult to conduct a standard benefit/cost analysis to prove cost effectiveness.

Hazard Mitigation Planning

Mitigation plans are the foundation for effective hazard mitigation. A mitigation plan demonstrates the commitment to reduce risks from natural hazards and serves as a strategic guide for decision makers as they commit resources. The mitigation planning process includes hazard identification and risk assessment leading to the development of a comprehensive mitigation strategy reducing risks to life and property. The mitigation strategy section of the plan identifies a range of specific mitigation actions and projects being considered to reduce risks to new and existing buildings and infrastructure.

Management Costs

Management costs are any indirect costs and administrative expenses reasonably incurred by a Grantee or Sub grantee in administering a grant or sub grant award.

For more information concerning applications for FEMA Hazard Mitigation Assistance Grants, contact:

Mississippi Emergency Management Agency
Office of Mitigation
601-933-6362

Other Grant Sources

Listed below are agencies providing programs to support communities developing and implementing various projects. The city of Gulfport will utilize these agencies and other sources, when possible, to further their mitigation goals.

Mississippi Development Authority 601-359-3179
Mississippi Emergency Management Agency 601-933-6362
Mississippi Department of Environmental Quality 601- 961-5171
Mississippi Office of Homeland Security 601-346-1500
Mississippi State Department of Health 601-576-7400
USDA Rural Development *601- 965-4316*
Mississippi Department of Marine Resources 228-374-5000
Mississippi Department of Transportation 601-359-7025
Mississippi Department of Wildlife, Fisheries and Parks 601-432-2400
US Army Corps of Engineers Mobile District 334-690-2495
Mississippi Forestry Commission 601-359-1386
USDA Natural Resources Conservation Service National NRCS Office – 202-720-8851 State NRCS Conservationist – 601-965-5196

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7.0 Plan Maintenance

This section outlines an efficient and effective process for the Gulfport Hazard Mitigation Committee to track progress on mitigation strategies, document events that may occur, and integrate concepts identified with existing and new planning/ordinance documents. This process is used as a tool for lessening vulnerabilities and improving strategies identified during the plan update.

7.1 Monitoring, Evaluating and Updating the Plan

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

Monitoring the Plan

The city of Gulfport's Deputy Building Official serves as Chairman of the Gulfport Hazard Mitigation Committee and is responsible for ensuring the Plan is monitored for effectiveness. When necessary, he collects information from other city departments to update the plan. The chairman is responsible for the plan's general upkeep and oversight as it relates to compliance with the hazard mitigation grant program requirements, all files and necessary documentation, as well as conducting routine plan reviews. The chairman is supported by the City's Emergency Manager. The Chief Administrative Officer and the Deputy Planning Administrator will be responsible for administrative decisions and coordination of plan integration with future planning initiatives.

The role of the chairman includes the following tasks:

- Schedule, at a minimum, an annual meeting with the Gulfport Hazard Mitigation Committee (February)
- Develop meeting agendas
- Invite other agencies/departments to participate in meetings
- Schedule post-disaster event meetings with the Gulfport Hazard Mitigation Committee for declared disasters if significant damage was sustained or the hazard disclosed vulnerabilities to city facilities/infrastructure that need to be addressed
- Coordinate updates to the public with the Public Information Officer when applicable (this may include but is not limited to plan amendments, completion of mitigation actions, notification of programs available to the public for mitigation, etc.)
- Coordinate plan updates every five years as required by FEMA

During annual meetings, the committee will address any issues occurring since the last plan update, assess events impacting the Gulf Coast to determine if changes in the plan are required, and complete the evaluation and project implementation worksheets for documentation purposes and insert in Appendix 8.7.E (as described in the next section).

If significant changes, updates, or amendments to the plan are suggested by the Hazard Mitigation Committee, they will inform MEMA's Bureau of Mitigation Planning to determine the appropriate action the city should take.

Evaluating the Plan

Annually, the chairman will lead the Gulfport Hazard Mitigation Committee in an exercise to complete the plan evaluation checklist to assist in documenting the status of mitigation strategies undertaken during the past year. The checklist is provided in Appendix 8.7-A and includes the following components:

- Evaluate the goals and objectives ensuring they address current and expected conditions
- Determine any changes in the nature or magnitude of risks identified in the plan
- Evaluate current resources for adequacy in implementing the plan
- Document any implementation problems with other agencies, including technical, political, legal or coordination issues
- Evaluate the effectiveness of the Gulfport Hazard Mitigation Committee
- Evaluate the effectiveness of the city's capabilities

To further support the evaluation checklist, two worksheets were developed and are provided in Appendix 8.7-B.

- Project Implementation Worksheet (listing of mitigation actions identified in Chapter 5)
- Mitigation Planning Team Worksheet (FEMA's Local Mitigation Planning Handbook, Worksheet 2.1)

The Evaluation Checklist and Project Implementation Worksheet is completed annually (at a minimum) and stored in Appendix 8.7-E. The Mitigation Planning Team Worksheet is completed only if a change is recommended by the Chairman and/or the Committee.

Updating the Plan

Requirement 201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five years in order to continue to be eligible for mitigation project grant funding.

