COLUMBUS CONSOLIDATED GOVERNMENT HAZARD MITIGATION PLAN 2024 - 2029

Columbus-Muscogee County, GA Homeland Security & Emergency Management

100 10th Street

Columbus, Georgia 31901

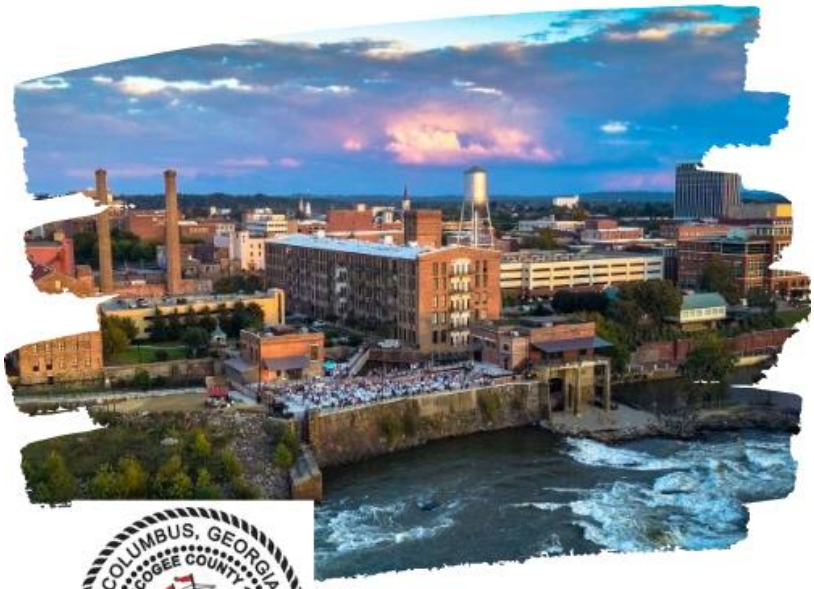
corbett.chance@columbusga.org

706.225.4072

Lux Mitigation and Planning Corp.

Columbus Consolidated Government, Georgia

Hazard Mitigation Plan Update 2024 – 2029



Prepared for the Columbus Consolidated Government
100 10th Street
Columbus, Georgia 31901
706.225.4712
www.columbusga.gov

This document was funded in part by the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Planning Grant awarded to Columbus Consolidated Government, Georgia, through the Georgia Emergency Management Agency (GEMA) to fulfill the requirements of the Federal Disaster Mitigation Act of 2000 (DMA 2000). Columbus Consolidated Government's 2018 Hazard Mitigation Plan was updated by the Columbus Consolidated Government Hazard Mitigation Plan Update Committee and was prepared by Lux Mitigation and Planning Corp. For additional information, please contact Columbus-Muscogee County Homeland Security & Emergency Management.

Preface

Mitigation Vision for the Future

Emergency Managers succeed or fail based on how well they follow the following fundamental principles of emergency management, mitigation, preparedness, response, and recovery. Purposefully, our emergency management forefathers put the word mitigation first as a "means" to prevent or minimize the effects of disasters.

Mitigation is commonly defined as sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects. Hazard mitigation focuses attention and resources on community policies and actions that will produce successive benefits over time. A mitigation plan states the aspirations and specific courses of action that a community intends to follow to reduce vulnerability and exposure to future hazard events. These plans are formulated through a systematic process centered on the participation of citizens, businesses, public officials, and other community stakeholders.

Mitigation forms, or should form, the very foundation of every emergency management agency. To reduce, minimize, or eliminate hazards in their communities, emergency management agencies adopt and implement mitigation practices. The Federal DMA 2000 sets the benchmark and outlines the criteria for communities with the vision to implement hazard mitigation practices in their communities.

The Columbus Consolidated Government realizes the benefits achieved by the development and implementation of mitigation plans and strategies in their community. The Columbus Consolidated Government's elected officials, public safety organizations, planners, and many others have proven that by working together towards the development and implementation of this plan, they can reduce the loss of life and property in their communities.

