Houston County, Georgia

Pre-Disaster Mitigation Plan

Adopted: September 2004

Amended: May 2010

Amended: September 2015

Amended: December 2020

Prepared For:
Houston County Emergency Management Agency
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A RESOLUTION OF
THE HOUSTON COUNTY BOARD OF COMMISSIONERS
PURSUANT TO THE DISASTER MITIGATION ACT OF 2000
AUTHORIZING ADOPTION OF THE
HOUSTON COUNTY PRE-DISASTER HAZARD MITIGATION PLAN
2020 UPDATE

WHEREAS, Houston County and its municipal governments are required by the Disaster Mitigation Act of 2000 to complete a Pre-Disaster Hazard Mitigation Plan; and

WHEREAS, under the provisions of the Disaster Mitigation Act of 2000, local governments that complete Pre-Disaster Hazard Mitigation Plans will remain eligible for federal mitigation funding; and

WHEREAS, Houston County and its municipal governments have completed the required five-year update to the Pre-Disaster Hazard Mitigation Plan that fulfills the federal requirements of the Disaster Mitigation Act of 2000; and

WHEREAS, the updated Houston County Pre-Disaster Hazard Mitigation Plan has been presented for public comment, reviewed by federal, state, and local agencies, and revised to reflect their concerns; and

NOW, THEREFORE, BE IT RESOLVED that the Board of Commissioners formally adopts the Houston County Pre-Disaster Hazard Mitigation Plan 2020 Update.

RESOLVED THIS 1st DAY OF DECEMBER 2020.

BY: _____
Tommy Stalnaker, Chairman

ATTEST: _____
Barry Holland, Director of Administration

2020-8

A RESOLUTION OF THE CITY OF CENTERVILLE PURSUANT TO THE DISASTER MITIGATION ACT OF 2000 AUTHORIZING ADOPTION OF THE HOUSTON COUNTY PRE-DISASTER HAZARD MITIGATION PLAN 2020 UPDATE

WHEREAS, The City of Centerville, Houston County, and the other municipalities in the county are required by the Disaster Mitigation Act of 2000 to complete a Pre-Disaster Hazard Mitigation Plan; and

WHEREAS, under the provisions of the Disaster Mitigation Act of 2000, local governments that complete Pre-Disaster Hazard Mitigation Plans will remain eligible for federal mitigation funding; and

WHEREAS, the City of Centerville, Houston County, and the other municipalities in the county have completed the required five-year update to the Pre-Disaster Hazard Mitigation Plan that fulfills the federal requirements of the Disaster Mitigation Act of 2000; and

WHEREAS, the updated Houston County Pre-Disaster Hazard Mitigation Plan has been presented for public comment, reviewed by federal, state, and local agencies, and revised to reflect their concerns; and

NOW, THEREFORE, BE IT RESOLVED that the City of Centerville formally adopts the Houston County Pre-Disaster Hazard Mitigation Plan 2020 Update.

RESOLVED THIS 17th DAY OF NOVEMBER 2020.

BY: _____
John R. Harley, Mayor

ATTEST: _____
Krista Bedingfield, City Clerk

Resolution No. 2020-71

A RESOLUTION OF THE CITY OF PERRY PURSUANT TO THE DISASTER MITIGATION ACT OF 2000 AUTHORIZING ADOPTION OF THE HOUSTON COUNTY PRE-DISASTER HAZARD MITIGATION PLAN 2020 UPDATE

WHEREAS, The City of Perry, Houston County, and the other municipalities in the county are required by the Disaster Mitigation Act of 2000 to complete a Pre-Disaster Hazard Mitigation Plan; and

WHEREAS, under the provisions of the Disaster Mitigation Act of 2000, local governments that complete Pre-Disaster Hazard Mitigation Plans will remain eligible for federal mitigation funding; and

WHEREAS, the City of Perry, Houston County, and the other municipalities in the county have completed the required five-year update to the Pre-Disaster Hazard Mitigation Plan that fulfills the federal requirements of the Disaster Mitigation Act of 2000; and

WHEREAS, the updated Houston County Pre-Disaster Hazard Mitigation Plan has been presented for public comment, reviewed by federal, state, and local agencies, and revised to reflect their concerns; and

NOW, THEREFORE, BE IT RESOLVED that the City of Perry formally adopts the Houston County Pre-Disaster Hazard Mitigation Plan 2020 Update.

RESOLVED THIS 17th DAY OF NOVEMBER 2020.

BY: _____
Randall Walker, Mayor

MAYOR AND COUNCILMEN OF THE CITY OF PERRY, GA. SEAL

ATTEST: _____
Annie Warren, City Clerk

A RESOLUTION OF THE CITY OF WARNER ROBINS PURSUANT TO THE DISASTER MITIGATION ACT OF 2000 AUTHORIZING ADOPTION OF THE HOUSTON COUNTY PRE-DISASTER HAZARD MITIGATION PLAN 2020 UPDATE

WHEREAS, The City of Warner Robins, Houston County, and the other municipalities in the county are required by the Disaster Mitigation Act of 2000 to complete a Pre-Disaster Hazard Mitigation Plan; and

WHEREAS, under the provisions of the Disaster Mitigation Act of 2000, local governments that complete Pre-Disaster Hazard Mitigation Plans will remain eligible for federal mitigation funding; and

WHEREAS, the City of Warner Robins, Houston County, and the other municipalities in the county have completed the required five-year update to the Pre-Disaster Hazard Mitigation Plan that fulfills the federal requirements of the Disaster Mitigation Act of 2000; and

WHEREAS, the updated Houston County Pre-Disaster Hazard Mitigation Plan has been presented for public comment, reviewed by federal, state, and local agencies, and revised to reflect their concerns; and

NOW, THEREFORE, BE IT RESOLVED that the City of Warner Robins formally adopts the Houston County Pre-Disaster Hazard Mitigation Plan 2020 Update.

RESOLVED THIS 16th DAY OF NOVEMBER 2020.

BY: Randy Toms
Randy Toms, Mayor

ATTEST: Mandy Stella
Mandy Stella, City Clerk

CITY OF WARNER ROBINS

Contents

Stakeholders

The Houston County Board of Commissioners, in conjunction with the Houston County Emergency Management Agency (HEMA), amended and updated the Houston County Pre-Disaster Mitigation Plan, through the planning processes described herein. This Pre-Disaster Mitigation planning process was completed in cooperation with Houston County's three municipalities: Cities of Centerville, Perry, and Warner Robins. Additionally, representatives from various community agencies, the local healthcare community, and Robins Air Force Base participated in the update of this plan. The Middle Georgia Regional Commission facilitated the planning process and documented all accomplishments and milestones.

Mission Statement

To make Houston County and the Cities of Centerville, Perry and Warner Robins less vulnerable to the effects of natural and human-caused hazards through effective planning, hazard risk assessments and a coordinated mitigation strategy.

Vision Statement

Develop a countywide hazard mitigation mindset through local government leadership and community-based partnerships, leading the way to a safe and livable environment for all Houston County citizens.

CHAPTER 1: INTRODUCTION

Beginning in 2000, and in accordance with the requirements of the Disaster Mitigation Act of that year, each county in the United States was required to develop a Pre-Disaster Mitigation Plan (PDMP). These plans were intended to address each individual community vulnerability to hazards prior to a disaster event occurring. Based upon this requirement, Houston County initiated the development of a plan that would ensure compliance with this legislative requirement and help ensure the community's preparedness in the event of a hazard. The Middle Georgia Regional Commission facilitated the first planning process in Houston County. By 2004, the county had finalized and adopted the first Houston County Pre-Disaster Mitigation Plan. The intent of this plan was to help identify areas of vulnerability in the community, reduce the risks that natural and technological hazards presented in the county, and to build a work program that would guide decision-making and resource provision. Since 2004, the PDMP has been updated twice – in 2009 and 2014, with each planning process addressing new concerns and mitigation activities.

With the passing of another five-year period, the plan update process began again in mid-2019. As had been done in past planning efforts, this update used a planning process that included a cross-section of community partners. The updated plan includes a detailed and comprehensive analysis and evaluation of critical community facilities, hazard events, losses, and current plans. From this analysis and evaluation, an updated list of goals, objectives, and strategies, was developed to further ensure the safety of Houston County residents.

The geographic scope of the Houston County Pre-Disaster Mitigation Plan incorporates three cities: Centerville, Perry, and Warner Robins, as well as all unincorporated areas within Houston County. Robins Air Force Base is also included in this planning process.

Planning Process

The planning committee was comprised of representatives from governmental and non-governmental organizations, utilities, businesses, schools, public safety and health organizations, and the private sector. The members of this committee bring expert knowledge regarding all aspects of emergency management, hazard identification, and mitigation strategies. Planning committee members worked to identify challenges and opportunities related to emergency management, collect and verify data, and formulate and prioritize goals and objectives. Committee members worked closely with the Houston Emergency Management Agency and Middle Georgia Regional Commission staff to identify specific focuses of the plan and content guidance.

As mentioned previously, and as was done in previous planning cycles, numerous participants were involved in the update of this document. The list of planning committee participants, their titles, and organizations are as follows:

Name	Title	Organization
Jason Jones	Fire Chief	City of Centerville Fire Department
John Harley	Mayor	City of Centerville
Mike Brumfield	Director of Operations	City of Centerville Utility Department
Ben Knight	Assistant Superintendent	City of Centerville Utility Department
Lee Parker	Fire Chief	City of Perry Fire Department
Kirk Crumpton	Battalion Chief	City of Perry Fire Department
Steve Lynn	Chief of Police	City of Perry Police Department
Jack Johnson	Senior Lieutenant	City of Perry Police Department
Newell Dixon	Training Chief	City of Warner Robins Fire Department
Robert Wood	Deputy Chief	City of Warner Robins Fire Department
Ross Moulton	Fire Chief	City of Warner Robins Fire Department
Randy Toms	Mayor	City of Warner Robins
John Wagner	Chief of Police	City of Warner Robins Police Department
Todd Edwards	Special Operations Captain	City of Warner Robins Police Department
Montie Walters	Director	City of Warner Robins Utility Department
Cecil Graves	Construction Manager	City of Warner Robins Utility Department
Joey McDuffie	Water Supervisor	City of Warner Robins Water Department
Rogie Roberson	VP of Member Solutions	Flint Energies
Don Thomas	Chief Ranger	Georgia Forestry Commission
Scott Cox	Area Manager	Georgia Power
Barry Holland	Director of Administration	Houston County Administration
Robbie Dunbar	Director of Operations	Houston County Administration
Forrest Walker	Director of Facilities	Houston County Board of Education
Billy Dollar	Maintenance Department Director	Houston County Board of Education
Walter Stephens	Director of School Operations	Houston County Board of Education
Christopher Stoner	EMA Director and Fire Chief	Houston County Fire Department
Ricky Harlowe	Commander	Houston County 911 Center
Michael Slaton	Environmental Health Specialist	Houston County Health Department
Sharon Pettit	Environmental Health Specialist	Houston County Health Department
Heather Holloway	Registered Nurse	Houston County Health Department
Christine Buffington	Environmental Health County Manager	Houston County Health Department
William Rape, Jr.	Chief Deputy	Houston County Sheriff's Office
David Borghelli	EMS Director	Houston Healthcare EMS
Cassandra White	Program Analyst	Robins Air Force Base

Throughout the planning process, complete records were maintained for all meetings. This documentation includes agendas, sign-in sheets, and labor documentation forms verifying the community's local match. All records and data will be maintained and retained by the Middle Georgia Regional Commission for a period of no less than three years from the date of GEMA/FEMA approval, should either entity seek to audit for verification purposes.

The plan update was prepared by assembling the ideas, thoughts, and research of the Houston County Pre-Disaster Mitigation Planning Committee. The assembly of the plan document was completed by the Middle Georgia Regional Commission staff. The ideas, thoughts, and actions of the committee were put together into one comprehensive document. A draft was presented to the full committee for its review and comment.

Two public hearings were conducted during the planning process in an effort to solicit public input and participation in the local plan update (*see Public Hearing Notices and Agendas in **Appendix E***). The first public hearing was held on Tuesday, November 12, 2019, to give the public an opportunity to comment on the plan update during the drafting stage. Notice of the hearing was printed in the Houston Home Journal. The public hearing was held at the Houston County Board of Commissioners Annex. While citizen participation and input were solicited, no members of the community attended the hearing, and therefore, no public comment was received.

A second public hearing was held on January 28, 2020. Notice of the hearing was published in the Houston Home Journal, on Houston County's social media sites, and by the local television news media. At this time a draft of the plan update was made available for public review and comment. This public hearing was similarly held in the Houston County Board of Commissioners Annex. Seven members of the public attended. The meeting was also attended by the Houston County EMA Director, the Houston County Director of Administration, and a staff person from the Middle Georgia Regional Commission, all members of the planning committee. Questions received from the public included wanting to know when a list and map of emergency shelters would be available to the public. The EMA director stated that this information would be made available once the emergency shelters were identified. One attendee requested adding common gathering spaces for public events and festivals to public facilities in the terroristic threats section. MGRC staff responded that the feedback would be incorporated into the goals and objectives under terroristic threats. Another attendee asked if this plan covered hazards that may involve aircraft crashes or malfunctions. The planning committee responded that the rarity of those events resulted in them not including that technological hazard in the plan; however, the local emergency operations plan accounts for response to such an event. Additionally, coordination with Robins Air Force Base ensure that response would be appropriate. The EMA Director also noted that the goals and objectives under the Hazardous Material Spills section would help ensure that the local governments are prepared for additional effects of such an event. No additional comments were received, and the hearing was closed.

Surrounding county and regional representatives were identified to assist in the plan update process, including Bleckley, Dooly, Macon, Macon-Bibb, Peach, Pulaski, and Twiggs Counties. They were requested to participate in the plan update and review the plan for consistency with their local plans. Representatives from the respective communities did not attend any of the planning meetings. No comments were received from neighboring counties. Documentation of the request for review can be found in **Appendix E**.

The specific steps and processes taken to update this plan are explained and summarized in each chapter and section of this document. Generally speaking, an update to the Hazard Risk and Vulnerability (HRV) assessment was accomplished by compiling and reviewing historical data on the location of specific hazards, the value of existing property in hazard locations, and analyzing the risk to life, property, and the environment that could potentially result from future hazard events. Additionally, an updated Capabilities Assessment was conducted by the Houston County EMA Director, collaboratively with the planning committee, to determine areas of vulnerability, ability, and action. More specifically, the Houston County Pre-Disaster Mitigation Planning Committee accomplished the HRV assessment/update by conducting the following steps:

Inventory of Critical Facilities – Critical facilities are important to the community in that they provide essential products or services to the public that are necessary to preserve the welfare and quality of life in the county. Additionally, these facilities fulfill important public safety, emergency response, and/or disaster recovery functions. As had been done in past cycles, Houston County's critical facilities were reviewed, updated, mapped, and illustrated as found in **Appendix A**.

Hazard Identification – Maps and historical data sources were reviewed and analyzed in order to identify the geographic extent, intensity, and probability of occurrence for various hazard events (see GEMA Worksheet #1 – **Appendix D**).

Profiling Hazard Events – The characteristics of each hazard were analyzed to determine how each has affected Houston County in the past. Analysis included examining what part of Houston County's population and infrastructure (to include an examination of each individual jurisdiction) has been most vulnerable to each specific hazard. A profile of each natural hazard is provided in Chapter 2, with technological hazards portrayed in Chapter 3.

Vulnerability Assessment – This step was accomplished by comparing each previously identified hazard with the inventory of affected critical facilities and populations exposed to each hazard. Updated data and information were used in conducting the assessment. An analysis of development trends and an assessment of each participating jurisdiction's risks were also included.

Goals, Objectives, and Action Items – The goals, objectives, and action items were identified after reviewing the hazards, vulnerability, and critical facilities. The planning committee reviewed previous goals, objectives, and action items to determine if they

were still relevant and added additional content to this section to fully address areas of vulnerability.

As was the case during previous planning cycles, the planning committee discussed future buildings and infrastructure considered critical whose vulnerability should be assessed. Numerous new facilities were added to this list, including schools, pump stations, lift stations, and public safety facilities.

The planning committee did agree that all relevant mitigation practices and principles presented in this plan should be applied to any other significant development, infrastructure expansion or critical facility that occurs over the five-year planning period. Any significant additions of community facilities/infrastructure will necessitate an immediate update of the plan.

Plan Organization
As identified in the Table of Contents, the Houston County Pre-Disaster Mitigation Plan is organized as follows:

Chapter 1 introduces the previous planning process, as well as actions taken during the update of the plan. It includes the purpose and intent of the plan, the methodology used in developing and updating the plan, a list of those involved in the planning process and a descriptive narrative of how each section of the plan was reviewed, analyzed and revised.

Chapter 2 profiles the various natural hazards that can occur within the community.

Chapter 3 addresses technological hazards.

Chapter 4 identifies specific community-based mitigation goals, objectives, and strategies for each of the identified natural hazards.

Chapter 5 identifies goals, objectives, and strategies to mitigate any technological hazards that may occur within the community.

Chapter 6 provides for the assignment of various mitigation activities to certain individuals/organizations to ensure that the plan is implemented and carried out. Included is an evaluation and monitoring component, as well as a process for future plan updates.

Chapter 7 concludes with a summary of the plan and identification of all references. Additionally, the plan contains a series of appendices that incorporate various planning tools and supporting documentation. It should be noted that **Appendix E** fully documents the plan update process. This appendix is presented in chronological order showing the sequence of events and actions that occurred.

Local Hazard Risk Vulnerability Summary

Current research confirms that within Houston County, the most prevalent, significant, natural hazard events continue to be *thunderstorm winds* that routinely strike, especially during the spring and summer seasons. However, there are other natural hazards that could pose a threat to Houston County. The planning committee identified and verified six additional natural hazard events that could significantly impact the community in a negative manner. These six events are tornadoes, flooding, drought, lightning, wildfires, and winter storms. All of these hazards were identified by reviewing available data. Data availability differed based on the hazard.

Additionally, *hazardous material spills* are the most prevalent technological hazard, and they continue to occur at a high rate within Houston County. Terroristic activities have not been a frequent occurrence in the county, but based on national trends, the planning committee determined this to be an important hazard to plan for and was thus added to the hazard list.

Dam failure, extreme heat, extreme cold, hail, and hurricanes were considered and discussed, but Hazard Risk and Vulnerability Analysis determined the frequency of occurrence and degree of impact (e.g. injuries, deaths, property damage) in Houston County and its three municipalities to be minimal or non-existent, and thus are not included in the plan. In previous plans, wildfires were considered to have a minimal or non-existent impact in Houston County; however, in the 2020 update, wildfire was added to the hazard list.

Additional technological hazards were also considered. The committee elected not to include any hazards such as aircraft crashes that may occur due to the presence of Robins Air Force Base (RAFB). The extreme rarity of these types of events and difficulty in developing mitigation strategies resulted in this type of event not being included. It is important to note that numerous Air Force policies and regulations address mitigation procedures, as well as response actions for such an event. The Robins Air Force Base Comprehensive Emergency Management Plan (CEMP) is used to respond and recover from the Department of Defense (DoD) aircraft accidents on and off base property. This plan is coordinated annually through the Houston County Emergency Management Agency.

Current Facilities and Services

Please see the Houston County/City of Centerville/City of Perry/City of Warner Robins Service Delivery Strategy (SDS) Agreement for detailed insight into the services provides by each local government. This document is located in ***Appendix C****.*

Houston County is home to three cities, Centerville, Perry, and Warner Robins, that maintain various facilities and provide different levels and types of services.

Centerville has a government administration building, which is the center of general government operations. Centerville does have its own police department and fire

department, which provide service to Centerville residents. There are multiple fire stations in the city. Centerville also provides sewerage collection services to city residents and can provide this service to residents in the unincorporated county according to the SDS. The city, however, does not treat wastewater. Warner Robins treats wastewater from Centerville. Centerville does provide water service to its residents and has an extra-territorial service area beyond city limits.