In accordance with federal regulations, the Gulfport Hazard Mitigation/Flood Protection Plan is updated every five years. In the event of a significant disaster or any substantial change in land use planning or regulations impacting the mitigation goals and actions identified within this plan, frequent updates will be made.

The city of Gulfport's Deputy Building Official will complete a yearly progress report, as described in the Evaluation Section above, to improve the documentation of the progress made by the city on the strategies defined in this plan. In doing so, the plan will become more of a "living document" that is proactive and integrates with the city's future initiatives.

If a significant event warrants an update within the plan life, the Deputy Building Official follows the same procedures used in developing the original plan and will incorporate opportunities for the pubic to have input and provide comments.

Any amendments made to the plan during the planning cycle are coordinated through the Chief Administrative Officer. Appendix 8.7-C will contain any documentation of amendments and will be given to MEMA and FEMA for review during the life of the plan. Amendments may include, but are not limited to, additional mitigation goals, objectives and actions.

7.2 Incorporation into Existing Planning Mechanisms

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

As outlined in Chapter 5 under Table 5.1, the city of Gulfport has a number of regulatory policies in place to guide development. Examples include the Comprehensive Plan, Zoning Ordinances, Building Codes, Fire Prevention Codes and the Flood Damage Prevention Ordinance. As these mechanisms are updated, the city, using a traditional planning approach, will continue to incorporate mitigation practices into these documents through implementation. By reviewing, and where applicable, incorporating hazard mitigation strategies into the updated documents, the Director of Urban Development will ensure all revisions made to governing documents are consistent with the elements outlined in the 2013 Gulfport Hazard Mitigation/Flood Protection Plan. The city of Gulfport will incorporate the requirements of this Plan into other programs, plans and regulations insuring consistency for implementation. For example, each time the city makes changes to their Floodplain Management Ordinance, the staff with the Planning and

Zoning Division will consider modifying the zoning and subdivisions requirements to reflect these changes insuring consistency in implementation.

The city's designated CRS Coordinator must maintain specific information on structures within the city's floodplain, maintain records on education and outreach efforts, and document proactive efforts the city takes in reducing the risk from flooding which could occur within their jurisdiction. This information is presented to the Gulfport Hazard Mitigation Committee at their yearly review meeting. The Committee is apprised of updates to city plans, regulations and policies as a standard agenda item. The Hazard Mitigation Planning Committee may recommend elements of the Gulfport Hazard Mitigation/Flood Protection Plan be included within proposed planning mechanisms under development or review by the city.

The Deputy Building Official is tasked with assuring the building codes and floodplain ordinances are enforced in accordance with this Plan. Recognizing the importance of proper building techniques, as outlined in the current building codes, play an integral role in life and safety matters.

Gulfport will continue to evaluate and review items detailed in this Plan for consideration of other local planning mechanisms. Annually, components of the Hazard Mitigation/Flood Protection Plan may be added or omitted as deemed necessary by the Gulfport Hazard Mitigation Committee and respective city officials. This process covers a five-year period allowing prioritizing of long-term goals and more accurate tracking and forecasting of needs.

When a new plan is being developed, the Chairman of the Gulfport Hazard Mitigation Committee will provide a copy of the hazard mitigation plan to the agency/consultant responsible for its development.

7.3 Continued Public Involvement

Requirement §:201.6(c)(4)(iii): The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process.

Gulfport appreciates the importance of continued public involvement in the evolution of this plan. To ensure the health and wellbeing of the community is addressed by the city, opportunities are provided for public involvement in ongoing activities.

If significant changes are required of the plan by MEMA/FEMA, the Gulfport Hazard Mitigation Committee will notify the public and encourage their participation in meetings to review any changes. The Committee may also send notifications to the public on plan amendments, completion of mitigation actions, and notification of programs available for mitigation, etc. Meeting notifications will be advertised using the most appropriate communication method such as newspaper advertisements, city web page, postings in city facilities, etc.

A copy of the Hazard Mitigation/Flood Protection Plan is available to the public at the Planning and Zoning Department.

During the next five years, the Gulfport Hazard Mitigation Committee will meet with various local and state agencies/organizations to strengthen relationships, identify partnering opportunities to address identified mitigation actions, and increase awareness of the capabilities these groups can provide.

Attending conferences, workshops, and seminars regarding emergency preparedness, response and recovery operation is another opportunity to meet with local agencies, surrounding communities and neighboring state agencies. These conferences are typically held each year and posted on the Mississippi Emergency Management Agency's web page. Below is a list of annual conferences:

- National Hurricane Conference
- Mississippi Preparedness Summit "Partners in Preparedness"
- Gulf States Hurricane Conference (MS, LA, TX, AL)
- Mississippi Civil Defense Emergency Management Association

A meeting/workshop documentation form was developed to assist the Gulfport Hazard Mitigation Committee in recording public/agency involvement activities for this plan cycle, as well as provide valuable information needed in plan updates. This form is provided in Appendix 8.7-D.

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Approved January 8, 2014

by:

Mississippi Emergency management Agency

and

Federal Emergency Management Agency

FEMA

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