The jurisdictions covered by this plan include the following:

Columbus Consolidated Government

Adoption Resolution – Columbus Consolidated Government

Requirement §201.6(c)(5)

RESOLUTION – COLUMBUS CONSOLIDATED GOVERNMENT

COLUMBUS-MUSCOGEE COUNTY HAZARD MITIGATION PLAN 2024

WHEREAS, the Columbus Consolidated Government recognize that it is threatened by several different types of natural and man-made hazards that can result in loss of life, property loss, economic hardship and threats to public health and safety; and

WHEREAS, the Federal Emergency Management Agency (FEMA) has required that every county and municipality have a pre-disaster mitigation plan in place, and requires the adoption of such plans in order to receive funding from the Hazard Mitigation Grant Program; and

WHEREAS, a Hazard Mitigation Plan is a community's plan for evaluating hazards, identifying resources and capabilities, selecting appropriate actions, and developing and implementing the preferred mitigation actions to eliminate or reduce future damage in order to protect the health, safety and welfare of the residents in the community; and

WHEREAS, the Columbus Consolidated Government Hazard Mitigation Plan 2024 has been prepared in accordance with FEMA requirements at 44 CFR 201.6; and

WHEREAS, the Plan will be updated every five years;

NOW, THEREFORE, BE IT *RESOLVED*, by the Council of the Columbus Consolidated Government, Georgia, that:

1) Columbus Consolidated Government, Georgia, has adopted the Columbus Consolidated Government Hazard Mitigation Plan 2024; and

2) It is intended that the Plan be a working document and is the first of many steps toward improving rational, long-range mitigation planning and budgeting for the Columbus Consolidated Government.

PASSED, APPROVED AND ADOPTED by the Council of the Columbus Consolidated

Government, Georgia, in regular session this _____ day of _____, 20_____.

_____ _____

Mayor Clerk of Council

Table of Contents

CHAPTER THREE – HAZARD PROFILES (CONTINUED)

CHAPTER ONE – INTRODUCTION

Summary of Updates for Chapter One

The following table provides a description of each section of this chapter and a summary of the changes that have been made to the Columbus Consolidated Government Hazard Mitigation Plan 2018.

Chapter 1 Section	Updates
Introduction	• Identification of Mitigation Goals
Authority	• Verbiage updated
Funding	• Verbiage updated
Scope	• Verbiage updated
Purpose	• Verbiage updated
Consistency with Federal Guidelines	• Verbiage updated
Plan Review	• Verbiage updated • Updated mitigation meeting dates for 2023 planning process
Hazard Mitigation Plan Update Committee	• Updated committee list with the 2023 planning participants • Updated to meet Federal guidelines
Public Participation	• Updated to match the 2023 planning process
Multi-Jurisdictional Considerations	• Updated with requirement descriptions
Incorporation of Existing Plans, Studies, and Resources	• Updated with new plan, study, and resource incorporations

Purpose

The purpose of the Columbus Consolidated Government Hazard Mitigation Plan Update is to:

- Protect life, promote safety, and preserve property by reducing the potential for future damages and economic losses that result from natural and technological hazards;
- Make communities in Columbus Consolidated Government safer places to live, work, and play;
- Qualify for grant funding in both the pre-disaster and post-disaster environments;
- Speed the recovery and redevelopment process following future disaster events;
- Demonstrate a firm local commitment to hazard mitigation principles; and,
- Comply with state and federal legislative requirements for local multi-jurisdictional hazard mitigation plans.

Goals

The Columbus Consolidated Government Hazard Mitigation Plan Update is the first phase of a multi-hazard mitigation strategy for the entire community. This Plan encourages cooperation among various organizations and crosses political sub-divisions. As written, this Plan fulfills the requirements of the Federal DMA 2000. DMA 2000 provides federal assistance to state and local emergency management agencies and other disaster response organizations to reduce damage from disasters. The Act is administered by GEMA and FEMA.

It is important that state and local government, public-private partnerships, and community citizens can see the results of these mitigation efforts; therefore, the goals and strategies need to be achievable. Columbus Consolidated Government's Hazard Mitigation Plan Update Committee adopted the following goals during plan development:

GOAL 1
Maximize the use of all resources by promoting intergovernmental coordination and partnerships in the public and private sectors

GOAL 2
Harden communities against the impacts of disasters through the development of new mitigation strategies and strict enforcement of current regulations that have proven effective

GOAL 3
Reduce and, where possible, eliminate repetitive damage, loss of life and property from disasters

GOAL 4
Bring greater awareness throughout the community about potential hazards and the need for community preparedness

This plan complies with all requirements and scope of work as described in Columbus Consolidated Government's Hazard Mitigation Grant application.

Scope

The scope of the Columbus Consolidated Government Hazard Mitigation Plan Update encompasses all areas of Columbus Consolidated Government. The Plan identifies all natural and technological hazards that could threaten life and property in Columbus Consolidated Government. The scope of this Plan includes both short and long-term mitigation strategies with implementation and possible sources of project funding.

The Hazard Mitigation Plan Update is organized to incorporate the requirements of Interim Final Rule 44 CFR 201.4.

Chapter One includes an overview of the Hazard Mitigation Plan Update, the overall goals of the plan, and details of the planning process as required by Interim Final Rule 44 CFR 201.4(c)(1).

Chapter Two of the Plan details the Columbus Consolidated Government profile, including the demographics and history of the county.