Perry has a government administration building, which is the center of general government operations. The city also has its own police and fire department, which provides services to the city's residents. There are multiple fire stations in the city. Perry does provide its own sewerage collection and treatment services for its residents in the city. Perry can provide wastewater services beyond city limits according to the SDS. Perry also provides water service to its residents. Perry cannot provide water service beyond its city limits according to the SDS.

Warner Robins also has its own government administration complex serving as the center of general government operations. Warner Robins has its own police and fire departments serving its residents. There are multiple fire stations in the city. Warner Robins provides sewerage collection and treatment services to city residents. The SDS also allows for it to provide sewerage treatment services to Centerville and residents in the northern and eastern part of Houston County. Warner Robins provides water service to city residents, in addition to areas beyond the city's boundaries.

Houston County has two government complexes that have a range of government services and operations. The county has its own sheriff's department and fire department serving residents in unincorporated areas. Houston County does not provide any wastewater collection or treatment to residents according to the SDS. However, the county does have a large service area for providing water to residents.

Georgia Power and Flint Energies have electric power substations throughout the county to serve Houston County residents.

Houston County is the agency designated as the provider of Emergency Management Services for the entire county under an agreement with the other cities. For fire protection and prevention, the county and cities have mutual aid agreements.

The plan and authorized its submission to GEMA and FEMA for their respective review and approval on February 3, 2020. Should any changes or alterations of the plan be required by either of these entities, HEMA is instructed to make such changes to ensure that Houston County has a compliant plan in place.

CHAPTER 2: NATURAL HAZARD, RISK & VULNERABILITY SUMMARY

During the plan update process, the Houston County Pre-Disaster Mitigation Planning Committee used the natural hazards identified in the two previous plans as a baseline for discussion and analysis. The planning committee then reviewed, discussed, and considered other natural hazards that could potentially affect Houston County. The committee ultimately determined that the six hazards identified in the previous plan still pose a direct and measurable threat to the community. The committee also elected to add an additional hazard, wildfires, resulting in a total of seven natural hazards.

The entire county is exposed to six of the seven natural hazards; tornadoes, drought, thunderstorm winds, lightning, wildfires, and winter storms. The remaining hazard, flooding, is isolated to select areas of the county that are within the flood plain and/or hazard area. Each of these potential hazards is addressed individually, with data to support the committee's findings and recommendations. Additionally, each hazard is followed by a summary of changes resulting from the plan update.

After having identified the natural hazards that pose a significant threat to the community, the planning committee proceeded to "profile" each hazard event in order to help answer the question: *How bad can it get*? This process consisted of examining hazard frequency data, assessing existing maps (i.e. road maps, topographic maps, aerial photography, etc.) and technology (e.g. Geographic Information System (GIS) and digital mapping) that may already exist at the local level, and inventorying assets and facilities exposed to each hazard event. GEMA Worksheet #2 (see **Appendix D**) and GEMA Worksheets #3a and #3b (see **Appendix A**) were helpful planning tools utilized by the planning committee during this process. Also, new and/or projected development, to include buildings and infrastructure, was researched, discussed, and given consideration.

Flooding (see Appendix A for hazard area map and related data)
Within any given geography, many different variables must be considered when determining if an area is susceptible to flooding. Topography, ground saturation, soil permeability, rainfall intensity and duration, drainage, and vegetative cover, to only name a few, contribute to the determination of whether or not an area will flood. Large amounts of rainfall over a short period of time can result in flash floods, which routinely do minimal damage. However, should the soil become saturated or super-saturated, even a small amount of rainfall can cause flooding issues. As more and more land is being developed, the presence of impermeable surfaces, roads, driveways, and parking lots cause an increase in the likelihood of flooding within an area.

History and Context
Despite a low volume of occurrences flooding has caused significant damage within Houston County. The Flood of '94 is the most impactful flood to Houston County and much of Georgia in modern history. Initiated by Tropical Storm Alberto, the region received approximately 14 inches of rain within a few hours. This caused dramatic flooding throughout Houston County that lingered throughout the county for days. The

loss of personal property was catastrophic and the impact on the local economy was significant. The total dollar value of damages paid by GEMA/FEMA as a result of this flood was $5,596,064. Beyond this flood, Houston County has avoided frequent events. Fortunately, those that have occurred have been milder by comparison. Although a culvert or dry stream bed may take on excessive water during heavy rainstorms, flooding to the extent that it causes significant damage has historically been rare.

The Houston County Pre-Disaster Mitigation Planning Committee reviewed historical data from the original and 2010 amended plans, as well as more recent data made available through the National Climatic Data Center (NCDC), for effects of flooding on the community. The areas most susceptible to flooding are illustrated in the Flood Hazard Area Map found in **Appendix A**, with all other areas primarily spared from flooding. Unfortunately, available data is not suitable or sufficient to make a reliable determination regarding the frequency of occurrence, or future probability of flooding, for each individual jurisdiction within Houston County.

In Houston County, there have been 15 reported flooding events since 2000, causing an estimated $600,000 in property damage. Since the time of the 2015 update, there have been four flooding events in the county reported to the National Climatic Data Center. Each of these was a flash flood event. The impact of these floods is considered low as, combined, they caused an estimated $10,000 in property damage (see *GEMA Worksheet #1 Addendum* in **Appendix D**). However, there have been more severe floods in Houston County since 2000. In 2005, a flash flood resulted in $150,000 in property damage. Another flash flood in 2005 caused $250,000 in property damage. Of the 15 reported floods since 2000, 10 have resulted in property damage ranging from $1,000 to $250,000. In analyzing the available data, Houston County averages a significant flooding event every 1.2 years. According to available records, there have been no injuries or deaths as a result of floods in that time period.

Echeconnee Creek

Flood Categories (in feet)	
Major Flood Stage:	24
Moderate Flood Stage:	20
Flood Stage:	15
Action Stage:	13
Low Stage (in feet):	0

Historic Crests
(1) 16.95 ft on 05/05/2010
(2) 16.80 ft on 12/24/2015
(3) 16.77 ft on 04/02/2016
(4) 16.33 ft on 04/08/2014
(5) 15.97 ft on 12/20/2009
Show More Historic Crests

(P): Preliminary values subject to further review.

Recent Crests
(1) 15.11 ft on 05/26/2018
(2) 15.87 ft on 01/03/2017
(3) 16.77 ft on 04/02/2016
(4) 15.00 ft on 01/01/2016
(5) 16.80 ft on 12/24/2015
Show More Recent Crests

(P): Preliminary values subject to further review.

Low Water Records
Currently none available.

Big Indian Creek

Flood Categories (in feet)	
Major Flood Stage:	38
Moderate Flood Stage:	35
Flood Stage:	30
Action Stage:	27
Low Stage (in feet):	0

Historic Crests
(1) 27.21 ft on 12/16/2009
(2) 26.81 ft on 01/22/2010

(P): Preliminary values subject to further review.

Recent Crests
(1) 26.81 ft on 01/22/2010
(2) 27.21 ft on 12/16/2009

(P): Preliminary values subject to further review.

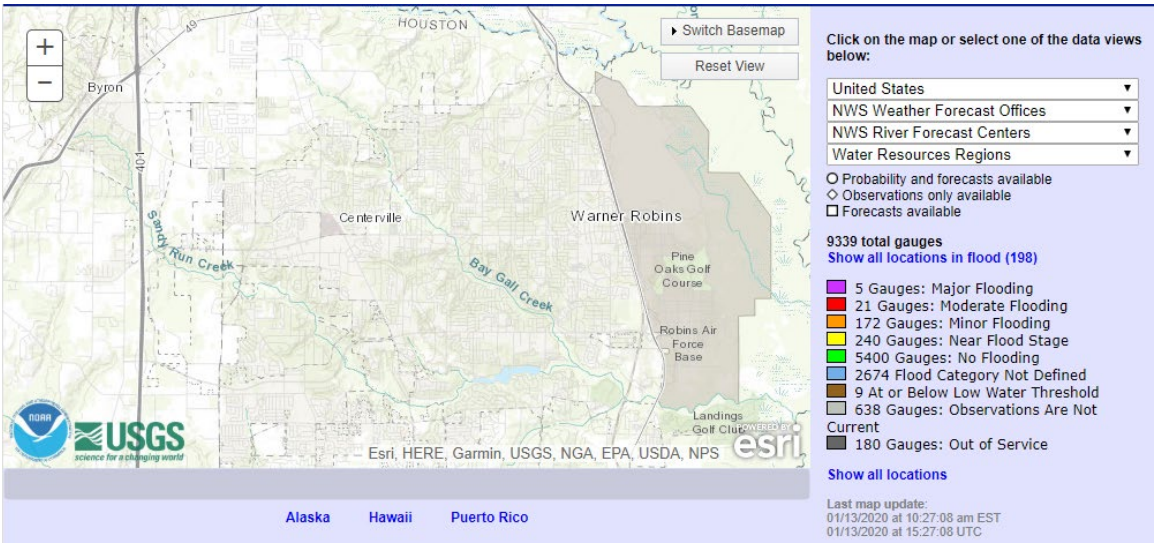
Low Water Records
Currently none available.

In order to measure the extent of the flooding, available data were considered that described depth of floodwater. In FEMA's 2007 Flood Study of Houston County and Incorporated Municipalities, there are profiles of sections of creeks and tributaries inside Houston County. Utilizing the median sea level (MSL) of each body's riverbed and the MSL elevation of the predicted 1-percent-annual-flood-chance, the depth of water during a hazard, the potential Insurance

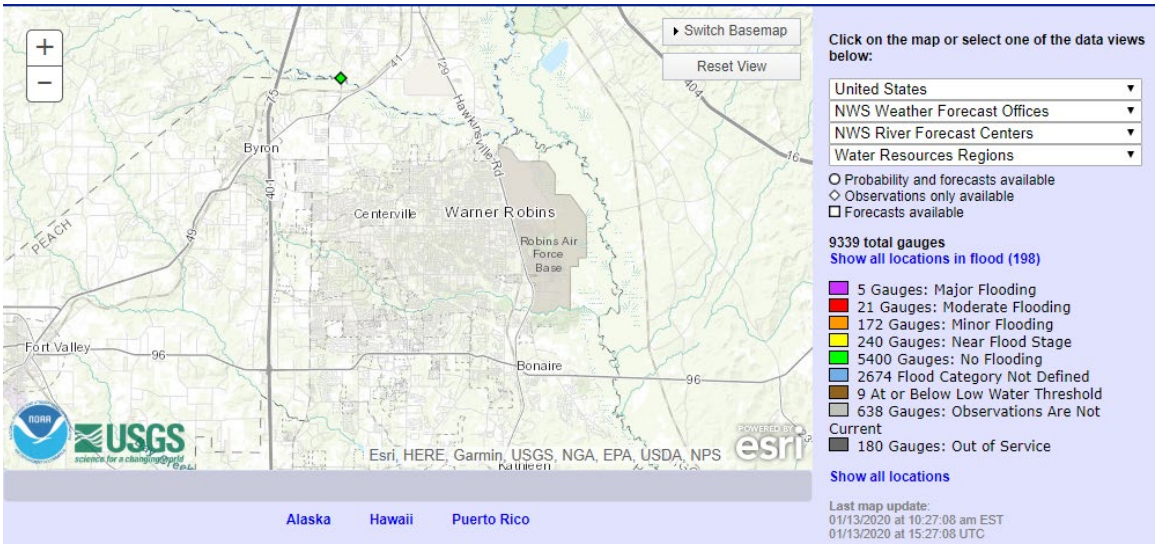
100-year flood was predicted. The results of this analysis showed that of the 20 bodies of water considered, two had an average depth of more than 15 feet, the Echeconnee Creek and a tributary. Three other bodies had average depths of more than 10 feet. The average flood depth for all the bodies of water is 8.16 feet. The United States Geological Survey (USGS) has gauges on two of the county's creeks, Big Indian and Echeconnee, which help determine the depth of water during historic crests. Big Indian Creek was determined to have an average depth of 27.01feet during historic crests, while the Echeconnee Creek was determined to have an average depth of 16.56 feet. These measurements indicate the possibility of some impactful floods within the county.

The following maps show the river gauge locations in Houston County and its municipalities.

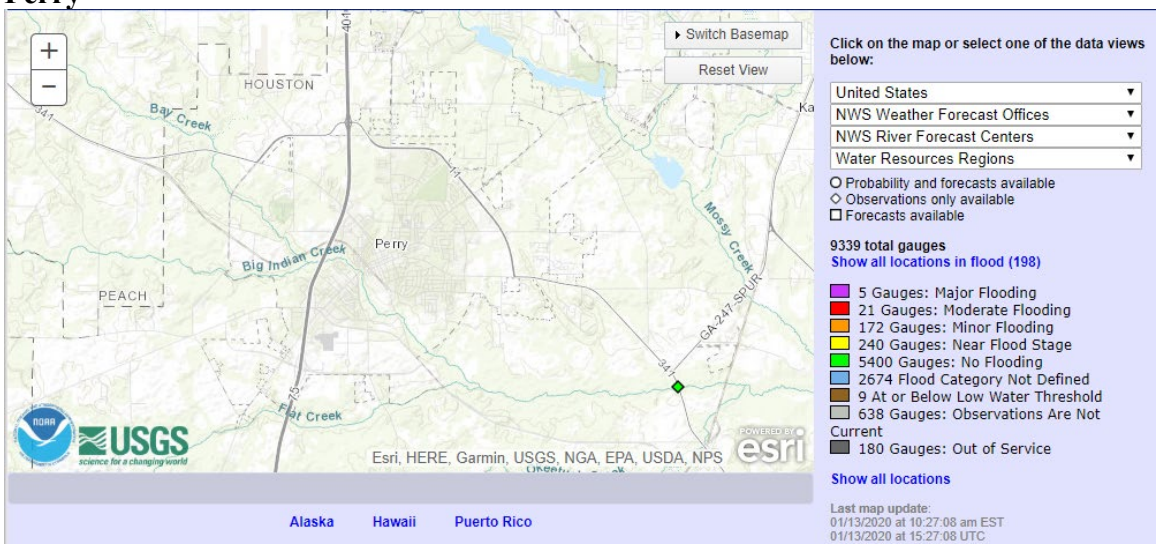
Centerville



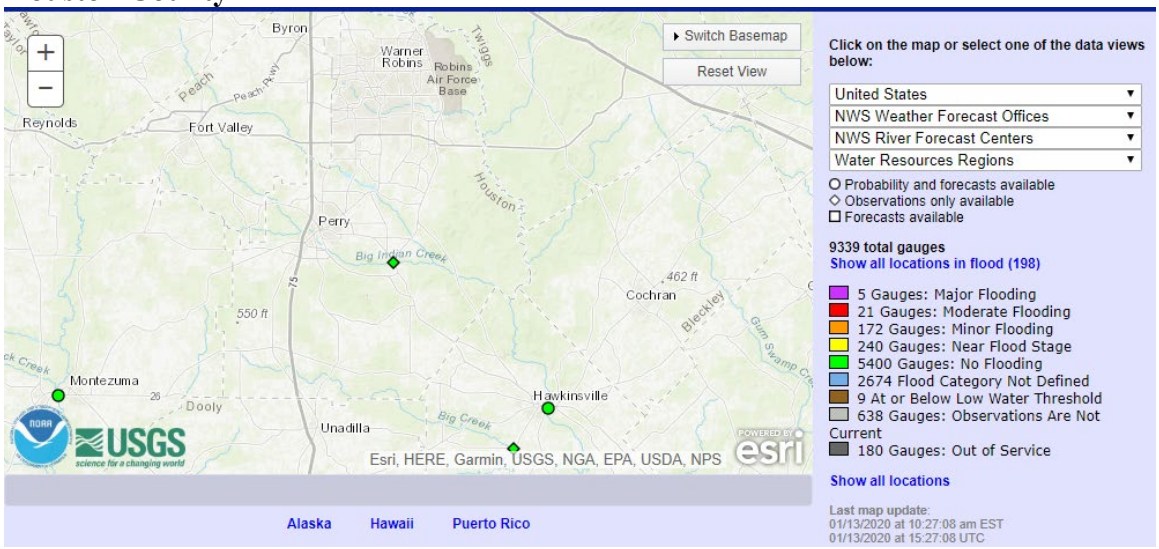
Warner Robins



Perry



Houston County



Houston County, as an active NFIP community, had its initial Flood Hazard Boundary Map (FHBM) identified in 1976 and its initial Flood Insurance Rate Map (FIRM) identified in 1990. The county's current effective map dates to 2007. The City of Centerville has its FHBM identified in 1974 and its initial FIRM identified in 1988. Centerville's current effective map dates to 2007. The City of Perry had its initial FHBM identified in 1974 and its initial FIRM identified in 1978. Perry's current effective map dates to 2007. The City of Warner Robins had its initial FHBM identified in 1974 and its initial FIRM identified in 1978. Warner Robins' current effective maps dates to 2007. None of these jurisdictions participate in the Community Rating System program. However, they are all committed to complying with the National Flood Insurance Program and its requirements. Each community will take following steps necessary to

meet the minimum requirements set by the NFIP: (1) Inspecting all development to ensure compliance with local ordinance, (2) Assisting in the preparation and revision of floodplain maps, (3) Providing information to residents about flood hazards, floodplain data, and flood insurance, and (4) Maintain records of floodplain development. Houston County, Centerville, and Warner Robins all have flood damage prevention ordinances in place to restrict uses that are dangerous to health, safety, and property due to water. The City of Perry does not have a flood damage prevention ordinance, but it does have regulations in place related to stormwater and flood prevention.

Impacts

There is an 80.0 percent chance that Houston County will experience a flood in any given year based on the historic frequency of 20 flood events in the past 25 years. In the past 10 years, the frequency has with a 0.7 frequency per year. Based on these trends, Houston County's future probability of flooding is declining.

During the update process, assets (particularly critical facilities) were examined using a risk-based analysis to determine the most vulnerable locations within the county (see GEMA Worksheet #3a and GMIS Critical Facility Inventory Reports in **Appendix A**). Because not all facilities are located within a flood hazard area, some facilities can be assumed to be safe should flooding occur within the community.

GEMA Worksheet #3a in **Appendix A** reflects totals for types of assets, their values, and local populations exposed to flooding. A noteworthy limitation, however, is that the information and data reflected on this form encompass the entire planning area (i.e. Houston County), to include the cities of Centerville, Perry and Warner Robins. Currently, the community lacks the ability to accurately separate the information by individual jurisdiction. According to the Georgia Mitigation Information System's (GMIS) National Flood Insurance Program (NFIP) Repetitive Loss Properties report, there are four repetitive loss properties within the county each being residential. Three of these properties have been impacted on two occasions while one property has been impacted six times.

As with the previous update of the Houston County Pre-Disaster Mitigation Plan, the planning committee felt it would be beneficial to examine land use and development trends as they relate to mitigation planning for flood hazard events. An emphasis was placed on examining residential and commercial uses because of the high degree of vulnerability to life and property associated with these uses.

Many areas of Houston County, particularly the area between Warner Robins and Perry, have experienced rapid suburban development over the past 20 years. The City of Warner Robins contains several older residential areas that were built between the late 1940s and early 1960s during the early development of Robins Air Force Base. As RAFB has grown, so has the need for housing in a variety of housing types. Through an aggressive annexation and utility expansion policy, Warner Robins' residential development has expanded to the west and south. New residential development has not been limited to the City of Warner Robins alone. The City of Centerville and the unincorporated area of Houston County north

of Highway 96 have seen a boom in new housing in suburban-type subdivisions; some potentially creeping into flood-prone areas.

As Warner Robins grew, commercial development spread along the city's primary traffic arteries (Watson Boulevard and Highway 247 Connector, Russell Parkway and Houston Lake Boulevard) in a "strip" development pattern. The City of Perry is characterized by classic traditional neighborhoods with suburban development taking place in the north and south of the city. Perry's downtown serves as its central business district with strip commercial development occurring along the major transportation corridors.