Chapter Three identifies the risk assessment process, past natural hazard events with associated losses, and current natural hazard risks. Potential losses are also analyzed as required by Interim Final Rule 44 CFFR 201.4(c)(2). Additionally, Chapter Three identifies and analyzes potential technological hazards faced by Columbus Consolidated Government.

Chapter Four identifies Columbus Consolidated Government's hazard mitigation goals and objectives, mitigation strategies and actions, and sources of potential funding for mitigation projects as required by Interim Final Rule 44 CFR 201.4(c)(3).

Chapter Five identifies the maintenance and implementation strategies for the Plan. The process for evaluation of the Hazard Mitigation Plan implementation progress is also detailed as required by Interim Final Rule 44 CFR 201.4(c)(4) and (5).

Funding

Columbus Consolidated Government was awarded a Hazard Mitigation Planning Grant by FEMA through GEMA for the update of Columbus Consolidated Government's 2018 Hazard Mitigation Plan. FEMA contributed 90% toward the total cost of the Plan Update. The Hazard Mitigation Planning Grant required a 10% match by Columbus Consolidated Government. This match was fulfilled entirely (100%) by In-Kind contributions; time spent by sub-grantee employees, local stakeholders, representatives from organizations, and citizen volunteers updating the Plan was provided instead of cash from the Columbus Consolidated Government's budget.

Consistency with Federal and State Mitigation Policies

The Plan is intended to enhance and complement state and federal recommendations for the mitigation of natural and technological hazards in the following ways:

- Substantially reduce the risk of life, injuries, and hardship from the destruction of natural and technological disasters on an ongoing basis;
- Create greater public awareness about the need for individual preparedness and about the need to safer, more disaster resistant communities;
- Develop strategies for long-term community sustainability during disasters; and,
- Develop governmental and business continuity plans that will continue essential private sector and governmental activities during disasters.

FEMA publishes several guidance documents for local governments on mitigating natural disasters. The updated Columbus Consolidated Government Hazard Mitigation Plan recognizes, adopts, incorporates, and endorses the following principles:

- Develop a strategic mitigation plan for Columbus Consolidated Government;
- Enforce current building codes;
- Develop incentives to promote mitigation;
- Incorporate mitigation of natural hazards into land use plans;
- Promote awareness of mitigation opportunities and programs throughout our community on a continual basis; and,
- Identify potential funding sources for mitigation projects.

It is vital that the private sector is included in mitigation efforts that are consistent with state and federal recommendations, such as the following:

- Develop mitigation incentives with insurance agencies and lending institutions;
- Encourage the creation of a business continuity plan for the continuance of commerce during and following a disaster; and,
- Partner with local businesses to educate customers about potential hazards in the community and possible mitigation ideas.

Individual citizens must be made aware of the hazards they may encounter. Additionally, they must be educated on how to protect themselves from the hazards they face. They must be shown that mitigation is an important part of reducing loss of life and property in their community. Their support is critical to the success of any mitigation effort. The updated Columbus Consolidated Government Hazard Mitigation Plan supports the following FEMA recommendations regarding individual citizens:

- Become educated on the hazards that may impact your community;
- Become part of the process by supporting and encouraging mitigation programs that reduce vulnerability to disasters; and,
- An individual's responsibility is to safeguard his/her family, as well as themselves, prior to a disaster event.

Authority

In the past, federal legislation has provided funding for disaster relief, recovery, and some hazard mitigation planning. The DMA 2000 is the latest legislation to improve the planning aspect of that process; it reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. The DMA 2000 establishes a pre-disaster hazard mitigation program and designates new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). Section 322 identifies the new requirements for planning activities and increases the amount of HMGP funds available to states that have developed a comprehensive mitigation plan prior to the disaster.

State and local communities must have an approved mitigation plan in place prior to receiving post-disaster HMGP funds. Local mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to and the capabilities of the individual communities. To implement the new DMA 2000 requirements, FEMA prepared an Interim Final Rule, published in the Federal Register on February 26, 2002, at 44 CFR Parts 201 and 206, which establishes planning and funding criteria for states and local communities.

Developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans, Columbus Consolidated Government's Updated Hazard Mitigation Plan will be brought forth to each participating jurisdiction in Columbus Consolidated Government to be formally adopted. The Plan shall be routinely monitored and revised to maintain compliance with the following provisions, rules, and legislation:

Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390); and FEMA's Interim Final Rule published in the Federal Register on February 26, 2002, at 44 CFR Part 201.