Land use and development trends provide a basis for making decisions on the type of mitigation approaches to consider and the locations where these approaches can be implemented. Specific goals, objectives, and strategies related to flooding vulnerability resulting from land use and development in Houston County, and its three municipalities, are found in Chapter 4.

Conclusion
As previous versions of mitigations plans have been implemented, the community has gradually become less susceptible to flood. The primary reason for this has been the development of policies that discourage the development of facilities within high-risk flood plains. Additionally, the local utility and public works departments have prioritized the protection of local utilities, particularly the sewage treatment facilities by installing back-up power generators and pumps.

Summary of Changes
Hazard history and frequency data related to flooding was updated from the original plan; probability of future occurrences was adjusted accordingly; maps were created using the Georgia Mitigation Information System (GMIS); a new analysis of land use, development trends and existing ordinances and regulations was accomplished; and flooding susceptibility for each jurisdiction was re-examined via GMIS on-line tool.

Tornadoes (see Appendix A for hazard area map and related data)

As noted in previous plans, tornados are the most unpredictable and destructive of all weather phenomena that affect Houston County. A tornado is a violently rotating column of air extending from a thunderstorm cloud to the ground. The most violent tornados are capable of tremendous destruction, in some cases extreme devastation, with wind speeds that can exceed 250 miles per hour. Damage paths can be of varying widths up to and exceeding one mile, with the length of the path up to 50 miles long. While tornado season is considered March-August, they are known to strike whenever deadly atmospheric conditions are present. The planning committee used previous plans and relevant NCDC data to consider the threat that tornados pose to Houston County's residents and critical facilities.

Enhanced Fujita Scale	
EF Rating	**3 Second Gust (MPH)**
0	65 - 85
1	86 - 110
2	111 – 135
3	136 – 165
4	166 – 200
5	Over 200

Historically, Houston County has used the Fujita Scale to measure the strength of tornados. Since 2007, the Enhanced Fujita Scale has been used to rate the intensity of a tornado by examining the damage caused by the tornado after it has passed over man-made structures. The scale ranges from EF0 to EF5 with an EF0 tornado having wind speeds of 65-85 mph causing typically minor damage (e.g. damage to chimneys; broken tree branches; shallow-rooted trees pushed over; and damage to signs). The other end of the scale is represented by an EF5 tornado, with wind speeds greater than 200 mph and capable of lifting automobiles into the air and completely destroying buildings.

History and Context

Though tornadoes are fairly infrequent in Houston County, they occur with little warning and can occur in any geographic location. Because of this, the municipalities are equally as vulnerable as the unincorporated county to this threat. There are no significant differences between the county and the cities of Centerville, Perry, and Warner Robins in terms of the risks associated with tornados. Because of the infrequency in which tornados actually touch down, data is not sufficient to make a reliable determination regarding the frequency of occurrence, or future probability of occurrence, for each individual jurisdiction within Houston County. Only six tornadoes have been reported inside the county since 2000. Five of these events resulted in property damage ranging from $10,000 to $250,000. The planning committee noted that despite the relatively few occurrences, the potential devastation and unpredictability of tornados demand appropriate mitigation action.

As noted in previous plan versions, the most impactful and catastrophic tornado to touch down in Houston County occurred in 1953. In that year, an EF4 tornado touched down in the northern portion of the county, crossed Highway 247, continued through a residential area, and ultimately traveled across RAFB before leaving the county. This tornado left 18 people dead, 300 people confirmed injured, and over $25 million in property damages. The severe damage was due, not only to the magnitude of the event but also because of its location in a densely populated portion of the City of Warner Robins. A further alarming statistic is that the Houston County population at that time was less than 25,000 people. With a population of nearly six times that today, that same tornado would cause an astronomically larger amount of damage.

Since this event, 21 tornados have been verified in Houston County (see *Hazard Frequency Table* in **Appendix D**). Speaking to the danger of these phenomena, five of the total 22 recorded tornados have resulted in injuries and two have been deadly. Trend analysis shows that a tornado has impacted Houston County approximately one every 3 years. Based on this historical data, there is a 33.3 percent chance of a tornado impacting the county each year. The potential damage caused by a tornado event is extremely high.

Fortunately, 81.8 percent of the reported tornados have been EF1 or lower. While these were not the most powerful, they still managed to cause over $3 million in property damage, nine injuries, and one death. The impact of future tornadoes will be heavily dependent upon the location of touch down. Touching down in a heavily developed area, similar to the 1953 tornado, could have devastating impacts on life and property. As Houston County has rapidly grown by nearly 50,000 people over the past 20 years, there is a significant risk that a tornado could be devastating because of the spread of development.

Impacts

Houston County has a 33.33 percent chance per year of being impacted by a tornado based on historic frequency over the last 22 years. Based on the data, there has been a tornado once every three years in the county. That frequency has been higher when looking at the past ten years when there has been a 50 percent chance per year of being impacted by a tornado.

The best-case scenario for Houston County is to see crop and timber damage away from the population center. This will still have a financial impact on the local economy.

It can be assumed that all facilities within Houston County could be damaged by a tornado; as such weather events are indiscriminate as to when or where they strike. Using a straight-line method for estimating losses, it can be assumed that structures with the greatest replacement value could potentially sustain the most monetary damage. It is no surprise that RAFB is the most vulnerable to a tornado strike due to its size. RAFB uses a robust mass notification system to alert base personnel to impending weather events, including tornado watches and warnings.

The planning committee, operating on the assumption that a facility would sustain 75 percent damage in the event of a tornado, identified some of the costliest facilities in the county. Some of the vulnerable facilities include many of the area schools, particularly the high schools (i.e. Houston County High, Northside High School, Perry High School, Warner Robins High School), as well as the Houston County Medical Center, the Guardian Center, the Georgia National Fairgrounds & Agricenter, and Frito-Lay, Inc. GEMA Worksheet #3a in **Appendix A** reflects totals for types of assets, their values, and local populations exposed to tornadoes. The GMIS generated Critical Facility Inventory Report found in **Appendix A** reflects this same data for the community's critical facilities. As indicated previously, the ability to separate the information contained in Worksheet #3a by individual jurisdiction is not currently available.

Land use and development trends were examined and discussed but were determined to be not overly relevant to mitigation planning for tornados. This is due to a tornado's propensity to strike anywhere within the county and with varying degrees of severity. Developing around or away from a tornado is not feasible. Houston County currently has building codes that mandate that structures be built to the design wind speed of approximately 99 miles per hour. This applies to manufactured houses as well. The

minimum standards established by these codes provide reasonable protection to persons and property within structures that comply with the regulations for most natural hazards. Additionally, ordinances currently exist within Houston County to allow local officials to implement curfews to close off certain portions of the county during a declared emergency such as a tornado.

Conclusion
Overall, Houston County has high exposure to potential damage from tornados. Should a tornado hit certain portions of the county that are highly developed, significant damage could occur depending on the strength and duration of the event. As has been evidenced by the number of events within the past 66 years (22 events), tornados have struck Houston County on average once every 3.0 years. As the location of tornados is indiscriminate, no one can predict what facilities, if any, will be damaged in such an event. Additionally, the planning committee determined that due to the indiscriminate nature of tornados, mitigation activities should be applicable to the entire planning area. Any mitigation measures that can be taken by local officials to make the community safer in the event of tornado activity are encouraged.

Summary of Changes
Hazard history and frequency data related to tornados were updated from the original plan; the probability of future occurrences was adjusted accordingly; changes in land use and development trends were examined for applicability; population changes were noted; costliest facilities were updated, and the GMIS online tool was used for mapping and analysis.

Drought (see Appendix A for hazard area map and related data)

In order to understand the danger presented by drought, the planning committee analyzed previous data from the former plans and new data provided by the National Climatic Data Center (NCDC). By definition, drought is a prolonged period of moisture deficiency. Drought conditions affect the cultivation of crops, as well as water availability and water quality. Drought is also a key factor in wildfire development. Drought conditions make natural fuels (grass, brush, trees, dead vegetation, etc.) more fire-prone.

During droughts, the community is exposed to several potentially harmful situations. Groundwater levels can decline due to a lack of recharge from precipitation. Additionally, dry grass and underbrush can increase the threat of fire to a dangerous level. Fortunately, Houston County has been spared from any wildfire activity destroying numerous acres and real estate. One of the most significant effects of drought for Houston County is the impact on agricultural products. To date, agricultural losses have been the primary losses associated with drought as no critical facilities have sustained any damage or downtime due to dry weather.

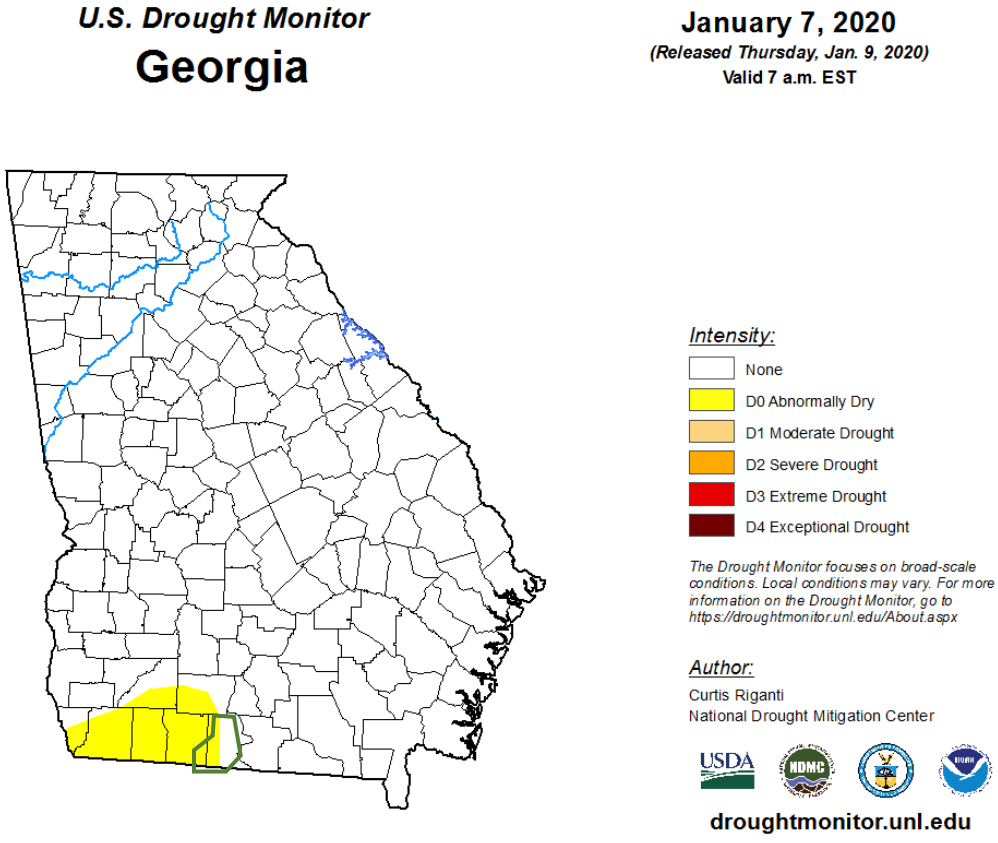
History and Context
Since 2000, there have been 22 occurrences of drought in the county. It is important to note that the NCDC data recorded multiple events during what was a sustained period of

extended drought. For example, in the years, 2000, 2001, 2002, 2007, and 2016, each saw multiple drought events adjacent to one another. This makes the data potentially misleading. Additionally, available data shows a date for the events but does not give a beginning or an end. While this makes the data more difficult to interpret, it does provide a framework and timeframe to understand drought conditions in the county.

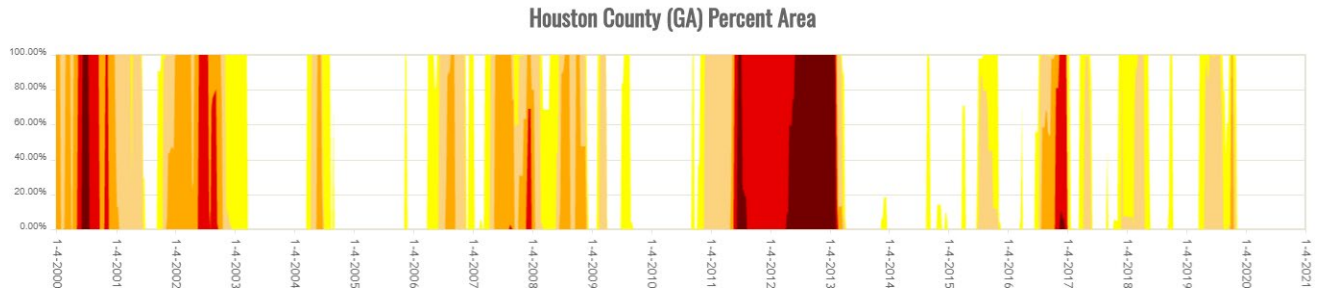
Fortunately for the county, recent years have shown declining drought events. Since the last update in 2015, there has been only one instance of reported drought. This event occurred in late 2016 and no evidence of death, injury, or damage was identified. A drought in the spring and summer of 2000 was the only drought event to have reported damage. This damage was very significant with $3.28 million in damages.

While drought conditions, extreme heat, and dry weather can have negative health impacts on people, animals, and vegetation, those conditions have been determined to rarely impact physical structures. As was the case in the previous planning cycles, there are no records of critical facilities having been damaged by drought conditions. The planning committee believes that this is unlikely to occur.

The United States Drought Monitor records drought conditions for each county in the US each month. It records these levels on a scale that ranges from Abnormally Dry (D0) to Exceptional Drought (D4). According to the USDM records from January 2015 until December 2019, there were 90 weeks (22.5 months) where some parts of Houston County experienced some level of drought (Moderate Drought (D1) to Exception



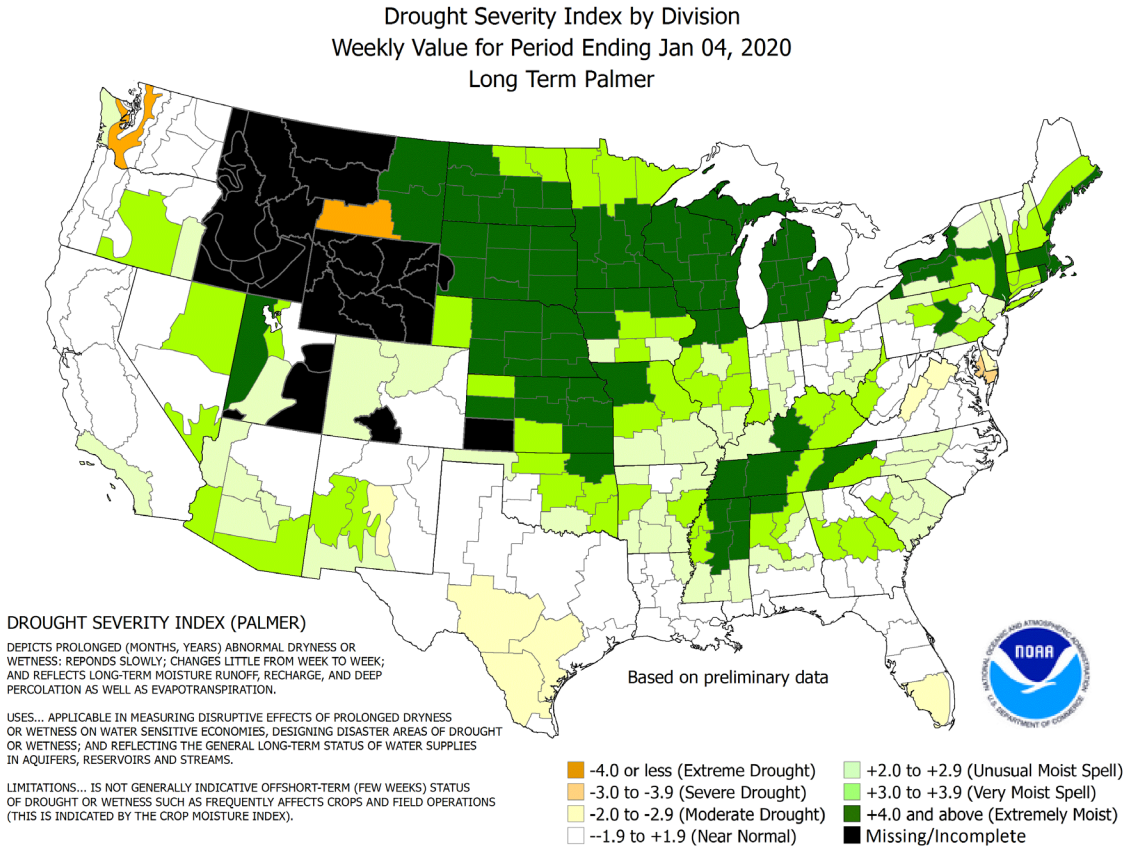
Drought (D4)). This accounted for 46.9 percent of the months during that time period. With drought having been present nearly 50 percent of the last five years somewhere in the county, the planning committee determined that it was highly likely that drought will occur in any given month. The following graphics show a point in time status for drought conditions in Houston County (outlined in green) and the time series conditions for Houston County in the graphic below.



Previous planning committees included drought as a considered hazard because of conditions that may result due to it. Specifically, it creates conditions susceptible to wildfires and other conflagration events. Without rainfall, these fires can be much more difficult to control and fight. Because of its lack of direct impact on critical facilities, there was considerable debate as to whether its significance rose to the level of being in the plan. Correspondingly, there was additional debate as to whether wildfire should be mentioned specifically. Ultimately, the planning committee decided to keep drought as a hazard of note because of its relationship to other hazards like wildfire.

Impacts

There is a 118.18 percent chance that Houston County will experience a drought based on the historic frequency over the last 22 years. During the available historic record, a drought has occurred once every 0.85 years. Quantifiable damage from droughts is difficult to determine. Since no damage to critical facilities is anticipated as a result of droughts, the estimated losses to critical facilities are still considered to be $0. Crop damage cannot be accurately quantified due to the fact that different crops require different amounts of rain and different temperature requirements. Additionally, the duration of the drought and the severity of the drought are other variables that preclude accurately identifying a cost associated with crop damage.



With drought having little to no impact on facilities, and no reported instances of significant wildfire activity resulting from drought, agricultural losses are most likely to extend from drought conditions. While difficult to quantify a monetary impact, historical data indicates that most periods of drought in Houston County have been short in duration, typically lasting a single growing season.

Unlike floods and tornadoes, for which higher population and development mean a higher potential for damage, drought conditions are most impactful to rural lands that have low population density. Additionally, lands with agricultural resources are most likely to assume damage and loss. The bulk of agricultural lands in the county are found in the southern portion away from the more urbanized Warner Robins and Centerville. Areas of development abutting agricultural lands are the facilities most likely to be impacted.

Conclusion

After careful consideration, the Houston County Pre-Disaster Mitigation Planning Committee determined that the financial damage associated with drought should be minimal to any facilities or vital infrastructure within the county (see **Appendix A**, GEMA Worksheet #3a). A vulnerability exists for agricultural commodities, but quantifying the vulnerability is not possible due to the different variables discussed

above. While crop damage resulting from drought is primarily confined to agricultural areas of the county, water shortages impact all Houston County residents. Therefore, the planning committee determined that any potential mitigation measures should target the entire planning area.

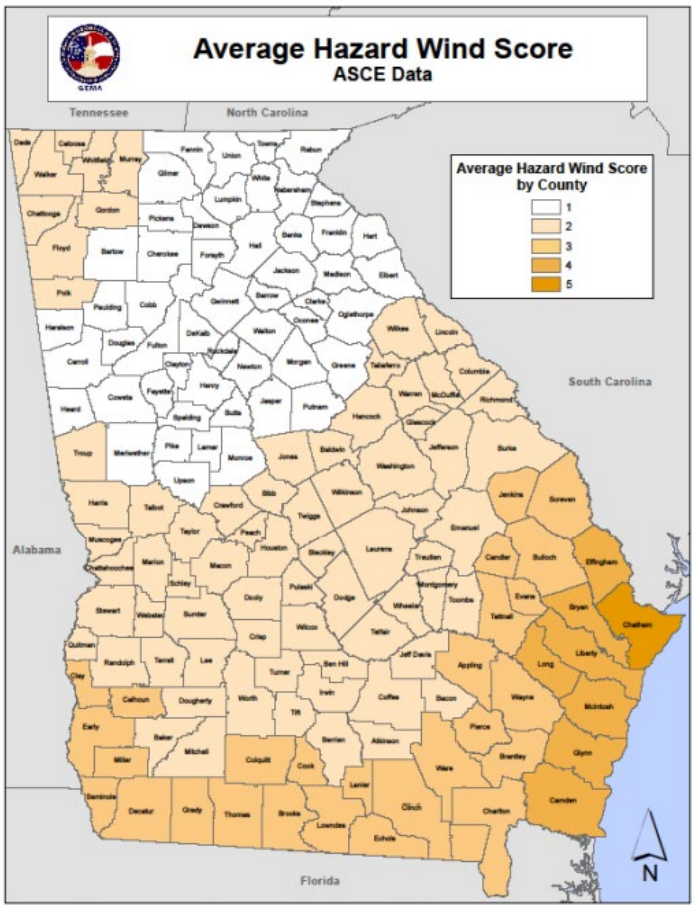
In the most recent plan cycle, there has been little to change the community's susceptibility to drought occurrences. As mentioned, drought itself has little impact on critical facilities; however, its relationship to wildfire requires ongoing mitigation activities. Through the ongoing education and awareness activities, it is hopeful that these will help mitigate fires caused by drought conditions.

Summary of Changes
Hazard history and frequency data related to drought were updated from the original plan; the probability of future occurrences was adjusted accordingly; changes in land use and development trends were examined for applicability, and a GMIS online tool was utilized for mapping and analysis.

Thunderstorm Winds (see Appendix A for hazard area map and related data)

In previous planning cycles, thunderstorm winds were by far the most frequent hazard affecting Houston County. With the inclusion of the wildfire hazard in this plan, thunderstorm winds are no longer the most frequent hazards. However, this hazard is more likely to impact the entire county, unlike wildfires which are more likely to occur in undeveloped areas. The historical impact of these winds was gauged through NCDC data. Thunderstorm winds are generally short in duration involving straight-line winds and/or gusts in excess of 50 miles per hour. Thunderstorm winds tend to affect areas of the county with significant tree stands, areas with exposed property and infrastructure, and above ground utilities. These winds can cause power outages, transportation and economic disruptions, significant property damage, and pose a high risk for injuries or loss of life. The county and its cities are equally vulnerable/likely to be affected by winds. As is the case with many hazards, high population density and development can increase the risks and vulnerabilities associated with thunderstorm winds. Weather systems with thunderstorm winds vary in size and often occur irrespective of boundaries often impacting multiple jurisdictions simultaneously and in succession. This makes it difficult to distinguish impacts geographically.

During spring and summer seasons, the county typically experiences countless thunderstorms, some packing significant winds. As a result of these winds, properties are damaged from roofs blowing off, trees being downed, loose debris or from some other source.



As illustrated in the wind hazard map, the entire county, including the cities of Centerville, Perry and Warner Robins, has the same Wind Hazard Score. With a Wind Hazard Score of 2, Houston County residents can typically expect 90 to 99 mile per hour winds during thunderstorm events. The Wind Hazard Score is reflective of the 2000

Hazard Score	Wind Speeds
1	<90 mph gust
2	91 – 100 mph gust
3	101 – 110 mph gust
4	111 – 120 mph gust
5	>120 mph gust

International Building Code.

History and Context

Houston County has incurred 218 thunderstorm and high wind events since 1962 (see *Hazard Frequency Table* in Appendix D). Data was reviewed that shows the value of the property damage caused as a result of thunderstorm winds from 2000 to the present. Since 2000, there have been 118 thunderstorm events. Damages from those events total more than $2 million. Of the 118 events, 7.6 percent of the events caused property damage equal to or greater than $50,000. An additional 24 events produced damage between $10,000 and $50,000. As previously indicated, severe thunderstorm winds occur more frequently than any other natural hazard event within Houston County. When considering the probability of future occurrence, NCDC data indicates that Houston County and its three municipalities have over a staggering 330.3 percent chance of at least one thunderstorm occurring each year.

Impacts

In evaluating assets that are susceptible to thunderstorm winds, the committee concurred with the findings documented in the original plan that all critical facilities, as well as all public, private and commercial property, are susceptible to thunderstorm winds (see **Appendix A**, GEMA Worksheet #3a). Again, using straight-lined loss estimates (structure replacement, content replacement, functional downtime, and displacement time), some of the county's larger employers (RAFB, Frito-Lay, Houston Medical Center, Perry Hospital, and several larger schools) were the most likely to sustain costly damage from thunderstorm winds. The GMIS report on critical facilities can be found in **Appendix A**.

Conclusion
Overall, thunderstorm winds pose one of the greatest threats to the livelihood of citizens in Houston County. As thunderstorms tend to appear anytime and anywhere, this hazard poses a serious threat to both lives and property and impacts the entire planning area. As with tornados, the planning committee determined that limiting land use and development was not useful in preparation for thunderstorm winds. Because it is the most frequent hazard that affects Houston County, it is recommended that specific attention be given to ensure that structures within Houston County are built to appropriate code standards. Presently, local codes require that all mobile homes within the county be "tied-down" to prevent damage during strong thunderstorm winds. Additional mitigation measures of this type are encouraged.

Since the time of the previous plan development, there has been little to change the community's susceptibility to thunderstorm winds and their damage. The community has continued to educate the public and enforce policies that will help the community respond to these occurrences.

Summary of Changes
Hazard history and frequency data related to thunderstorm winds were updated from the original plan; the probability of future occurrences was adjusted accordingly; changes in land use and development trends were examined for applicability, and a GMIS online tool was used for mapping and analysis.

Lightning (see Appendix A for hazard area map and related data)

Accompanying thunderstorms, and occasionally occurring by themselves, lightning events appear most frequently in Houston County during the summer months. During this update period, the Houston County Pre-Disaster Mitigation Planning Committee reviewed former planning documents and NCDC data. Lightning is a phenomenon whereby an electrical charge emits from clouds, potentially reaching between 100 million and one billion volts. These charges move from cloud to cloud, cloud to ground, and in rare instances from ground to cloud. Though most events occur in the summer, lightning events can happen at any time and any location within the county.

Lightning often strikes buildings and trees, particularly those that are tallest within the storm's location. Because of the damage caused by their heat and voltage, this phenomenon poses a threat to the county's facilities. Lightning can cause varying degrees of damage to a facility should it strike. The most common damage occurs when lightning runs into a structure where it can destroy electrical equipment (contents of facilities) and start fires. While damage is frequently minor, some cases can result in fires that destroy an entire structure. Additionally, during drought-like conditions, lightning strikes in dry, wooded areas can cause the ignition of natural fuels, producing brush and wildfires. Due to the unpredictability of lightning, all parts of the county are equally susceptible to strikes and equally vulnerable to their effects.

History and Context

Because of the correlation between lightning and thunderstorms, this planning effort examined data related to both lightning and thunderstorm winds when reviewing the frequency of the impact on the county. As mentioned in the previous section, there have been 218 instances of thunderstorm winds since 1962 reported to NCDC. Each of these instances would have contained some level of lightning, though many may have not impacted the ground or any facility. Available records of lightning events provided by NCDC shows that there were 18 lightning events between 2000 and today. Fifteen of these events resulted in some level of property damage ranging between $500 and $250,000. Four lightning events caused between $50,000 and $300,000. Two events, one which occurred in 2000 and the other in 2008, resulted in injuries to local residents. The most injuries were caused in the 2008 event in Bonaire, an unincorporated community south of Warner Robins. On September 11, 2008, lightning struck the field during the half-time of a middle school football game. Twelve people were injured; nine adults and three children. Three adults faced serious injuries, but thankfully, all victims recovered. There have been no new recorded incidents of lightning strikes since the last plan update. (see *Hazard Frequency Table* in **Appendix D**).

The NCDC data, on its own, would only indicate 0.85 lightning events per year since 2000. This data, however, only considered damage or injury-causing events. There are likely many additional instances of lightning that went unreported due to the extreme difficulty of documenting every lightning strike within a community. Because of this, the committee, as previous committees did, acknowledged the high likelihood that there is a greater frequency of events. For this reason, the committee considered instances of thunderstorm winds and general local knowledge when evaluating the relevancy of this hazard. When including thunderstorm data, Houston County can expect at least 6.11 lightning events to occur within a given year. According to the National Lightning Detection Network from Vaisala, much of Houston County received from between 6 and 12 flashes of lightning per square mile per year between 2008 and 2017.

Impacts

GEMA Worksheet 3a and GMIS Critical Facility Inventory Reports found in **Appendix A** help to illustrate the potential monetary impact to the community. Some of the high-cost critical facilities subject to lightning damage include the community's many schools and educational facilities, valued at over $410 million. Worksheet 3a reflects more than 60,000 structures countywide vulnerable to lightning strikes; valued at a total cost of more than $16 billion. As stated previously, this data is not available by individual jurisdiction.

Land use and development trends were examined and discussed but were considered by the planning committee as not applicable to mitigation planning for lightning. As with tornados, lightning's propensity to strike anywhere within the county negates limiting land use or development as a means of mitigation.

Currently, all newly constructed facilities within Houston County are to be properly grounded to minimize the devastating effect of lightning strikes. Although all lightning strikes cannot be avoided, properly grounded facilities can minimize the effect should lightning strike a location. Houston County does not currently require lightning rods to be installed on critical facilities or private structures, but new structures should be adequately grounded to prevent significant damage.

Despite the fact that documentation is only available to indicate very few lightning strikes within the county, this hazard causes more damage than one might imagine. This evidence is much more indicative of the extent to which lightning threatens and impacts the community than the few recorded instances reported by NCDC. Despite NCDC data indicating 1.2 lightning events per year over the past 10 years, local officials estimate many more lightning events, including structure strikes, than NCDC reports indicate. Local information indicates that the extent to which lightning impacts Houston County is much more severe (average of 3-5 strikes per year). The Pre-Disaster Mitigation Planning Committee recognizes this as a harmful event in the community and measures should be taken to lessen its effects over the entire planning area.

Conclusion
Since the development of the last plan, there has been progress in mitigating the community's vulnerability to lightning, particularly regarding the monitoring of lightning events. Likewise, local jurisdictions have been active in placing back-up generators at key facilities. There is still work to be done in this action step; however, the progress has helped to protect the community.

Summary of Changes
Hazard history and frequency data related to lightning were updated from the original plan; the probability of future occurrences was adjusted accordingly; changes in land use and development trends were examined for applicability, and a GMIS online tool was used for mapping and analysis.

Winter Storms (see Appendix A for hazard area map and related data)

Since 2000, there have been nine winter weather events of varying degrees of severity. Three of those events were classified as winter storms, two were heavy snow, two were winter weather, one was an ice storm, and one was classified as frost/freeze. The incidence and severity of winter weather and storms in past two decades indicate that there is still a need to include this hazard in the PDMP. After reviewing the data in the previous plans, the NCDC data, and committee members' knowledge, the planning committee discussed continuing this as a focus hazard. The past damages of winter storms and the modest increase in the frequency of winter storms during the most recent planning cycle encouraged the planning committee to make this determination.

Winter storms are distinguished from other winter events because they bring not only snow but the threat of freezing rain and ice storms. A heavy accumulation of ice, especially when accompanied by high winds, devastates trees and power lines. When ice forms on sidewalks, streets, or highways, they become extremely hazardous to pedestrians and motorists in Houston County. Like with other hazards, there is no distinction between the individual jurisdictions' vulnerability to them.

History and Context

In the previous planning cycle, the committee considered multiple winter storm events that occurred in successive decades. In 1973, the county was shut down due to approximately 18 inches of snow that fell in one day. Ten years later, in January 1983, Houston County was struck with another significant snowstorm. In March 1993, another winter storm, consisting of significant amounts of ice hit Houston County producing icy conditions along roads and power lines in the county. The community has also documented a two-inch snowstorm that hit Houston County during the winter of 2002 causing dangerous travel conditions over a 24-hour period.

The State of Georgia has faced a series of crippling winter storms in the past few years. In 2010, much of the northern portion of Georgia was in a state of shutdown due to ice forming along roadways. Fortunately, this storm did not have a significant impact on Middle Georgia. The region was not so fortunate in the winter storm in January 2014. In addition to causing area-wide gridlock and loss of power in the Metro-Atlanta area, the storm caused school and business shut-downs across the state, including Houston County and many other counties within Middle Georgia. Though the county avoided some of the major issues that plagued other areas, this event still made it apparent that there was a risk in these hazards. In January 2018, Middle Georgia was again hit by winter weather with most of the counties in the region seeing accumulations of 2-3 inches of snow. Fortunately, there was no damage from the winter weather. However, because much of Georgia and Middle Georgia do not have the equipment to respond to these types of winter weather events, an otherwise manageable incident could cripple a community.

Impacts

NCDC shows two reported winter storms, one heavy snow, one ice storm, and one event of winter weather in the past 10 years (see *Hazard Frequency Table* in **Appendix D**). There is a 28.26 percent chance that a winter storm event will occur in any given year based on the 46-year historic record. On average a winter storm event occurs once every 3.54 years. Because these events are considered to be infrequent, it has been considered impractical for Houston County to procure and maintain the necessary equipment to address these weather events. Additionally, past efforts noted the difficulty in mitigating winter storms through land use and development patterns chiefly because of the infrequency of the events and unpredictability of winter storms' geographic impact. While winter storms can threaten physical structures, their primary impact is on people. GEMA Worksheet #3a in **Appendix A** depicts the total number of structures, the value of those structures and the population exposed to the winter storm hazard (encompasses the entire planning area; not available by individual jurisdiction). While damage to buildings resulting from winter storms is minimal, it is important to note that the number of people

who either reside, work in, or visit these structures on a daily basis are vulnerable to the effects of winter storms. Similarly, the Critical Facility Inventory Report, obtained from the Georgia Mitigation Information System (see **Appendix A**), reflect data on the value of the community's critical facilities, content value, as well as occupancy estimates.

The extent to which the community is vulnerable to this hazard is evident when examining snow and ice accumulations from previous storms. As stated, this is an infrequent hazard event; however, accumulations have averaged between 2-4 inches. This is exceptionally high for the Middle Georgia region and the problem is exacerbated due to the lack of snow and ice removal equipment. As little as one-half-inch of accumulation can wreak havoc on the community.

Within the county, damage to facilities is caused primarily by downed trees and power lines crashing into or falling onto facilities, leaving many structures vulnerable to fire Also, during times of snow and ice, generally associated with very cold temperatures, persons with inadequate heat try to warm their homes in the most cost affordable method available. This frequently includes using unsafe flammable materials that can result in structure fires. Winter storms are typically short in duration, and the damage associated with them is often minimal (particularly to critical facilities); however, the potentially crippling effect this hazard poses, necessitates mitigation measures be undertaken to lessen its impact.

Conclusion
Since the time of the previous plan development, there has been little to change the community's susceptibility to winter storms and their damage. The community has continued to update shelter locations and to identify places where roads might be impacted by ice. The relative infrequency and lack of severe winter storms do not justify highly expensive actions that would drastically decrease the community's impact from winter storms, like the purchase of heavy response equipment.

Summary of Changes
Hazard history and frequency data related to winter storms were updated from the original plan; the probability of future occurrences was adjusted accordingly; changes in land use and development trends were examined for applicability; GMIS online tool was used for mapping and analysis.

Wildfires

A wildfire is an event where grassland, brush, and/or undergrowth is not intentionally set for the purpose of a prescribed burn by responsible entities. Fire can be healthy for ecosystems in certain cases, but when they are uncontrolled, they can threaten lives and property. Most of the wildfires begin either through negligence or the deliberate setting of fires. Based on Georgia Forestry Commission data, the average extent for a wildfire statewide is four acres per event. Over time the extent of damage experienced as a result of a wildfire has significantly decreased.

History
The planning committee used hazard event history supplied by the Georgia Forestry Commission (GFC) to construct a complete listing of wildfires throughout Houston County. A review of data from the GFC indicates that there have been 456 wildfires in Houston County between 2006 and 2019. These 456 fires during this period that consumed an estimated 1,650.57 acres of land. Wildfires are spatially defined hazards that can affect one portion of the community greater than other portions of the community. Such fires are more likely to occur in undeveloped areas of the county.

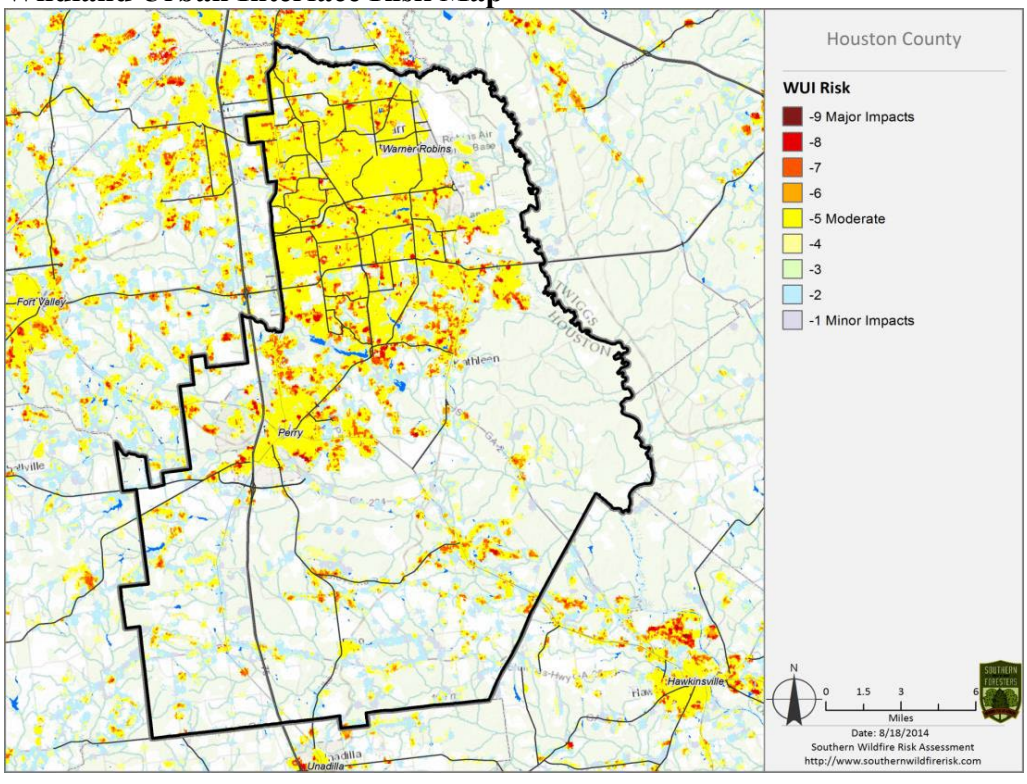
The 456 recorded wildfire events within Houston County over the almost 15-year period between 2006 and 2019 years translates to a 3507.69 percent chance of a wildfire event occurring in Houston County in any given year. Through mutual aid agreements with the Georgia Forestry Commission, all emergency personnel will be involved in the response to wildfire events when they occur.

The majority of these fires during this period were caused by machine use followed by debris burning, and then children. There were peaks in the number of wildfires and acreage burned in 2006 and 2011. These peaks are partially attributed to periods of drought the county was experiencing.