Plan Review

Requirement §201.6(c)(1)

The contractor, Lux Mitigation and Planning, had the primary responsibility for collecting updated information and presenting pertinent data to the Plan Update Committee. An online, Dropbox folder was created for Columbus Consolidated Government's Plan Update. The approved 2018 Hazard Mitigation Plan was uploaded to the Dropbox folder, and the link to the folder was emailed to all members of the Hazard Mitigation Plan Update Committee. Each chapter of the 2018 Plan was reviewed. Hazard vulnerability and risk assessment data was updated, as was critical infrastructure information.

Special attention and consideration were given to the review and edit of mitigation strategies listed in the 2018 Plan. The Plan Update Committee examined each strategy and determined whether the strategy had been completed, needed to be modified, was in progress, or no longer applied. The Committee was highly encouraged to create new mitigation strategies to meet the current needs of the Columbus Consolidated Government. Mitigation strategies from other Georgia counties were reviewed to help with the creation of new strategies. When the Committee agreed a new mitigation action would be beneficial, it was tailored to Columbus Consolidated Government's needs and was included in the 2023 Plan. The contractor sent the Committee, including sporadically attending participants, regular emails which contained a Dropbox link to the most updated version of the Plan and encouraged the Committee to thoroughly critique each version.

Hazard Mitigation Plan Update Committee Meeting Dates

Monday, September 25, 2023	
Morning Session	Kick-Off Meeting; Introduction to Hazard Mitigation
Afternoon Session	Hazard Identification and Prioritization; Community Risk Assessment Analysis
Monday, October 23, 2023	
Morning Session	Essential and Critical Facilities; Review and Edit 2018 Mitigation Strategies
Afternoon Session	Discuss New Mitigation Strategies; Discuss Available Hazard Mitigation Grants; Discuss Other Hazard Mitigation Plan Uses

*The public was welcome and encouraged to attend all Hazard Mitigation Plan Update meetings.

Significant Changes to the 2018 Plan

Each section of Columbus Consolidated Government's 2018 Hazard Mitigation Plan has been revised in some manner. Therefore, a summary of those changes will be listed in the first section of each chapter. Significant additions/modifications to this Plan include the following:

- Addition of Extreme Temperatures to Natural Hazards
- Addition of Landslide to Natural Hazards
- Addition of Critical Infrastructure Failure to Technological Hazards
- Incorporation of Communications Failure into Critical Infrastructure Failure

Hazard Mitigation Plan Update Participants

Requirement §201.6(b)(2)

The following participants contributed to the update of Columbus Consolidated Government's 2018 Hazard Mitigation Plan: *(in alphabetical order)*

Gary Allen
Clerk of Council
Columbus Consolidated Government Council

Greg Arp
Chief of Police
Muscogee County School District Police

Edward "E.J." Bess
Disaster Program Manager
American Red Cross

Holli Browder
Director
Columbus Consolidated Government Parks and Recreation

Michelle Brown-Mang
Deputy Director
Columbus Consolidated Government Public Works

Samantha Cato
Deputy Director
Russell County (AL) Emergency Management Agency

Amber Clark
Director
Columbus Airport

Caleb Cole
Customer Advocacy Manager
Columbus Consolidated Government Water Works

Chance Corbett
Director
Columbus-Muscogee County Homeland Security and Emergency Management

Jeremy Cummings
Vice President of Field Services
Columbus Water Works

Darrell Emfinger
Emergency Preparedness Director
Georgia Department of Public Health - West Central Health District

Everett Fleming
Assistant Director
METRA Transit System

Johnny Floyd
Director
Chattahoochee County Emergency Management Agency

Pat Frey
Vice President
United Way of the Chattahoochee Valley

Patrick Gladen
CERT Commander
Muscogee County Prison

Shelby Guest
Executive Vice President
Visit Columbus GA

Anthony Guignard
Application Developer
Columbus Consolidated Government Information Technology/GIS

Jessica Harris
Department Assistant – Facilities Management
Piedmont Columbus Regional

Fredrick Jackson
Chief Safety Officer
METRA Transit System

David Jury
911 Center Director
Columbus Police Department

Jennifer Kelley
Administrator and Emergency Preparedness Liaison
Hospital Authority of Columbus GA
Ridgecrest Rehab and Skilled Nursing Home, Orchard View, and Muscogee Manor Skilled Nursing Home

Chad Kirchen
Director of Risk Management
Muscogee County School District

Eric Kline
Logistics Officer
Russell County (AL) Emergency Management Agency

Brian Lackey
GIS Manager
Columbus Consolidated Government Information Technology/GIS

Brandon Landis
Emergency Manager
United States Army – Fort Moore

David Martin
Director
Russell County (AL) Emergency Management Agency

Cody Meshes
Stormwater Management Engineer
Columbus Consolidated Government Engineering