Impact
Wildfires are the most frequent natural hazard event occurring within Houston County. These 456 fires since 2006 have destroyed thousands of acres in Houston County. Below are three graphics illustrating the risk and wildfire impacts in Houston County.

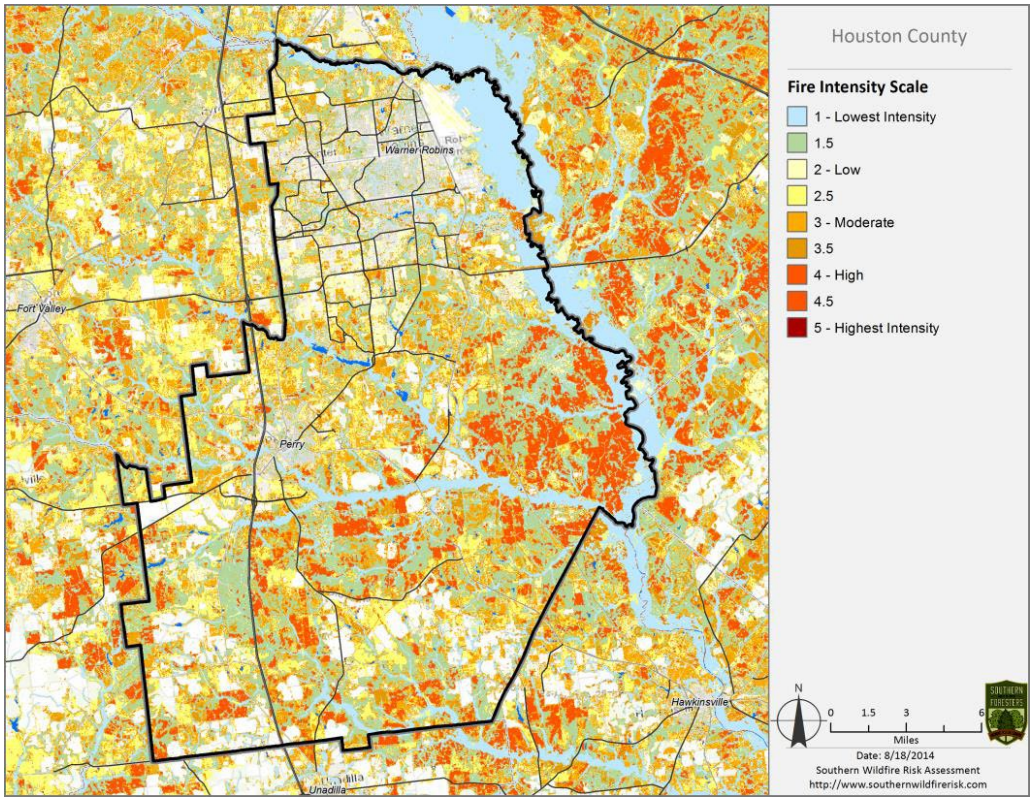
The wildland urban interface risk map reflects housing density depicting where humans and their structures meet or intermix with wildland fuels.

Wildland Urban Interface Risk Map



Fire Intensity Scale Map

The fire intensity scale map shows how intense a fire would be throughout the county. The fire intensity scale is a fire behavior output, which is influenced by three environmental factors - fuels, weather, and topography. The intensity classes are described in the following table.

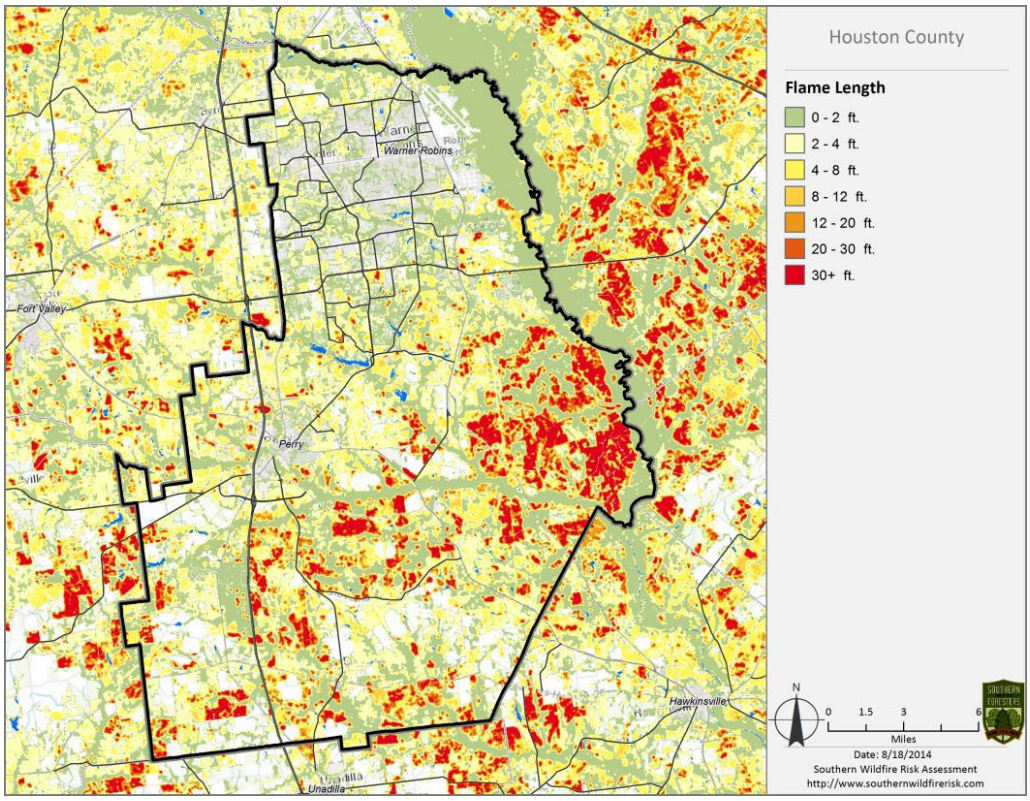


Fire Intensity Scale Class Descriptions	
Class 1, Very Low	Very small, discontinuous flames, usually less than one foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
Class 2, Low	Small flames, usually less than two feet long; a small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
Class 3, Moderate	Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows

	are generally effective, increasing the potential for harm or damage to life and property.
Class 4, High	Large flames, up to 30 feet in length; short-range spotting is common; medium-range spotting is possible. A direct attack by trained firefighters, engines, and dozers is generally ineffective, an indirect attack may be effective. Significant potential for harm or damage to life and property.
Class 5, Very High	Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. An indirect attack is marginally effective at the head of the fire. Great potential for harm or damage to life and property.

Flame Length Map

The Flame Length map shows how tall flames are likely to be throughout the county.



For much of unincorporated Houston County, the residents and land are consistently in a danger zone for potential wildfires. The residents and land in the Cities of Centerville, Perry, and Warner Robins are at lesser risk. *Additional information concerning the Southern Wildfire Risk Assessment Summary Reports for Houston County and the Cities of Centerville, Perry, and Warner Robins can be found in* ***Appendix C****.*

Conclusion

This section on wildfires is new to the Houston County Pre-Disaster Mitigation Plan. With the number and scale of wildfires, the planning committee thought it was important

to include this information in the plan and take measures to ensure the residents, property, and critical facilities in the county are protected in the event of a wildfire.

Summary of Changes
This section on wildfires is new to the plan. Hazard history and frequency data related to wildfires were added; the probability of future occurrences was adjusted accordingly; changes in land use and development trends were examined for applicability, and a GMIS online tool was used for mapping and analysis.

CHAPTER 3: LOCAL TECHNOLOGICAL HRV SUMMARY

Within Houston County, there are few identified technological hazards. The planning committee identified two technological hazards worth inclusion in this plan – hazardous material spills and terroristic threats. The planning committee discussed including other hazards, particularly related to activities at Robins AFB; however, the rarity of incidents like plane crashes led the committee to decide against including such hazards. However, the community must be aware of the potential for technological hazards due to the presence of RAFB.

Hazardous Materials Spills (see Appendix A for hazard area map and related data)

Hazardous materials are substances that are harmful to the health and safety of people and property. Facilities that produce, process or store hazardous materials are at risk for spills, as well as facilities that treat or dispose of hazardous waste. Hazardous materials spills generally come from two sources. Transportation-related spills occur on or along roads and rail lines within a jurisdiction as hazardous substances are transported from one location to another. Fixed location spills occur anywhere within the county where the materials are stored, maintained, or handled.

Commercial businesses, the Department of Defense, and private citizens are all potentially responsible for the spilling of hazardous materials within Houston County. With the diverse mixture of business and industrial sectors operating in Houston County, the types of hazardous materials that could spill in the community are many and varied. Residents and employees alike must be sure to take precautions when transporting or using hazardous materials to ensure the safety of their property, their neighbor's property, and the well-being of everyone in the vicinity.

History and Context
Within a 29-year period for which data is available, there were 121 hazardous material spills within the county (see *Hazard Frequency Table* in **Appendix D**). Based on this data, Houston County has averaged 2.4 spills per year, and there is a 413.9 percent chance of a hazardous material spill in any given year.

Data was obtained from the Toxics Release Inventory (1987 – 2005), the Hazardous Site Response Notification database made available by the Georgia Department of Natural Resources Environmental Protection Division, the National Response Center (NRC) provided by the Right-to-Know Network, and the Georgia Environmental Protection Division Complaint Tracking System. While the data was analyzed to determine noteworthy differences between the county and the cities in terms of the risks and vulnerabilities associated with hazardous material spills, no clear patterns emerged. Existing data is not suitable or sufficient to make a reliable determination regarding the frequency of occurrence, or future probability of hazardous materials spills related to each individual jurisdiction within Houston County.

All critical facilities within the county are susceptible to experiencing shutdowns due to hazardous material spills. Persons occupying certain critical facilities may be forced to evacuate the premises should spills of certain substances occur in close proximity to the structure, thus creating shutdowns at the facility. Additionally, some of the facilities have potentially harmful substances stored on site. Should these materials be spilled, the potential exists for damage to property, as well as evacuations due to the contaminants. Mitigation measures can be taken to help ensure that vital natural resources and critical facilities are adequately protected in the event of a hazardous material spill.

Impacts
There are no discernible differences in the susceptibility of facilities between the county or cities in Houston County regarding hazardous material spills. Public and private facilities must maintain proper procedures and precautions for handling hazardous materials. Additionally, each must maintain measures for action in the event of a spill, either in the facility or nearby.

The potential extent of this hazard in the planning area is difficult to quantify. Each potential spill would be unique in its magnitude and severity. Past data and information do not allow for an accurate profile of this hazard event; however, the potentially catastrophic nature of this technological hazard requires the community to be prepared and vigilant. GEMA Worksheet 3a and the GMIS Critical Facility Inventory Reports located in **Appendix A** help illustrate the sheer number of buildings, infrastructure and people exposed to this hazard on a daily basis (encompasses the entire planning area; not available by individual jurisdiction).

Land use and development trends were examined for possible application related to hazardous materials spills and mitigation measures. With burgeoning residential and commercial development occurring in Houston County, best management practices should be followed in relation to minimizing the impact of hazardous materials spills on residences, businesses, and environmentally sensitive areas. Examples include using infrastructure availability to steer certain types of development (those prone to hazardous material spills) away from areas of natural, cultural, historic, and environmentally sensitive resources; using appropriate setbacks to minimize risks to citizens and businesses from transportation-related hazardous materials spills; developing general policies and protection measures for those industries/developments that use, store or transport hazardous materials.

Summary of Changes
Hazard history and frequency data related to hazardous materials spills were updated from the original plan; the probability of future occurrences was adjusted accordingly; changes in land use and development trends were examined for applicability, and a GMIS online tool was used for mapping and analysis.

Terroristic Threats

Terrorism is defined as the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives. Terroristic threats are very diverse and can include chemical, biological, radiological, nuclear, explosive, cyber, environmental, or active shooter attacks. The planning committee elected to include terroristic threats in this plan, recognizing the enormous damage that a terrorist attack could do to the residents and structures of Houston County and attempting to mitigate any weaknesses that could facilitate such an attack.

The planning committee has determined the financial damage associated with terrorism could be extremely substantial to any facility or vital infrastructure within the county over time. All effects of terrorism could influence structures, crops, and life depending on the concentration area and type of attack. Normally, the severity of terrorism will allow very little preparation time for the instances. All potential mitigation actions should include the entire Houston County area because all locations of Houston County are susceptible to terrorism.

Summary of Changes

Terroristic threats are a new addition to the Houston County Pre-Disaster Mitigation Plan. Given the location of Robins Air Force Base within the county and the increasing trend of active shooter situations in various public and private facilities nationwide, the planning committee decided to add this element to the PDMP. The potential for damage to critical facilities and Houston County residents could be extreme depending on the nature of the threat. As a result, the planning committee determined this hazard should be thoroughly analyzed and planned for.

CHAPTER 4: LOCAL NATURAL HAZARD MITIGATION GOALS & OBJECTIVES / COMMUNITY MITIGATION GOALS, POLICIES & VALUES

This chapter identifies a series of community goals and objectives pertaining to each of the natural hazards identified in Chapter 2. As part of the update process, the planning committee performed a comprehensive review of the goals and objectives listed in the original plan. The committee also discussed overall community mitigation goals and values to ensure consistency with those identified for each natural hazard. Existing policies, regulations, ordinances, and land use were examined for applicability. New and/or projected development related to buildings and infrastructure was researched and given consideration. Overall, the priorities of the community as reflected in the plan did not change drastically from the previous planning cycle. The focus of the plan remains largely unaltered though a few specific action items were added.

The planning committee also revisited the STAPLEE Criteria (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) in evaluating alternative mitigation actions (see GEMA Worksheet #4 in **Appendix D**). Finally, adjustments were made as necessary to those goals and objectives that were re-evaluated and determined to still be valid; new goals and objectives were added where applicable. Each hazard is followed by a summary of changes resulting from the plan update initiative.

The planning committee also identified and validated several methods of public education and awareness regarding natural hazard mitigation. All public information efforts are aimed at keeping the residents of Houston County fully engaged in the implementation and periodic maintenance of this mitigation plan. Many of these education and awareness tools are multi-hazard in nature and include the following: implementing a countywide crisis alert or notification system, distribution of informational brochures or pamphlets, public and private sector briefings, workshops and demonstrations, Public Service Announcements, etc.

The section that follows (as well as the corresponding section in Chapter 5) serves as the Houston County Mitigation Action Plan. Each natural and technological hazard is described along with relevant goals and objectives. Specific action steps designed to achieve each objective are identified, along with the agency or department responsible for implementation. An estimated cost is provided, as well as various funding mechanisms, the affected jurisdiction(s), a projected timeline towards implementation, the priority of the action as determined by the Pre-Disaster Mitigation Planning Committee, and finally the status of the action or project. Each action item has been assigned to one or more responsible departments or agencies for implementation. These entities are frequently the community's local governments and their departments, like the utilities, public works, code enforcement, and emergency management departments. Other implementing agencies include local nonprofits, state organizations, the local school system, and utility companies. Each one of the entities has dedicated, professional staff which will work towards accomplishing the outlined activities. In some cases, current resources and staff time are sufficient to perform the tasks. In other circumstances, the community has

identified that outside resources like grant funding are necessary to accomplish the action steps.

Flooding

Houston County and the Cities of Centerville, Perry, and Warner Robins have developed a series of countywide objectives and action items intended to address flooding. Many of these objectives and action items are continuations from previous plans. The planning committee determined those items to be relevant and necessary to ongoing mitigation of the flood hazard throughout the county. The measures identified for flooding are also consistent with the overall community mitigation goal of making Houston County and its municipalities less vulnerable to the effects of natural hazards through the development of a coordinated mitigation strategy. A part of this coordinated mitigation strategy is the current and continued participation of Houston County and its three municipalities (Centerville, Perry and Warner Robins) in the National Flood Insurance Program (NFIP). Mitigation goals, objectives and action steps for flooding, as determined by the committee, are as follows.

Goals, Objectives, and Action Steps

Mitigation Goal #1: Minimize losses to existing and future structures located within identified flood hazard areas.

Objective #1: Prevent future construction within identified flood hazard areas.

Action Step #1: As an NFIP compliance strategy component, continue enforcement of building codes prohibiting construction within the flood hazard area; review existing code to determine the need for alterations; continue to inspect each facility and require site engineering to determine if a facility is to be constructed in a flood hazard area.

Objective #2: Protect lives and existing property within identified flood hazard areas.

Action Step #1: As an NFIP compliance strategy component, utilize GEMA/FEMA buyout programs to obtain property located within the flood hazard area; identify existing structures in the flood hazard area; pursue funding to move each of these structures.

Action Step #2: Apply for mitigation grant funding from state or federal sources to minimize losses in the event of a flood; match potential projects with potential sources of funding.

Action Step #3: Obtain permits from relevant environmental agencies and conduct regular clean-up and maintenance of the watershed in Bay Gall Creek.

Objective #3: Protect the environment from flood damages.

Action Step #1: Ensure protection of wastewater treatment plants within Houston County.

Action Step #2: Continue to address stormwater management issues throughout the county and as applicable in each of the three municipalities.

Action Step #3: Acquire supplies and equipment (e.g., sandbags) necessary to mitigate flooding for the county and each of its municipalities.

Action Step #4: Acquire supplies (e.g., containment boom) to limit the impact of pollutants (e.g. oil, fuel) in area water bodies.

Action Step #5: Continue utilization of Houston County Fire Department Hazardous Materials in assisting with flood disaster response and recovery within or outside Houston County.

Objective #4: Continue utilization of Georgia Search and Rescue (GSAR) Task Force IV in assisting disaster response and recovery within or outside of Houston County.

Action Step #1: Continue identification and training of personnel to be members of the GSAR team.

Action Step #2: Conduct Simulated Disaster Exercises for multiple emergency service organizations.

Objective #5: Enhance coordination among city and county emergency response agencies.

Action Step #1: Enhance communication system that would enable all relevant agencies to engage in real-time communication in the event of a disaster or emergency.

Objective #6: Obtain all necessary equipment and/or supplies for emergency response.

Action Step #1: Acquire backup generators for all critical facilities including, but not limited to treatment plants, lift stations, fire stations, and government facilities.

Action Step #2: Ensure that all critical facilities are wired to accept mobile generators capable of providing emergency power.

Objective #7: Provide educational opportunities to school children and the general public.

Action Step #1: Implement a disaster response curriculum within the school system.

Action Step #2: Educate the public through GEMA/FEMA/Red Cross brochure distribution.

Objective #8: Provide safe emergency shelter locations for people impacted by disasters.

Action Step #1: Identify locations for emergency shelters throughout Houston County and its municipalities.

Action Step #2: Ensure all shelters have the necessary supplies to assist residents when necessary.

Action Step #3: Implement coordination and management protocols between the county and municipalities for managing identified emergency shelters.

Action Step #4: Acquire mobile generators for use at emergency shelters.

Objective #9: Ensure that required records have adequate backup.

Action Step #1: Develop a system that provides adequate backup of all essential governmental records for the county and each of its municipalities.

Summary of Changes
Introductory information regarding the history of flooding in the county was removed as that information has been provided earlier in the plan. Additional introductory information regarding the importance of mitigation activities has been condensed to remove redundancy and add clarity.

No objectives or action steps were removed from the plan during this update cycle. The committee determined that all objectives and action steps from the previous plan remain critical for mitigating floods in Houston County.

However, the committee identified a need for more robust action items related to flood mitigation. Three additional action steps were added under Objective #3. Action Step #3 was added to ensure that all local governments had the objective of acquiring necessary supplies to mitigate flooding impacts on structures, particularly government structures. Action Step #4 was also added to help local governments acquire equipment that would help mitigate the impacts of dangerous chemicals in water bodies. Action Step #5 was also added so that hazardous materials teams would have a role in flood mitigation as it relates to hazardous materials being released because of flooding.