Benjamin Moser
President and CEO
United Way of the Chattahoochee Valley

Donna Newman
Director
Columbus Consolidated Government Engineering

Quincy Preer
Deputy Director
Columbus-Muscogee County Homeland Security and Emergency Management

Ryan Pruett
Director
Columbus Consolidated Government Inspections and Code

Tiffany Samples
Director of Public Safety
St Francis – Emory Healthcare

Roland Sandoval
Captain of Special Operations
Columbus Fire and EMS

Salvatore Scarpa
Chief
Columbus Fire and EMS

Dareion Smith
Emergency Preparedness Specialist
Georgia Department of Public Health – Columbus Health Department

Jennifer St John
Chief Impact Officer
United Way of the Chattahoochee Valley

Myron Strange
Major
Muscogee County Sheriff's Department

Brookie Tate
Security Manager
Columbus Water Works

Glen Thomason
Deputy Chief Appraiser
Columbus Consolidated Government Tax Assessor's Office

Beverley Townsend, MD
District Health Director
Georgia Department of Public Health – West Central Health District

Bill Watt
Disaster Volunteer
American Red Cross

Suzanne Widenhouse
Chief Appraiser
Columbus Consolidated Government Tax Assessor's Officer

Rex Wilkinson
Senior Planner
Columbus Consolidated Government Planning Department

The Plan Update Committee relied on their consultant to guide them through the update process. During meetings, the participants had productive discussions, expanded their professional networks, asked thoughtful questions, made important decisions, and provided critical input during key stages in the update process.

Efforts were made to involve all departments, as well as community organizations and local businesses, which may have a role in the implementation of mitigation actions and/or policies. These efforts included sending invitations via email to attend the Kick-off Meeting, sending reminder emails before each upcoming meeting, emailing pertinent information throughout the process, and requesting the review and critique of each chapter in the updated Plan.

All neighboring counties – Chattahoochee, Harris, Lee (AL), Russell (AL), and Talbot – were asked to peer review the 2023 Mitigation Plan draft. The Plan was sent to each County EMA office. Columbus

Consolidated Government had significant support and contribution to the Hazard Mitigation Plan Update process from surrounding jurisdictions. Additionally, the EMA Directors from surrounding counties were asked to attend Plan Update Committee meetings in hopes they would share mitigation ideas from their own counties. Representatives from the Russell County (AL) Emergency Management Agency and the Chattahoochee County Emergency Management Agency attended both meetings of the Columbus Consolidated Government Hazard Mitigation Planning Committee. They provided valuable insight regarding how the Columbus Consolidated Government Hazard Mitigation Plan and identified strategies would be beneficial on a regional scale.

Public Participation

Requirement §201.6(b)(1)

State Requirement Element F2

Public awareness is a key component of any community's overall mitigation strategy. As citizens become more involved in decisions that affect their safety, they may develop a greater respect for the natural hazards present in their community, and thus, may take the steps necessary to reduce potential impacts of those hazards.

The following local organizations and businesses participated in the update of Columbus Consolidated Government's 2018 Mitigation Plan: American Red Cross, Muscogee Manor Skill Nursing Home, Orchard View, Piedmont Columbus Regional, Ridgecrest Rehab and Skilled Nursing Home, St. Francis – Emory Healthcare, and the United Way of the Chattahoochee Valley.

The Plan Update Committee took it upon themselves to ensure the processes undertaken for the development, implementation, and maintenance of the 2023 Hazard Mitigation Plan adequately considered public needs and viewpoints.

A list of public outreach initiatives can be found below:

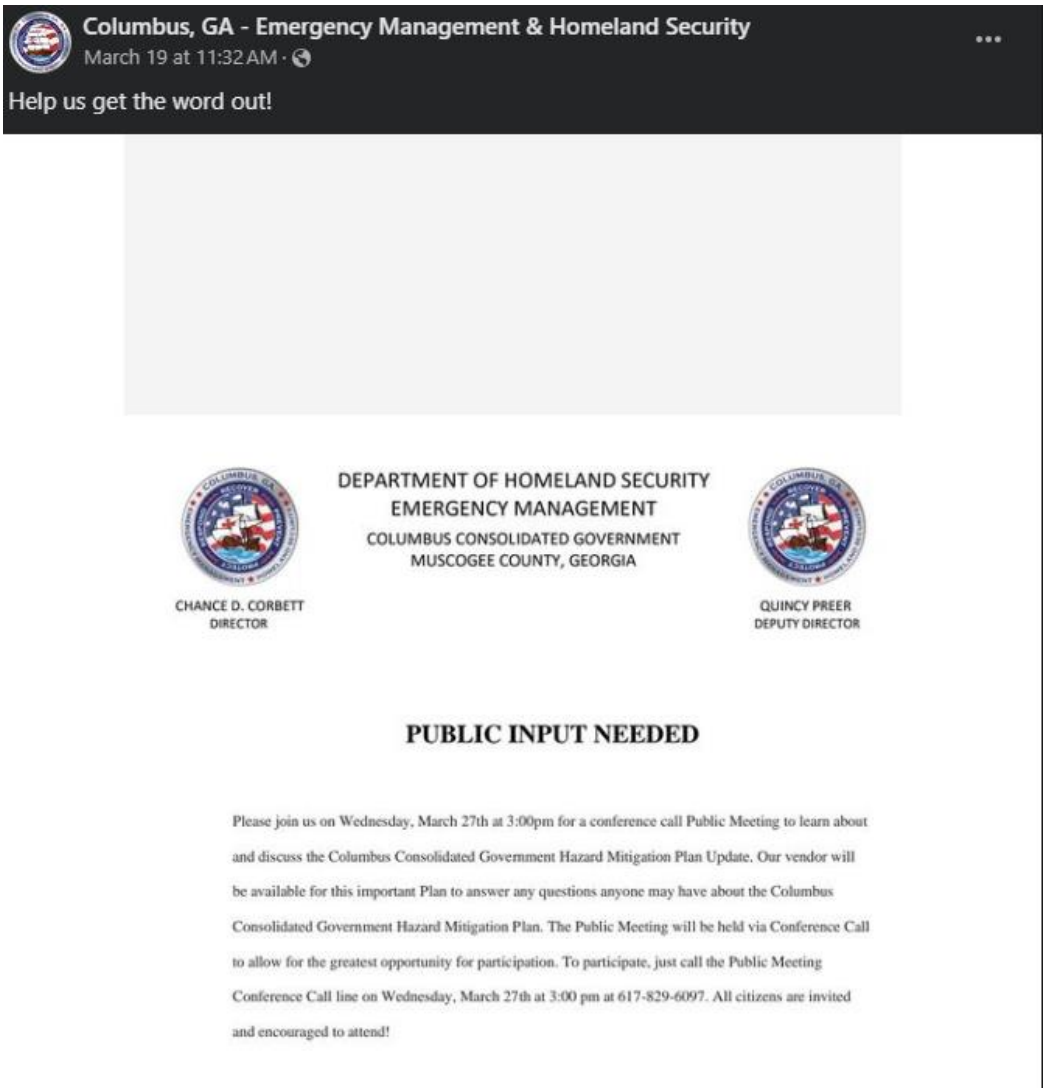
- Email reminders were sent to all Plan Update Committee members, as well as other stakeholders, prior to every meeting. Recipients were encouraged to share the meeting invitation with anyone they thought would be an asset to the Plan Update process or anyone who may want to learn more about what a Hazard Mitigation Plan is.
- The Columbus Consolidated Government attempted to incorporate underserved and vulnerable populations in the community during the Hazard Mitigation Plan Update process. This was accomplished by inviting organizations in the community who represent, serve, and/or support vulnerable and underserved populations throughout Columbus-Muscogee County. The following organizations that serve and support vulnerable and underserved populations participated in the Columbus Consolidated Government Hazard Mitigation Plan Update: American Red Cross, the Columbus Health Department, and the United Way of the Chattahoochee Valley. Additionally, all meetings of the Columbus Consolidated Government Hazard Mitigation planning committee were held at the Piedmont Columbus Regional Hospital, which is commonly utilized by members of vulnerable populations. This decision was made to provide the general public with easy potential access to meetings of the Columbus Consolidated Government Hazard Mitigation planning committee meetings. Meetings were held with open doors to encourage anyone utilizing the facility to come in and participate. Additionally, there were signs on the outside of the rooms advertising the Hazard Mitigation Planning meeting to encourage any potential members of the public to attend.
- A public meeting was held on March 27, 2024. This meeting was advertised via multiple medium, including the Columbus Emergency Management and Homeland Security Facebook page, the Columbus Consolidated Government Facebook page, the Columbus Consolidated Government webpage, and via WRBL – the local CBS affiliate in Columbus. In addition, the press release was directly shared with members of the local media to maximize information sharing. One group the press release was share with was the Courier Eco Latino news network in Columbus. This is a news network that directly connects with lower socioeconomic groups and racial and ethnic minority groups, including those for whom English is a second language. This group shared the notice throughout their networks. There were 17 participants on the public meeting conference call. Of the 17 participants, 11

were members of the Columbus Consolidated Government. Two local organizations that work directly with vulnerable populations participated in the conference call public meeting. These two organizations were House of Time and the United Way of the Chattahoochee Valley. There was also a representative from the Columbus Ledger-Enquirer and 3 members of the public. No comments or feedback were received from the members of the public.