Objective #5 and its single action step were identified as critical to flood mitigation. Ensuring everyone is able to communicate and obtain information on a single platform is critical for coordinating four local governments and any external support.

Objective #6 and its two action steps are additions to the flooding goals and objectives. The planning committee determined that not all critical facilities had fixed generators, nor were they all wired for generators if mobile generators were required.

Objective #7 and its two action steps are also additions to this section. While some educational activities and materials are available, the committee decided that these efforts are essential to protecting life and property during flooding events.

Objective #8 and its four action steps are new to this plan. With no currently designated shelter facilities, the planning committee concluded that identifying shelters and developing operating procedures for those shelters are essential for protecting Houston County residents.

Objective #9 and its one action step is the final addition to this section. There is uncertainty as to the level of critical data backup there is for the county and three municipalities. Therefore, the planning committee decided that this objective was essential for ensuring county and city governments and facilities can be operational after a flooding event in case facilities holding records are damaged.

Information regarding the responsible department or agency, anticipated costs, existing and potential funding sources, jurisdiction, timeframe, priority, and status were removed from this section. These items will be addressed in *Chapter 6: Plan Implementation.*

Tornadoes

The planning committee reviewed and confirmed that the occurrence of a tornado in the county could cause widespread impact, including the destruction of infrastructure, loss of property, and potentially, damage to the health and welfare of residents and visitors. Mitigation measures identified by the committee can be used by local officials to take appropriate actions whereby the community is potentially spared future losses. The planning committee considered a range of mitigation options related to tornados and identified mitigation goals, objectives and action steps that will help the community respond to any deficiencies.

Goals, Objectives, and Action Steps
Mitigation Goal #1: Lessen the effects of tornados on the community.

Objective #1: Protect human lives from the effects of tornadoes.

Action Step #1: Obtain and distribute materials and information to help educate the public about tornadoes and tornado safety.

Action Step #2: Maintain National Weather Service StormReady status.

Action Step #3: Maintain funding for weather radio vouchers.

Action Step #4: Maintain active status with the CodeRed notification system.

Action Step #5: Improve and maintain the outdoor warning siren system to ensure that activation technology is up to date and system coverage reaches developed areas.

Action Step #6: Implement a disaster response curriculum within the school system.

Action Step #7: Educate and inform the public through safety announcements using multiple forms of outreach (government websites, local news, Facebook, alert systems, etc.)

Objective #2: Prepare emergency personnel to respond to the scene of a tornado.

Action Step #1: Maintain call-in procedures and contact information for off-duty emergency personnel (from all jurisdictions) when needed at the scene of a disaster/hazard event.

Action Step #2: Develop an approved debris management plan.

Objective #3: Encourage protection of residential and commercial structures and populations from the effects of tornados.

Action Step #1: Review Georgia Disaster Resilient Building Code Appendices to reduce the possibility of effects of tornadoes.

Action Step #2: Continue to encourage sheltering-in-place through the distribution of informational materials.

Objective #4: Obtain all necessary equipment and/or supplies for emergency response.

Action Step #1: Acquire backup generators for all critical facilities including, but not limited to treatment plants, lift stations, fire stations, and government facilities.

Action Step #2: Ensure that all critical facilities are wired to accept mobile generators capable of providing emergency power.

Objective #5: Provide safe emergency shelter locations for people impacted by disasters.

Action Step #1: Identify locations for emergency shelters throughout Houston County and its municipalities.

Action Step #2: Ensure all shelters have the necessary supplies to assist residents when necessary.

Action Step #3: Implement coordination and management protocols between the county and municipalities for managing identified emergency shelters.

Action Step #4: Acquire mobile generators for use at emergency shelters.

Objective #6: Enhance coordination among city and county emergency response agencies.

Action Step #1: Enhance communication system that would enable all relevant agencies to engage in real-time communication in the event of a disaster or emergency.

Objective #7: Ensure that required records have adequate backup.

Action Step #1: Develop a system that provides adequate backup of all essential governmental records for the county and each of its municipalities.

Summary of Changes

Introductory information regarding the history of tornadoes in the county was removed as that information has been provided earlier in the plan. Additional introductory information regarding the importance of mitigation activities has been condensed to remove redundancy and add clarity.

One action step was removed during this plan update under Objective #2. The action step, "Continually update and implement a mobilization plan to detail the actions of public safety officials," was removed as the committee felt that the plan is finalized and can be incorporated into the call-in procedures.

The committee identified a need for more robust objectives and action steps related to tornado mitigation. Three additional action items were added to Objective #1. Action Steps #2, #3, #5, #6, and #7 were all added to help ensure that Houston County residents have multiple means of receiving information about extreme weather threats.

The committee made minor changes to Objective #2, Action Step #1. Previously, the objective included "*update* and maintain call-in procedures…" The updates have been achieved, so the committee decided to amend the language to "*maintain* call-in procedures…" Action Step #2 is an addition. The planning committee identified that time being spent removing storm debris to the landfill in the southern end of Houston County impeded the speed of clean-up efforts. The committee decided that developing a debris management plan that would enable a faster clean-up was essential to storm recovery.

The planning committee added Objective #3 and its two action steps. Action Step #1 will help the local government determine if they need to make amendments to its building code to make buildings more resilient in the event of a tornado. Action Step #2 will provide residents with the necessary information to protect their lives in the event of a tornado.

Objective #4 and its two action steps are additions to the tornado goals and objectives. The planning committee determined that not all critical facilities had fixed generators, nor were they all wired for generators if mobile generators were required.

Objective #5 and its four action steps are new to this plan. With no currently designated shelter facilities, the planning committee concluded that identifying shelters and developing operating procedures for those shelters are essential for protecting Houston County residents.

Objective #6 and its single action step were identified as critical to tornado mitigation. Ensuring everyone is able to communicate and obtain information on a single platform is critical for coordinating four local governments and any external support.

Objective #7 and its one action step is the final addition to this section. There is uncertainty as to the level of critical data backup there is for the county and three municipalities. Therefore, the planning committee determined it to be essential for ensuring county and city governments and facilities can be operational in case facilities holding records are damaged due to thunderstorm winds.

Information regarding the responsible department or agency, anticipated costs, existing and potential funding sources, jurisdiction, timeframe, priority, and status were removed from this section. These items will be addressed in *Chapter 6: Plan Implementation.*

Drought

In previous planning cycles, it has been acknowledged that drought, itself, does not often affect critical facilities within the community. Previous committees and the current committee have recognized, however, that parts of the community can be devastated by long-term drought conditions. The chief condition noted was the loss of economic productivity due to crop loss and timber damage. Despite recent development, much of Houston County, particularly the southern portion, remains largely agricultural and particularly susceptible to damage from drought. When drought conditions occur, the crops, and those in the agricultural industry, tend to suffer severely. Also of concern, much of the county remains forest and woodland. Drought conditions, combined with lightning, negligence and other occurrences can result in fires that may grow and spread.

The current planning committee reviewed, updated and identified several non-structural mitigation measures in hopes of minimizing the potentially destructive effects of drought. The planning committee's focus is on the preservation of life and property. This may result in modifications to current policies and the implementation of local ordinances to ensure suggested mitigation measures are initiated. Specific mitigation goals, objectives and action steps for drought inflicted wildfires, as determined by the committee, are as follows.

Goals, Objectives, and Action Steps

Mitigation Goal #1: To minimize loss of life and property in Houston County due to fires resulting from drought conditions.

Objective #1: To protect facilities and vulnerable populations from the effects of fires resulting from drought conditions.

Action Step #1: Continue to work with the Georgia Forestry Commission to implement the Community Wildfire Protection Plan.

Action Step #2: Continue the education and awareness campaign directed towards homeowners on the importance of clearing underbrush a safe distance from homes and structures.

Summary of Changes
Introductory information regarding the history of drought in the county was removed as that information has been provided earlier in the plan. Additional introductory information regarding the importance of mitigation activities has been condensed to remove redundancy and add clarity.

The planning committee amended Action Step #1. The Community Wildfire Protection Plan was completed in 2016; therefore, the development of that plan is no longer relevant. However, the committee concluded that ongoing coordination with the Georgia Forestry Commission to implement this plan is essential in mitigating potential wildfires resulting from drought. The language of that action step has been amended to reflect the change.

Action Step #2 remained in the plan and was not changed. Action Step #3 was added to the plan. The planning committee wanted to add this objective to this section as reinforcing the burn ban is especially necessary during times of drought.

Information regarding the responsible department or agency, anticipated costs, existing and potential funding sources, jurisdiction, timeframe, priority, and status were removed from this section. These items will be addressed in *Chapter 6: Plan Implementation.*

Thunderstorm Winds
Thunderstorm winds are the most prevalent natural hazard in Houston County and are capable of causing damage. While the damage is often less than other hazards like tornadoes, the committee confirmed that the previous planning committee's belief that these winds can make small negative impacts on a facility. With this in mind, the committee determined to continue to take steps to alleviate the threats caused by this hazard.

The Houston County Pre-Disaster Mitigation Planning Committee reviewed, updated, and identified a range of mitigation options related to thunderstorm winds, and identified both structural and non-structural mitigation measures to ensure that the community

adequately tackles all issues related to thunderstorm winds. These measures may necessitate modifications to current policies and the implementation of appropriate local ordinances. The mitigation goals and objectives identified for thunderstorm winds are consistent with the overall community mitigation goal of creating a safe and livable environment for all Houston County citizens. Mitigation goals, objectives and action steps for thunderstorm winds, as determined by the committee, are as follows.

Goals, Objectives, and Action Steps

Mitigation Goal #1: Protect life and property in the event of strong thunderstorm winds.

Objective #1: Take measures to protect the lives of Houston County residents in the event of strong thunderstorm winds.

Action Step #1: Educate and inform the public through safety announcements using multiple forms of outreach (government websites, local news, Facebook, alert systems, etc.)

Action Step #2: Continue to encourage sheltering-in-place through the distribution of informational materials.

Action Step #3: Maintain active status with the CodeRed and Integrated Public Alert and Warning System (IPAWS) notification system.

Action Step #4: Improve and maintain the outdoor warning siren system to ensure that activation technology is up to date and system coverage reaches developed areas.

Action Step #5: Maintain National Weather Service StormReady status.

Action Step #6: Maintain funding for weather radio vouchers.

Action Step #7: Implement a disaster response curriculum within the school system.

Objective #2: Take measures to protect property in the event of strong thunderstorm winds.

Action Step #1: Identify and remove trees/limbs that could damage structures and/or power lines.

Action Step #2: Continue enforcement of existing codes that require mobile homes / manufactured homes to be tied-down and regularly update the existing code in accordance with best practices.

Action Step #3: Continue enforcement of Georgia Minimum Building Codes.

Action Step #4: Review Georgia Disaster Resilient Building Code Appendices to reduce the possibility of effects of thunderstorm winds.

Objective #3: Prepare emergency personnel to respond to impacts of thunderstorm winds.

Action Step #1: Maintain call-in procedures and contact information for off-duty emergency personnel (from all jurisdictions) when needed at the scene of a disaster/hazard event.

Action Step #2: Develop an approved debris management plan.

Objective #4: Obtain all necessary equipment and/or supplies for emergency response.

Action Step #1: Acquire backup generators for all critical facilities including, but not limited to treatment plants, lift stations, fire stations, and government facilities.

Action Step #2: Ensure that all critical facilities are wired to accept mobile generators capable of providing emergency power.

Objective #5: Enhance coordination among city and county emergency response agencies.

Action Step #1: Enhance communication system that would enable all relevant agencies to engage in real-time communication in the event of a disaster or emergency.

Objective #6: Provide safe emergency shelter locations for people impacted by disasters.

Action Step #1: Identify locations for emergency shelters throughout Houston County and its municipalities.

Action Step #2: Ensure all shelters have the necessary supplies to assist residents when necessary.

Action Step #3: Implement coordination and management protocols between the county and municipalities for managing identified emergency shelters.

Action Step #4: Acquire mobile generators for use at emergency shelters.

Objective #7: Ensure that required records have adequate backup.

Action Step #1: Develop a system that provides adequate backup of all essential governmental records for the county and each of its municipalities.

Summary of Changes
There were some significant changes under Objective #1. Action Step #1 was amended to add more detail about the methods of notification and outreach. Action Steps #2, #3, #4, #5, #6, and #7 were added to this section. These steps ensure that Houston County residents have multiple means of receiving information about thunderstorm winds. These action steps seek to provide residents with as much information as possible to protect their lives and property.

The planning committee elected to keep Objective #2 and its two action steps from the previous plan. The committee added two action steps to this objective, Action Steps #3 and #4. These action steps will help ensure that staff is reviewing and enforcing building codes to protect people and structures. Action Step #4 will further the objective of enforcing minimum building codes and enable the local government to determine if they need to make amendments to its building code to make buildings more resilient in the event of a tornado.

Objective #3, Action Steps #1 and #2 were added to this section. Action Step #1, maintaining a call-in list from all jurisdictions was deemed essential for response to the impact of thunderstorm winds, particularly given the potential sudden and violent nature of thunderstorms. Regarding Action Step #2, the planning committee identified that time being spent removing storm debris to the landfill in the southern end of Houston County impeded the speed of clean-up efforts. The committee decided that developing a debris management plan that would enable a faster clean-up was essential to storm recovery.

Objective #4 and its two action steps are additions to the thunderstorm winds goals and objectives. The planning committee determined that not all critical facilities had fixed generators, nor were they all wired for generators if mobile generators were required.

Objective #5 and its single action step were identified as critical to thunderstorm winds mitigation. Ensuring everyone is able to communicate and obtain information on a single platform is critical for coordinating four local governments and any external support.

Objective #6 and its four action steps are new to this plan. With no currently designated shelter facilities, the planning committee concluded that identifying shelters and developing operating procedures for those shelters are essential for protecting Houston County residents.

Objective #7 and its one action step is the final addition to this section. There is uncertainty as to the level of critical data backup there is for the county and three municipalities. Therefore, the planning committee determined it to be essential for ensuring county and city governments and facilities can be operational in case facilities holding records are damaged due to thunderstorm winds.

Information regarding the responsible department or agency, anticipated costs, existing and potential funding sources, jurisdiction, timeframe, priority, and status were removed from this section. These items will be addressed in *Chapter 6: Plan Implementation.*

Lightning

The previous plan identified the increased prevalence of damage due to severe lightning. Since 1998, there have been 18 reported occurrences of lightning. After considering the costs to people and property affected by lightning strikes that occurred in the county in the 2000s, the planning committee determined that lightning demonstrated the opportunity for damage to critical facilities. The committee determined that several steps could be undertaken to ensure that the effects of lightning on the community are minimized

The Houston County Pre-Disaster Mitigation Planning Committee considered a range of mitigation options related to lightning and identified both structural and non-structural mitigation measures to ensure that the community adequately tackles all issues related to lightning events. These mitigation measures may result in the alteration to current policies and practices in order to ensure proper implementation steps are undertaken. The county's historic and special considerations pose the same challenges for local officials and community planners when developing mitigation strategies for lightning. The mitigation goals and objectives identified for lightning are consistent with the overall community mitigation goal of creating a safe and livable environment for all Houston County citizens and for making Houston County and its three municipalities less vulnerable to the effects of natural hazards. Mitigation goals, objectives and action steps for lightning, as determined by the planning committee, are as follows.

Goals, Objectives, and Action Steps

Mitigation Goal #1: Protect Houston County from damage due to lightning strikes.

Objective #1: Protect Houston County residents from lightning strikes.

Action Step #1: Educate and inform the public on the potential dangers and damage associated with lightning strikes through disbursement of materials.

Action Step #2: Acquire necessary technology and equipment to detect lightning at outdoor gathering facilities (e.g. recreation/sporting events).

Action Step #3: Maintain active status with the CodeRed and Integrated Public Alert and Warning System (IPAWS) notification system.

Action Step #4: Maintain National Weather Service StormReady status.

Action Step #5: Maintain funding for weather radio vouchers.

Action Step #6: Implement a disaster response curriculum within the school system.

Objective #2: Protect critical facilities from damage due to lightning strikes.

Action Step #1: Acquire backup generators for all critical facilities including, but not limited to treatment plants, lift stations, fire stations, and government facilities.

Action Step #2: Ensure that all critical facilities are wired to accept mobile generators capable of providing emergency power.

Objective #3: Enhance coordination among city and county emergency response agencies.

Action Step #1: Enhance communication system that would enable all relevant agencies to engage in real-time communication in the event of a disaster or emergency.

Objective #4: Ensure that required records have adequate backup.

Action Step #1: Develop a system that provides adequate backup of all essential governmental records for the county and each of its municipalities.

Summary of Changes

The planning committee elected to amend Objective #1, Action Step #1. The previous plan had an action item about educating and informing the public, but it did not specify how it was going to do that. The amended action item specifies that this education will occur through the disbursement of materials. Action Step #2 is a new addition to this objective primarily aimed at protecting people at outdoor events. Along with Action Step #2, Action Steps #3, #4, and #5 are aimed at alerting people to lightning strikes in their area so that they can take appropriate protective measures. Action Step #6 was added to ensure that protecting oneself during a lightning event was covered in school.

Action Step #2 was added to Objective #2 which was carried over from the previous plan. In addition to acquiring backup generators, the planning committee wanted to ensure that critical facilities would be wired for mobile generator power in case it was not wired to a fixed generator or if a fixed generator failed. Minor changes were made to the language of Action Step #1 under this objective.

Objective #3 and its single action step were identified as critical to lightning mitigation. Ensuring everyone is able to communicate and obtain information on a single platform is critical for coordinating four local governments and any external support.

Objective #4 and its one action step is the final addition to this section. There is uncertainty as to the level of critical data backup there is for the county and three municipalities. Therefore, the planning committee determined it to be essential for ensuring county and city governments and facilities can be operational in case facilities holding records are damaged due to lightning.

Information regarding the responsible department or agency, anticipated costs, existing and potential funding sources, jurisdiction, timeframe, priority, and status were removed from this section. These items will be addressed in *Chapter 6: Plan Implementation.*

Winter Storms

Within Houston County, there is a legitimate concern over the threat of periodic winter storms. Houston County does not receive the amounts of snow and ice that other areas of the country receive; however, this alone poses a problem in that the community does not have the equipment necessary to combat treacherous weather conditions. In the Middle Georgia region, the formation of ice on roads, tree limbs, and power lines is the cause of most damage. The Houston County Pre-Disaster Mitigation Planning Committee determined during the update of this plan several steps could be undertaken to ensure that the effects of winter storms within the community are minimized.

A range of options was considered, and both structural and non-structural mitigation measures were identified in order to adequately address all issues related to winter storm conditions. Implementation of these measures may involve altering or modifying current policies and practices. Currently, there are no historic or special considerations that pose extraordinary challenges for the community related to the effects of winter storms. Also, the mitigation goals and objectives identified for winter storms are consistent with the overall community mitigation goal of creating a safe and livable environment for all Houston County citizens and for making Houston County and its three municipalities less vulnerable to the effects of natural hazards. Mitigation goals, objectives and action steps for winter storms, as determined by the committee, are as follows.

Goals, Objectives, and Action Items

Mitigation Goal #1: Protect Houston County from dangers and damage associated with winter storms.

Objective #1: Protect the lives of Houston County residents in the event of a severe winter storm.

Action Step #1: Educate and inform the public through safety announcements using multiple forms of outreach (government websites, local news, Facebook, alert systems, etc.)

Action Step #2: Maintain active status with the CodeRed and Integrated Public Alert and Warning System (IPAWS) notification system.

Action Step #3: Maintain National Weather Service StormReady status.

Action Step #4: Maintain funding for weather radio vouchers.

Objective #2: Obtain all necessary equipment and/or supplies for emergency response.

Action Step #1: Ensure Public Works and Road Department have all necessary equipment to combat winter storms.

Objective #3: Provide safe emergency shelter locations for people impacted by disasters.

Action Step #1: Identify locations for emergency shelters throughout Houston County and its municipalities.