Documentation of Public Meeting Notice

March 27, 2024 Public Meeting – Columbus Emergency Management & Homeland Security Facebook page

Columbus Consolidated Government Facebook page



Columbus Consolidated Government website

Press Releases

HAZARD MITIGATION PLAN UPDATE

Monday, March 25, 2024

[Columbus, Georgia, March 25, 2024] Please join us on Wednesday, March 27th at 3:00pm for a conference call Public Meeting to learn about and discuss the Columbus Consolidated Government Hazard Mitigation Plan Update. Our vendor will be available for this important plan to answer any questions anyone may have about the Columbus Consolidated Government Hazard Mitigation Plan. The Public Meeting will be held via Conference Call to allow for the greatest opportunity for participation. To participate, just call the Public Meeting Conference Call line on Wednesday, March 27th at 3:00 pm at 617-829-6097. All citizens are invited and encouraged to attend!

WRBL News Website

COLUMBUS

Public meeting to be held in late March on hazard mitigation plan in Columbus

by: Nicole Sanders
Posted: Mar 19, 2024 / 11:19 AM EDT
Updated: Mar 19, 2024 / 11:19 AM EDT

SHARE

COLUMBUS, Ga. (WRBL) —The city is asking for residents to join a public meeting on a hazard mitigation plan later this month.

The meeting on Wednesday, March 27 at 3 p.m. is to discuss the "Columbus Consolidated Government Hazard Mitigation Plan Update." According to the city, its vendor will be available to answer any questions during the meeting.

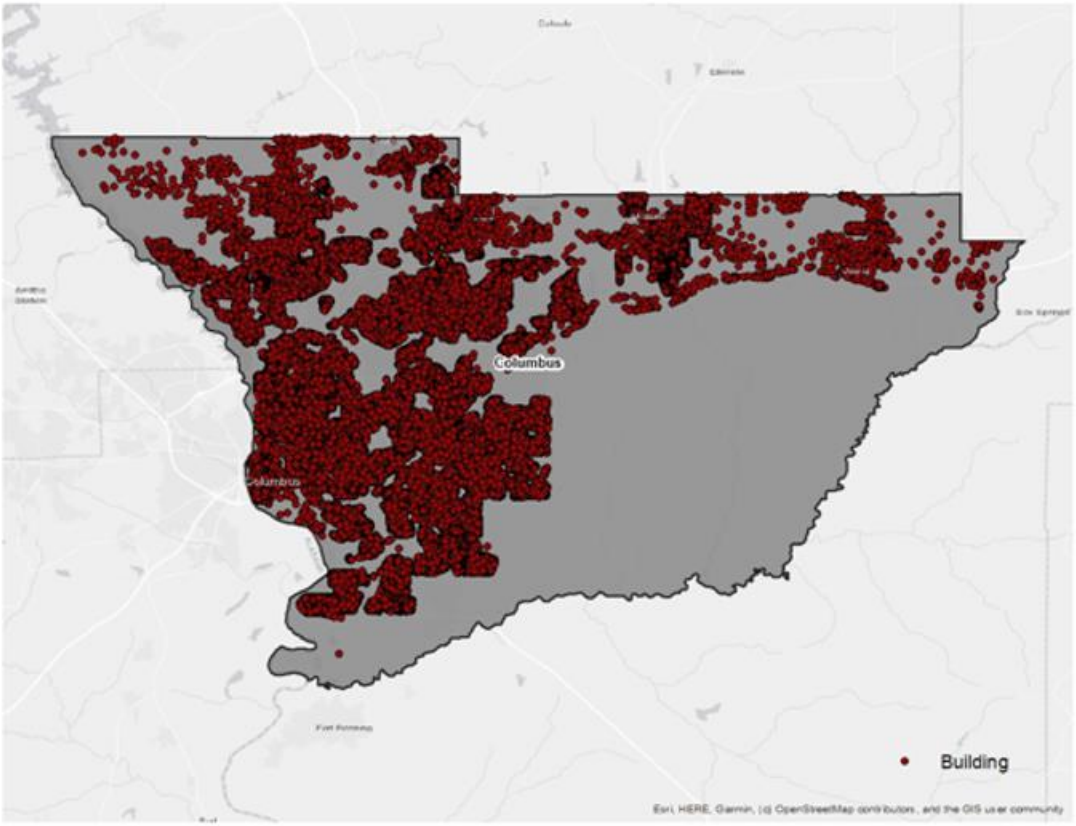
Interested parties can join the meeting through a conference call at 617-829-6097.