Action Step #2: Ensure all shelters have the necessary supplies to assist residents when necessary.

Action Step #3: Implement coordination and management protocols between the county and municipalities for managing identified emergency shelters.

Action Step #4: Acquire mobile generators for use at emergency shelters.

Objective #4: Protect the property of Houston County residents in the event of a severe winter storm.

Action Step #1: Identify and maintain a list of high-danger areas where ice typically occurs on roadways.

Action Step #2: Identify and remove trees/limbs that could damage structures and/or power lines.

Objective #5: Obtain all necessary equipment and/or supplies for emergency response.

Action Step #1: Acquire backup generators for all critical facilities including, but not limited to treatment plants, lift stations, fire stations, and government facilities.

Action Step #2: Ensure that all critical facilities are wired to accept mobile generators capable of providing emergency power.

Objective #6: Prepare emergency personnel to respond to the scene of a tornado.

Action Step #1: Maintain call-in procedures and contact information for off-duty emergency personnel (from all jurisdictions) when needed at the scene of a disaster/hazard event.

Objective #7: Enhance coordination among city and county emergency response agencies.

Action Step #1: Enhance communication system that would enable all relevant agencies to engage in real-time communication in the event of a disaster or emergency.

Objective #8: Ensure that required records have adequate backup.

Action Step #1: Develop a system that provides adequate backup of all essential governmental records for the county and each of its municipalities.

Summary of Changes
Objective #1 and the first action step are items carried over from the previous plan. Action Steps #2, #3, #4, and #5 are aimed at providing Houston County residents with as much information as possible so that they can make informed decisions about their safety during a winter storm. Continuing and achieving these objectives will ensure that residents have multiple means of accessing information.

Objective #2 and its single action step was added so that the county and/or its government can obtain equipment essential to combating winter storms. The planning committee noted that these types of events are relatively rare; however, having equipment on hand particularly to clear roads is essential to emergency operations in the county.

Objective #3 and its four action steps are new to this plan. With no currently designated shelter facilities, the planning committee concluded that identifying shelters and developing operating procedures for those shelters are essential for protecting Houston County residents.

Objective #4 and its first action step are continuations from the previous plan. The planning committee elected to add Action Step #2 as an essential strategy for combating winter storms. Removing trees and limbs in advance around structures and power lines will help prevent power outages and severe structural damage.

Objective #5 and its two action steps are additions to the winter storm goals and objectives. The planning committee determined that not all critical facilities had fixed generators, nor were they all wired for generators if mobile generators were required.

Objective #6 and Action Step #1 were added to the winter storm so that all jurisdictions would have up-to-date call-in procedures for all emergency personnel. While winter storms are somewhat predictable in terms of conditions, the way they impact people and facilities can vary requiring all jurisdictions to have complete call-in procedures.

Objective #7 and its single action step were identified as critical to winter storm mitigation. Ensuring everyone is able to communicate and obtain information on a single platform is critical for coordinating four local governments and any external support.

Objective #8 and its one action step is the final addition to this section. There is uncertainty as to the level of critical data backup there is for the county and three municipalities. Therefore, the planning committee determined it to be essential for ensuring county and city governments and facilities can be operational in case facilities holding records are damaged due to thunderstorm winds.

Information regarding the responsible department or agency, anticipated costs, existing and potential funding sources, jurisdiction, timeframe, priority, and status were removed from this section. These items will be addressed in *Chapter 6: Plan Implementation.*

Wildfires

In previous planning cycles, the planning committee did not include wildfire as a hazard that affects critical facilities. Rather, the previous plans addressed conditions related to wildfire under the drought hazard. During this planning process, the committee elected to consider wildfire as a separate hazard because of its ability to impact life, property, and critical facilities. Even though development in Houston County has increased over recent years, there is still a significant amount of undeveloped land in the southern portion of the county. Wildfire remains a serious threat to those areas.

The current planning committee reviewed, updated and identified several non-structural mitigation measures in hopes of minimizing the potentially destructive effects of wildfires. The planning committee's focus is on the preservation of life and property. This may result in modifications to current policies and the implementation of local ordinances to ensure suggested mitigation measures are initiated. Specific mitigation goals, objectives and action steps for drought inflicted wildfires, as determined by the committee, are as follows.

Goals, Objectives, and Action Steps

Mitigation Goal #1: Minimize loss of life and property in Houston County due to fires resulting from wildfires.

Objective #1: Protect facilities and vulnerable populations from the effects of fires resulting from wildfire conditions.

Action Step #1: Continue to work with the Georgia Forestry Commission to implement the Community Wildfire Protection Plan.

Action Step #2: Continue the education and awareness campaign directed towards homeowners on the importance of clearing underbrush a safe distance from homes and structures.

Action Step #3: Reinforce and educate the general public about the statewide burn ban.

Action Step #4: Create and maintain a database of critical facilities located in wildfire hazard areas.

Action Step #5: Coordinate vegetation management around critical facilities with property owners in order to ensure defensible space in areas with a higher risk of wildfires.

Action Step #6: Provide adequate fire hydrant coverage for all county residents.

Objective #2: Enhance coordination among city and county emergency response agencies.

Action Step #1: Enhance communication system that would enable all relevant agencies to engage in real-time communication in the event of a disaster or emergency.

Objective #3: Obtain all necessary equipment and/or supplies for emergency response.

Action Step #1: Acquire backup generators for all critical facilities including, but not limited to treatment plants, lift stations, fire stations, and government facilities.

Action Step #2: Ensure that all critical facilities are wired to accept mobile generators capable of providing emergency power.

Objective #4: Provide educational opportunities to school children and the general public.

Action Step #1: Implement a disaster response curriculum within the school system.

Action Step #2: Educate the public through GEMA/FEMA/Red Cross/Georgia Forestry Commission brochure distribution.

Objective #5: Provide safe emergency shelter locations for people impacted by disasters.

Action Step #1: Identify locations for emergency shelters throughout Houston County and its municipalities.

Action Step #2: Ensure all shelters have the necessary supplies to assist residents when necessary.

Action Step #3: Implement coordination and management protocols between the county and municipalities for managing identified emergency shelters.

Action Step #4: Acquire mobile generators for use at emergency shelters.

Objective #6: Ensure that required records have adequate backup.

Action Step #1: Develop a system that provides adequate backup of all essential governmental records for the county and each of its municipalities.

Summary of Changes

This entire section on wildfire is new to this PDMP. Objective #1 and its action steps were included to reinforce and add to preventative measures already in place in the

county. Each of the action steps is designed to increase awareness about wildfire risk and prevention and help local governments prioritize the facilities and structures for doing preventative work.

Objective #2 and its single action step were identified as critical to wildfire mitigation and response. Ensuring everyone is able to communicate and obtain information on a single platform is critical for coordinating four local governments and any external support.

Objective #3 and its two action steps are additions to the wildfire goals and objectives. The planning committee determined that not all critical facilities had fixed generators, nor were they all wired for generators if mobile generators were required.

Objective #4 and its two action steps are also additions to this section. While some educational activities and materials are available, the committee decided that these efforts are essential to protecting life and property during wildfires.

Objective #5 and its four action steps are new to this plan. With no currently designated shelter facilities, the planning committee concluded that identifying shelters and developing operating procedures for those shelters are essential for protecting Houston County residents.

Objective #6 and its one action step are the final addition to this section. There is uncertainty as to the level of critical data backup there is for the county and three municipalities. Therefore, the planning committee determined it to be essential for ensuring county and city governments and facilities can be operational in case facilities holding records are damaged due to lightning.

CHAPTER 5: LOCAL TECHNOLOGICAL HAZARD MITIGATION GOALS & OBJECTIVES / COMMUNITY MITIGATION GOALS, POLICIES & VALUES

Hazardous Materials Spills

During the plan update process, the Houston County Pre-Disaster Mitigation Planning Committee validated and confirmed that hazardous materials spills constitute the most prevalent technological hazard potentially damaging to the community. There have been a considerable number of minor spills in recent history, but this does not limit the potential of a catastrophic spill within the community. The threat is exacerbated due to the fact that there are several industries within the community that use large quantities of hazardous materials, including Robins Air Force Base. Hazardous chemicals are transported into and out of the county on a daily basis as a result of the base. Therefore, measures must be undertaken to ensure that the roads and rails of the Houston County community are protected.

The planning committee identified both structural and non-structural mitigation measures to ensure that the community adequately addresses all relevant issues. This may result in alterations to current policies and practices to ensure that proper mitigation measures are undertaken. In regards to facilities that are subject to hazardous materials spills, there are no historic or special considerations that pose extraordinary challenges for the community. Mitigation goals and objectives identified for hazardous materials spills are consistent with the overall community mitigation goal of creating a safe and livable environment for all Houston County citizens and for making Houston County and its three municipalities less vulnerable to the effects of technological hazards. Mitigation goals, objectives and action steps for hazardous material spills, as determined by the committee, are as follows.

Goals, Objectives, and Action Steps

Mitigation Goal #1: Protect Houston County from damages associated with Hazardous Material Spills.

Objective #1: Ensure public safety officials are trained to contain hazardous material spills.

Action Step #1: Continue to train adequate numbers of personnel to respond to a hazardous material spill.

Objective #2: Protect the environment in Houston County in the event of a hazardous material spill.

Action Step #1: Create a centralized and compatible map of the stormwater system to provide emergency personnel with the knowledge of shut-off points in the event of a hazardous material spill.

Action Step #2: Develop a GIS database of critical areas and facilities that may be impacted by hazardous material spills.

Action Step #3: Acquire supplies (e.g., containment boom) to limit the impact of pollutants (e.g. oil, fuel) in area water bodies.

Action Step #4: Continue utilization of the Houston County Fire Department Hazardous Materials team in assisting with hazardous material spill disaster response and recovery within or outside Houston County.

Objective #3: Enhance coordination among city and county emergency response agencies.

Action Step #1: Enhance communication system that would enable all relevant agencies to engage in real-time communication in the event of a disaster or emergency.

Objective #4: Obtain all necessary equipment and/or supplies for emergency response.

Action Step #1: Acquire backup generators for all critical facilities including, but not limited to treatment plants, lift stations, fire stations, and government facilities.

Action Step #2: Ensure that all critical facilities are wired to accept mobile generators capable of providing emergency power.

Objective #5: Provide safe emergency shelter locations for people impacted by disasters.

Action Step #1: Identify locations for emergency shelters throughout Houston County and its municipalities.

Action Step #2: Ensure all shelters have the necessary supplies to assist residents when necessary.

Action Step #3: Implement coordination and management protocols between the county and municipalities for managing identified emergency shelters.

Action Step #4: Acquire mobile generators for use at emergency shelters.

Summary of Changes
Objective #1 and its action steps are continuations from the last plan. The planning committee believed it was important to continue to train personnel, both existing and new.

Objective #2 is a continuation from the last plan, but most of the action steps are new. Action Step #1 is continuing from the last plan. Communities have made progress in mapping the stormwater system, but it is not complete, so the committee chose to keep

that action step. Action Step #2 was added so that officials can have a better understanding of the transportation network or industries that could threaten critical facilities. Action Step #3 was added so that communities can acquire the necessary equipment to combat hazardous materials' impact on the environment. The planning committee chose to add Action Step #4 to ensure that this team remains active in hazardous material response inside and outside the community.

Objective #3 and its single action step were identified as critical to hazardous material spill mitigation and response. Ensuring everyone is able to communicate and obtain information on a single platform is critical for coordinating four local governments and any external support.

Objective #4 and its two action steps are additions to the wildfire goals and objectives. The planning committee determined that not all critical facilities had fixed generators, nor were they all wired for generators if mobile generators were required.

Objective #5 and its four action steps are new to this plan. While hazardous material spills have historically been localized, there is the chance that they could have wider impacts. The planning committee concluded that identifying shelter facilities and their operating procedures was essential in case such an event occurred.

Terroristic Threats

The hazard of terroristic threats is new to the Houston County Pre-Disaster Mitigation Plan. While there has not been a history of terroristic threats in the county, the planning committee concluded that it should plan for these types of events given that incidents such as active shooter events have occurred at public facilities all over the country. The location of Robins AFB in Houston County also poses an additional risk for a terroristic threat.

The planning committee identified both structural and non-structural mitigation measures to ensure that the community adequately addresses all relevant issues. This may result in alterations to current policies and practices to ensure that proper mitigation measures are undertaken. In regard to facilities that are subject to terroristic threats, there are no historic or special considerations that pose extraordinary challenges for the community. Mitigation goals and objectives identified for terroristic threats are consistent with the overall community mitigation goal of creating a safe and livable environment for all Houston County citizens and for making Houston County and its three municipalities less vulnerable to the effects of technological hazards. Mitigation goals, objectives and action steps for terroristic threats, as determined by the committee, are as follows.

Goals, Objectives, and Actions Steps

Mitigation Goal #1: Minimize loss of life and property due to terroristic threats in Houston County.

Objective #1: Educate the public and public safety officials on terroristic threats and responses.

Action Step #1: Conduct educational sessions for the public of what to do in the event of a terroristic threat.

Action Step #2: Use the city and county website along with Facebook pages to notify the public of what to do in the event of a terroristic threat.

Objective #2: Train and equip relevant personnel from all jurisdictions.

Action Step #1: Organize a local Anti-Terrorism Advisory group.

Action Step #2: Conduct an annual terrorism simulation.

Action Step #3: Maintain an active EOC roster.

Action Step #4: Recruit and prepare volunteers to provide assistance during disasters whether in the field or within a shelter.

Action Step #5: Ensure all responsible parties have the necessary equipment and supplies needed to respond efficiently (e.g. bleeding control kits).

Objective #3: Enhance security measures at public facilities throughout Houston County.

Action Step #1: Upgrade and maintain security equipment at all public buildings.

Action Step #2: Conduct routine preventive maintenance on all county security systems.

Action Step #3: Ensure panic systems are available in all city and county government buildings.

Action Step #4: Assist the Houston County Health Department with evaluating their security measures and offer assistance with upgrades and maintenance as needed.

Objective #4: Protect school facilities and populations from terroristic threats.

Action Step #1: Install an alert system at county schools to alert people in the event of an emergency. (e.g. blue beacons)

Action Step #2: Improve surveillance systems to monitor the grounds at schools and accompanying facilities.

Action Step #3: Improve access control systems at county schools.

Action Step #4: Conduct regular lockdown drills in all schools with participation of School Resource Officers and HEMA representatives.

Action Step #5: Evaluate the need for a mobile security system for use at HCBOE events. (i.e. mobile metal detector system)

Action Step #6: Ensure panic systems are available in every classroom.

Objective #5: Ensure adequate evacuation plans are prepared and distributed.

Action Step #1: Evaluate unique evacuation plans for each public building and facility.

Objective #6: Enhance coordination among city and county emergency response agencies.

Action Step #1: Enhance communication system that would enable all relevant agencies to engage in real-time communication in the event of a disaster or emergency.

Objective #7: Provide safe emergency shelter locations for people impacted by disasters.

Action Step #1: Identify locations for emergency shelters throughout Houston County and its municipalities.

Action Step #2: Ensure all shelters have the necessary supplies to assist residents when necessary.

Action Step #3: Implement coordination and management protocols between the county and municipalities for managing identified emergency shelters.

Action Step #4: Acquire mobile generators for use at emergency shelters.

Summary of Changes
As noted, this section is a completely new addition to the plan. The following includes an explanation as to why the planning committee elected to include the objectives and action steps.

The planning committee wanted to add Objective #1 and its two action steps to ensure that Houston County residents were aware of what to do in the event they were under a terroristic threat. These objectives are designed for the general public, not any specific group.

Objective #2 and its action steps were added to ensure there is adequate training and preparation for both emergency response officials in addition to those who may be close to the scene of a terroristic threat.

The planning committee identified enhancing security measures at all public facilities as a critical objective related to mitigating terroristic threats under Objective #3. Action Steps #1 and #2 were identified to ensure that all county facilities had adequate security equipment and that the equipment was routinely maintained. The committee drafted Action Step #3 to ensure that all government buildings have some sort of panic system, whether it is hard-wired or implemented through another method. Some facilities do not have a panic system as of this plan. The committee identified Action Step #4 as a necessary item in light of recent events at the health department and increasing awareness that there are significant security gaps for staff at the existing facility.

Objective #4 and its action items are all aimed at protecting school facilities and their population. The planning committee identified the action steps which cover training and preparation, prevention through surveillance, and response.

The planning committee included Objective #5 and its action step as they want to ensure that all evacuation plans are up to date and accurate. All facilities have a plan, but they may not have been evaluated in recent years. Therefore, the committee wanted to make certain the plans are adequate.

Objective #6 and its single action step were identified as critical to hazardous material spill mitigation and response. Ensuring everyone is able to communicate and obtain information on a single platform is critical for coordinating four local governments and any external support.

Objective #7 and its action steps were included as Houston County currently has no identified shelters or shelter operations. The planning committee concluded that identifying shelters and developing operating procedures for those shelters are essential for protecting Houston County residents. These shelters may also be used as central meeting places in the event of a terroristic activity at a different public facility.

CHAPTER 6: IMPLEMENTATION PLAN

Implementation / Action Plan

Administrative Actions
The Houston County Pre-Disaster Mitigation Plan update process was overseen by the Houston County Emergency Management Agency (HEMA). Facilitation of the planning process was conducted by the Middle Georgia Regional Commission. The Houston County Board of Commissioners, the Centerville City Council, the Perry City Council, and the Warner Robins City Council authorized submission of the plan update to both GEMA and FEMA for their respective approvals. Once approval has been granted, the plan will be formally adopted by Houston County, the City of Centerville, the City of Perry, and the City of Warner Robins.

Authority and Responsibility
As a result of this update process, the HEMA Director shall assume the responsibility of upkeep and maintenance of the plan. It shall be the responsibility of the HEMA Director to ensure that the plan is used as a guide for undertaking mitigation measures within the community. The HEMA Director shall also be authorized to reconvene the planning committee to periodically review and update the plan throughout the useful life of the plan, not to exceed five years.

Through this process, the HEMA Director shall identify mitigation projects that have been undertaken within the community. Additionally, the planning committee shall continue to brainstorm, identify, and prioritize any additional mitigation projects that the community can/should undertake.

A comprehensive review of community planning documents was conducted to ensure they were consistent with the goals, objectives, strategies and action items identified in the Houston County Pre-Disaster Mitigation Plan. These included the Houston County/Cities of Centerville, Perry and Warner Robins Joint Comprehensive Plan, the Joint Solid Waste Management Plan (SWMP), the Middle Georgia Regional Plan, the Houston County Emergency Operations Plan, the Middle Georgia Regionally Important Resources (RIR) Plan, and the Houston County, City of Centerville, City of Perry, and City of Warner Robins Service Delivery Strategy (**Appendix C**). Additionally, over the previous five-year planning period, the Houston County Pre-Disaster Mitigation Plan was used by community planners and local officials during the update of these other planning mechanisms, and when appropriate, the Plan's data, mitigation strategies, and action steps were incorporated into these documents.

All action steps identified in this update of the Houston County Pre-Disaster Mitigation Plan will be evaluated for possible inclusion in the next update of the Joint Houston County/Cities of Centerville, Perry and Warner Robins Comprehensive Plan, including the Community Agenda and Community Work Program portion of that plan. The comprehensive plan is due for an update in 2021. In the past, local comprehensive planning efforts have considered previous versions of the mitigation plan. This activity will be further emphasized in the upcoming plan development. In addition, relevant

sections of this Pre-Disaster Mitigation Plan update will be included in the next revision of the Houston County Emergency Operations Plan. This has been a frequent practice and was done within the past planning cycle. Houston County and the cities are committed to ensuring all relevant mitigation strategies identified in this plan will be incorporated and integrated into existing plans, as well as all applicable future planning efforts. Additionally, during the duration of this plan, Houston County and the Cities of Centerville, Perry, and Warner Robins will consistently review their local ordinances including zoning, subdivision regulations, building codes, and hazard-related ordinances to ensure they are working efficiently to mitigate the hazards in this plan.

Plan Update and Maintenance/Public Involvement

Per the requirements set forth in the Disaster Mitigation Act of 2000, Houston County is required to update and revise the plan every five years. At the direction of the HEMA Director, the Houston County Pre-Disaster Mitigation planning committee convened in order to accomplish this revision.

The revision process included a firm schedule and timeline and identified any agencies or organizations participating in the plan revision. The committee reviewed the mitigation goals, objectives, and action items to determine their relevance to changing situations in the county, as well as changes in state or federal policy, and to ensure they are addressing current and expected conditions. The committee also reviewed the risk assessment portion of the plan to determine if this information should be updated or modified, given any newly available data.

Houston County is dedicated to involving the public directly in the five-year review and update of the Pre-Disaster Mitigation Plan. During the plan revision process, the committee conducted two public hearings to provide the public with a forum where they can express their concerns, opinions, or ideas about the plan. Additionally, the information was supplied to the local media for the purpose of informing the public about the PDMP planning process.

Documentation has been maintained showing all efforts at continued public involvement meetings. This documentation includes newspaper clippings reflecting the advertised public hearing notice, sign-in sheets, meeting minutes, etc. All relevant information will be forwarded to GEMA and FEMA as a product of the proposed plan revision if required.

The HEMA Director will ensure the revised plan is presented to the Houston County Board of Commissioners for formal adoption. In addition, all holders of the county plan will be notified of affected changes.

No later than the conclusion of the five-year period following initial approval of the plan, the HEMA Director shall submit a revised Pre-Disaster Mitigation Plan to the Georgia Emergency Management Agency.

Going forward, HEMA will continue to use similar methods to maintain and update their plan. HEMA will continue to update the public on mitigation initiatives using local media, as well as various social media outlets. The municipalities in Houston County will also use local and social media to inform the public on mitigation activities occurring their respective jurisdictions. Regarding ongoing public participation, community members can provide public comment at each local governments' regular convening of elected officials and at various town halls and other public meetings. Public meetings frequently occur when a community applies for a grant, and those meeting will give the public the opportunity to provide ongoing insight. Records and minutes of these meetings will be maintained.

Additionally, the education and public awareness component of hazard mitigation will provide an ongoing opportunity to keep the public informed about hazard mitigation and various programs while giving the public the chance to comment on plan implementation.

In terms of monitoring and evaluating the plan, the HEMA Director will convene regular meetings with the planning committee to ensure the plan stays up to date. The committee will maintain records from these meetings to include in the next five-year update of the plan.

Plan Implementation

Houston County and the Cities of Centerville, Warner Robins, and Perry are all committed to enhancing hazard mitigation within their respective jurisdictions and collectively. There are ongoing efforts led by Houston County EMA to enhance communication and coordination among the four jurisdictions in disaster response using enhanced communication systems and enhanced public awareness campaigns. Communities are also engaged in efforts to map all their infrastructure so that they can isolate and respond to impacts of hazards. However, many of the larger items that would aid in hazard mitigation such as generators and security systems for all critical facilities are beyond the financial capacity of any of the jurisdictions. Therefore, they will require financial assistance from various sources to effectively implement many of their hazard mitigation actions.

Prioritization

Each mitigation action item identified in this plan was prioritized by the members of the planning committee. Priority categories consist of High, Medium and Low. The methodology involved a comprehensive review of the projects identified in the original plan, a determination as to whether those projects are still active and/or relevant to the community, and identification of new projects to be included in the plan update. This process consisted of evaluating the Social, Technical, Assets, Political, Legal, Economic, and Environmental (STAPLEE) aspects of each action item identified. The committee assigned each action item a ranking of either "High," "Medium," or "Low" priority through a combination of many criteria brought together through the committee's discussion to ensure that all variables were considered.

Factors considered included the overall need for the activity to be conducted within the community, the cost associated with completing the activities, the overall benefit derived from undertaking the activity, ability to complete the project, and various other factors. The results of the committee's prioritization of each action item are shown below, with specific STAPLEE evaluation subsequently displayed.

The determination of the cost-benefit of a project was based upon the anticipated cost in relation to the perceived benefit of the action taken (see Worksheet #4 in **Appendix D**). If there was a high price tag associated with a project, yet a minimal number of people would benefit, the project was considered to have a low-cost benefit. Conversely, if minimal expenditures were required and the entire community would benefit, this received a favorable cost-benefit rating. All projects were evaluated to determine the favorability of the benefit in relation to the cost associated with completing the project.

Additionally, committee members used the criteria referenced above (availability of potential funding sources, overall feasibility, measurable milestones within the project, whether multiple objectives were addressed, and political support for the project) in order to determine the final prioritization of the project. Through discussion and debate, the committee collectively ranked their priorities, obtained consensus, and inserted the prioritized list of projects into the plan.

The following list of action items is organized by high priority, medium priority, and low priority action items and are color-coded accordingly.

High Priority Action Item	Medium Priority Action Item	Low Priority Action Item

Action Item	Hazard Category(ies)	Responsibility	Jurisdiction	Timeframe	Cost	Funding Source(s)
Apply for mitigation grant funding from state or federal sources to minimize losses in the event of a flood; match potential projects with potential sources of funding.	Flooding	Houston County Board of Commissioners	Houston County Centerville Perry Warner Robins	2020-2025	$400,000	General Fund, SPLOST, Grant Assistance
Obtain permits from relevant environmental agencies and conduct regular clean-up and maintenance of the watershed in Bay Gall Creek.	Flooding	Houston County Board of Commissioners	Houston County Centerville Warner Robins	2020-2025	$200,000	State and/or federal grant programs (GA DNR, USDA, EPA)
Ensure protection of wastewater treatment plants within Houston County.	Flooding	Public Works & Utility Departments	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Continue identification and training of personnel to be members of the GSAR team.	Flooding	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Conduct Simulated Disaster Exercises for multiple emergency service organizations.	Flooding	Houston County EMA	Houston County Centerville Perry	2020-2025	Staff Time	General Fund

			Warner Robins			
Educate the public through GEMA/FEMA/Red Cross brochure distribution.	Flooding	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time; Up to $1,000	General Fund, Grant Assistance
Enhance communication system that would enable all relevant agencies to engage in real-time communication in the event of a disaster or emergency.	Flooding HazMat Spills Lightning Terroristic Threats Thunderstorm Winds Winter Storms Tornadoes Wildfires	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Up to $200,000	General Fund, Grant Assistance

Acquire backup generators for all critical facilities including, but not limited to treatment plants, lift stations, fire stations, and government facilities.	Flooding HazMat Spills Lightning Thunderstorm Winds Winter Storms Tornadoes Wildfires	Local Governments (Board of Commissioners / City Councils)	Houston County Centerville Perry Warner Robins	2020-2025	$5 million	GEMA Pre-Disaster Mitigation Grant Programs
Ensure that all critical facilities are wired to accept mobile generators capable of providing emergency power.	Flooding HazMat Spills Lightning Thunderstorm Winds Winter Storms Tornadoes Wildfires	Local Governments (Board of Commissioners / City Councils)	Houston County Centerville Perry Warner Robins	2020-2025	$750,000	GEMA Pre-Disaster Mitigation Grant Programs and Local General Funds
Acquire mobile generators for use at emergency shelters.	Flooding HazMat Spills Terroristic Threats Thunderstorm Winds Winter Storms Tornadoes	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	$600,000	GEMA Pre-Disaster Mitigation Grant Programs

Identify locations for emergency shelters throughout Houston County and its municipalities.	Flooding HazMat Spills Terroristic Threats Thunderstorm Winds Winter Storms Tornadoes Wildfires	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Ensure all shelters have the necessary supplies to assist residents when necessary.	Flooding HazMat Spills Terroristic Threats Thunderstorm Winds Winter Storms Tornadoes Wildfires	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Up to $50,000	Grant/Loan Assistance; General Fund
Implement coordination and management protocols between the county and municipalities for managing identified emergency shelters.	Flooding HazMat Spills Terroristic Threats Thunderstorm Winds Winter Storms Tornadoes Wildfires	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund

Develop a system that provides adequate backup of all essential governmental records for the county and each of its municipalities.	Flooding HazMat Spills Terroristic Threats Thunderstorm Winds Winter Storms Tornadoes Wildfires	Local Governments (Board of Commissioners / City Councils)	Houston County Centerville Perry Warner Robins	2020-2025	$150,000	Local General Fund; Grant Assistance
Implement a disaster response curriculum within the school system.	Flooding Lightning Thunderstorm Winds Tornadoes Wildfires	Houston County EMA and Houston County Board of Education	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund; Grant Assistance
Continue to train adequate numbers of personnel to respond to a hazardous material spill.	HazMat Spills	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Acquire necessary technology and equipment to detect lightning at outdoor gathering facilities (e.g. recreation/sporting events).	Lightning	Houston County EMA and Houston County Board of Education	Houston County Centerville Perry Warner Robins	2020-2025	$250,000	Grant/Loan Assistance

Maintain active status with the CodeRed and Integrated Public Alert and Warning System (IPAWS) notification system.	Lightning Thunderstorm Winds Winter Storms Tornadoes	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	$40,000 Annually	General Fund
Maintain National Weather Service StormReady status.	Lightning Thunderstorm Winds Winter Storms Tornadoes	Houston County EMA	Houston County	2020-2025	Staff Time	General Fund
Maintain funding for weather radio vouchers.	Lightning Thunderstorm Winds Winter Storms Tornadoes	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Up to $10,000	General Fund
Ensure all responsible parties have the necessary equipment and supplies needed to respond efficiently (e.g. bleeding control kits).	Terroristic Threats	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Up to $10,000	General Fund; Grant Assistance
Upgrade and maintain security equipment at all public buildings.	Terroristic Threats	Local Governments (Board of Commissioners / City Councils)	Houston County Centerville Perry Warner Robins	2020-2025	$2 million	Grant/Loan Assistance; General Fund; SPLOST

Assist the Houston County Health Department with evaluating their security measures and offer assistance with upgrades and maintenance as needed.	Terroristic Threats	Houston County Board of Commissioners	Houston County Centerville Perry Warner Robins	2020-2025	$500,000	Grant/Loan Assistance; General Fund; SPLOST
Conduct regular lockdown drills in all schools with participation of School Resource Officers and HEMA representatives.	Terroristic Threats	Houston County Board of Education	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Evaluate the need for a mobile security system for use at HCBOE events. (i.e. mobile metal detector system)	Terroristic Threats	Houston County Board of Education	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Ensure panic systems are available in every classroom.	Terroristic Threats	Houston County Board of Education	Houston County Centerville Perry Warner Robins	2020-2025	$500,000	Grant/Loan Assistance; General Fund
Continue enforcement of existing codes that require mobile homes / manufactured homes to be tied-down and regularly update the existing code in accordance with best practices.	Thunderstorm Winds	Planning and Zoning Departments	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund

Continue enforcement of Georgia Minimum Building Codes.	Thunderstorm Winds	Planning and Zoning Departments	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Improve and maintain the outdoor warning siren system to ensure that activation technology is up-to-date and system coverage reaches developed areas.	Thunderstorm Winds Tornadoes	Local Governments (Board of Commissioners / City Councils)	Houston County Centerville Perry Warner Robins	2020-2025	$1 million	GEMA Pre-Disaster Mitigation Grant Programs; Local General Funds; SPLOST
Review Georgia Disaster Resilient Building Code Appendices to reduce the possibility of effects of strong winds.	Thunderstorm Winds Tornadoes	Planning and Zoning Departments	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Develop an approved debris management plan.	Thunderstorm Winds Tornadoes	Houston County EMA; Public Works	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund; Grant Assistance

Identify and remove trees/limbs that could damage structures and/or power lines.	Thunderstorm Winds Winter Storms	Public Works and Utility Departments	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Continue to encourage sheltering-in-place through the distribution of informational materials.	Thunderstorm Winds Winter Storms Tornaodes	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time; Up to $1,000	General Fund
Continue to work with the Georgia Forestry Commission to implement the Community Wildfire Protection Plan.	Drought Wildfires	Houston County EMA	Houston County	2020-2025	Staff Time	General Fund
Continue an educational and awareness campaign directed towards homeowners on the importance of clearing underbrush a safe distance from homes and structures.	Drought Wildfires	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund; Grant Assistance
Reinforce and educate the general public about the statewide burn ban.	Drought Wildfires	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund

As an NFIP compliance strategy component, continue enforcement of building codes prohibiting construction within the flood hazard area; review existing code to determine need for alterations; continue to inspect each facility and require site engineering to determine if facility is to be constructed in flood hazard area.	Flooding	Planning and Zoning Departments	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Continue to address stormwater management issues throughout the county and as applicable in each of the three municipalities.	Flooding	Public Works & Utility Departments	Houston County Centerville Perry Warner Robins	2020-2025	Up to $2 million	Grant/Loan Assistance, SPLOST
Acquire supplies and equipment (e.g., sandbags) necessary to mitigate flooding for the county and each of its municipalities.	Flooding	Public Works	Houston County Centerville Perry Warner Robins	2020-2025	Up to $100,000	General Fund, Grant Assistance
Acquire supplies (e.g., containment boom) to limit the impact of pollutants (e.g. oil, fuel) in area water bodies.	Flooding HazMat Spills	Public Works	Houston County Centerville Perry Warner Robins	2020-2025	Up to $100,000	General Fund, Grant Assistance
Continue utilization of Houston County Fire Department Hazardous Materials in assisting with flood disaster response and recovery within or outside Houston County.	Flooding HazMat Spills	Houston County EMA	Houston County	2020-2025	Staff Time	General Fund

Create a centralized and compatible map of the stormwater system to provide emergency personnel with the knowledge of shut-off points in the event of a hazardous material spills.	HazMat Spills	Public Works Departments	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund; Grant Assistance
Develop a GIS database of critical areas and facilities that may be impacted by hazardous material spills.	HazMat Spills	Public Works Departments	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund; Grant Assistance
Educate and inform the public on the potential dangers and damage associated with lightning strikes through disbursement of materials.	Lightning	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time; Up to $1,000	General Fund
Conduct educational sessions for the public of what to do in the event of a terroristic threat.	Terroristic Threats	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Use the city and county website along with Facebook pages to notify the public of what to do in the event of a terroristic threat.	Terroristic Threats	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund

Organize a local Anti-Terrorism Advisory group.	Terroristic Threats	Houston County EMA	Houston County	2020-2025	Staff Time	General Fund
Conduct an annual terrorism simulation.	Terroristic Threats	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Maintain an active EOC roster.	Terroristic Threats	Houston County EMA	Houston County	2020-2025	Staff Time	General Fund
Recruit and prepare volunteers to provide assistance during disasters whether in the field or within a shelter.	Terroristic Threats	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Conduct routine preventive maintenance on all county security systems.	Terroristic Threats	Local Governments (Board of Commissioners / City Councils)	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund

Ensure panic systems are available in all city and county government buildings.	Terroristic Threats	Local Governments (Board of Commissioners / City Councils)	Houston County Centerville Perry Warner Robins	2020-2025	$2.5 million	Grant/Loan Assistance; General Fund; SPLOST
Install an alert system at county schools to alert people in the event of an emergency. (e.g. blue beacons)	Terroristic Threats	Houston County Board of Education	Houston County Centerville Perry Warner Robins	2020-2025	$2 million	Grant/Loan Assistance; General Fund
Improve surveillance systems to monitor the grounds at schools and accompanying facilities.	Terroristic Threats	Houston County Board of Education	Houston County Centerville Perry Warner Robins	2020-2025	$2 million	Grant/Loan Assistance; General Fund
Improve access control systems at county schools.	Terroristic Threats	Houston County Board of Education	Houston County Centerville Perry Warner Robins	2020-2025	$2 million	Grant/Loan Assistance; General Fund
Educate and inform the public through safety announcements using multiple forms of outreach (government websites, local news, Facebook, alert systems, etc.)	Thunderstorm Winds Winter Storms	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund

Maintain call-in procedures and contact information for off-duty emergency personnel (from all jurisdictions) when needed at the scene of a disaster/hazard event.	Thunderstorm Winds Winter Storms Tornaodes	Local jurisdictions	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Obtain and distribute materials and information to enhance public awareness about tornadoes and tornado safety.	Tornadoes	Houston County EMA	Houston County Centerville Perry Warner Robins	2021-2026	Staff Time; Up to $1,000	General Fund
Create and maintain database of critical facilities located in wildfire hazard areas.	Wildfires	Houston County EMA	Houston County Centerville Perry Warner Robins	2021-2026	Staff Time	General Fund; Grant Assistance
Coordinate vegetation management around critical facilities with property owners in order to ensure defensible space in areas with higher risk of wildfires.	Wildfires	Houston County EMA	Houston County Centerville Perry Warner Robins	2021-2026	Staff Time	General Fund; Grant Assistance

Provide adequate fire hydrant coverage for all county residents.	Wildfires	Local Governments (Board of Commissioners / City Councils)	Houston County	2021-2026	Up to $3 million	General Fund; SPLOST; Grant Assistance
Educate the public through GEMA/FEMA/Red Cross/Georgia Forestry Commission brochure distribution.	Wildfires	Houston County EMA	Houston County	2021-2026	Staff Time; Up to $1,000	General Fund
Ensure Public Works and Road Department have all necessary equipment to combat winter storms.	Winter Storms	Public Works Departments	Houston County Centerville Perry Warner Robins	2020-2025	Up to $1.5 million	Grant/Loan Assistance
Identify and maintain a list of high-danger areas where ice typically occurs on roadways.	Winter Storms	Public Works Departments	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund

As an NFIP compliance strategy component, utilize GEMA/FEMA buyout programs to obtain property located within the flood hazard area; identify existing structures in the flood hazard area; pursue funding to move each of these structures.	Flooding	Houston County Board of Commissioners	Houston County Centerville Perry Warner Robins	2020-2025	Up to $500,000	State and/or federal buyout funding programs
Evaluate unique evacuation plans for each public building and facility.	Terroristic Threats	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund
Develop and maintain a list of established shelter locations; inform the public of open and working shelter locations to which they can go in the event of widespread power outages.	Winter Storms	Houston County EMA	Houston County Centerville Perry Warner Robins	2020-2025	Staff Time	General Fund

CHAPTER 7: CONCLUSION

Since the first plan was developed, the committee has obtained a great deal of information regarding disaster history, the presence of natural and technological hazards, and the impacts that these hazards present to the community. The update process began with the identification and verification of hazards that have occurred within Houston County over the past 66 years. This was followed by updating critical facilities data within the community. Assessments were then made to determine the vulnerability of the community to various hazards and determine their potential losses. After evaluation of the potential losses within the community, goals, and strategies were developed to implement mitigation measures within the community. These goals and strategies were then prioritized and used to formulate an action plan that the community can undertake to make the community a safer place to live and work.

Additionally, the plan update process included reconvening the planning committee and continued citizen involvement through two public hearings that were conducted in order to provide members of the community with the opportunity to comment and make suggestions about disaster mitigation, both present, and future, within the community. This plan update will help to foster a countywide hazard mitigation mindset through local government leadership and community-based partnerships, leading the way to a safe and livable environment for all Houston County citizens.

Sources:

- National Climatic Data Center
- Georgia Emergency Management Agency
- Georgia Forestry Commission
- Georgia Department of Natural Resources
- National Geophysical Data Center
- *Georgia Tornado Database*
- Georgia Department of Education
- Georgia Department of Community Affairs
- Georgia Department of Labor
- *The Macon Telegraph*
- National Oceanic & Atmospheric Administration (NOAA)
- NOAA – National Severe Storms Laboratory
- National Earthquake Hazard Reduction Program
- Nevada Seismological Laboratory
- United States Census Bureau
- United States Department of Agriculture – NDMC
- United States Geological Survey
- National Dam Safety Program
- Southern Group of State Foresters

Table of Appendices