Multi-Jurisdictional Considerations

FEMA does not require cities and towns to adopt a local Hazard Mitigation Plan. However, the Federal DMA 2000 requires that all municipalities, wishing to be eligible to receive Hazard Mitigation Grants through FEMA, must adopt a local multi-hazard mitigation plan and must update that plan every five years. Columbus Consolidated Government's most recent Hazard Mitigation Plan was approved by FEMA in October 2018. The 2023 Mitigation Plan is the third five-year update. This FEMA-approved 2023 Hazard Mitigation Plan makes Columbus Consolidated Government eligible for FEMA's Hazard Mitigation Grant Program, Flood Assistance Mitigation Grants, and Pre-Disaster Mitigation Grants.

As set forth by Georgia House Bill 489, the Emergency Management Agency is the implementing agency for projects pertaining to hazard mitigation. Columbus Consolidated Government is dedicated to work in the best interests of the jurisdiction. Unless noted otherwise, mitigation strategies apply equally to all jurisdictions. During the creation and update of this Plan, Columbus-Muscogee County Homeland Security & Emergency Management solicited and received participation from the following Columbus Consolidated Government municipalities: Columbus.

Distribution of Buildings in Columbus Consolidated Government



Source: 2024 Columbus Consolidated Government HAZUS Report

Incorporation of Existing Plans, Studies, and Resources

Requirement §201.6(b)(3)

State Requirement Element F3

Existing Plans

2018 Columbus Consolidated Government Pre-Disaster Hazard Mitigation Plan
2019 State of Georgia Hazard Mitigation Plan
Columbus Consolidated Government Local Emergency Operations Plan
Georgia Forestry Commission's Muscogee Co. Community Wildfire Protection Plan
Columbus Consolidated Government Joint Comprehensive Plan

Studies

2024 Hazard Risk Analyses (HAZUS Report)
2017 United States Department of Agriculture Ag Census
2010 United States Census
2020 United States Census
2009 Columbus Consolidated Government Flood Insurance Study
Radeloff, V. C., R. B. Hammer, S. I Stewart, J. S. Fried, S. S. Holcomb, and J. F. McKeefry. 2005. *The Wildland Urban Interface in the United States*. Ecological Applications 15:799-805.

Resources

2014 City of Boston Natural Hazard Mitigation Plan Update
2010 Camden County Joint Hazard Mitigation Plan Update
2010 Northern Virginia Hazard Mitigation Plan Update
National Climactic Data Center
National Weather Service
Columbus Consolidated Government Tax Assessor's Data
Columbus Consolidated Government Website
Georgia Mitigation Information System Database
Colorado State University (Hurricane mapping)
United States Geological Survey
FEMA Flood Insurance Rate Maps
National Flood Insurance Program
United States Coast Guard National Response Center Data
Georgia Department of Transportation
Georgia Safe Dams Program
Southern Group of State Foresters Wildfire Risk Assessment

Application of Existing Plans and Studies

Existing Planning Mechanism	Reviewed? Yes/No	Incorporation into 2022 Mitigation Plan
2018 Columbus Consolidated Government Hazard Mitigation Plan	Yes	Baseline for the 2022 Plan; updated mitigation strategies; updated hazards; updated Columbus Consolidated Government information
2019 State of Georgia Hazard Mitigation Plan	Yes	Hazard descriptions; potential hazards; mapping mechanisms; potential mitigation strategies that could be adopted on a local level
Columbus Consolidated Government Local Emergency Operations Plan (LEOP)	Yes	Identification of current resources; identification of current capabilities
Georgia Forestry's Columbus Consolidated Government Community Wildfire Protection Plan (CWPP)	Yes	Mitigation strategies for wildfire and drought; historical data
2017 USDA Agriculture Census	Yes	Agricultural data regarding potential losses for drought and wildfire
2020 United States Census	Yes	To update Columbus Consolidated Government's profile information
2009 Columbus Consolidated Government Flood Insurance Study	Yes	Identify potential flood prone areas; prioritization of flood-related mitigation strategies
Columbus Consolidated Government Comprehensive Plan	Yes	To identify future development trends; identify mitigation strategies to curb trends in a direction that considers the hazards of the area
Columbus Consolidated Government Flood Mitigation Assistance Plan	No	No such plan exists
2024 Columbus Consolidated Government HAZUS Report	Yes	Hazard Analysis

CHAPTER TWO – COUNTY PROFILE

Summary of Updates for Chapter Two

The following table provides a description of each section of this chapter and a summary of the changes that have been made to the Columbus Consolidated Government Hazard Mitigation Plan 2018.

Chapter 2 Section	Updates
Past Hazards	• This information involved a review of the hazards listed in the previous plan. • Information was updated for the last 50 years
History	• Expanded and updated from previous plan
Past Events	• Identification of major hazard events in Columbus Consolidated Government for the last 50 years • Focus on Federal Declarations and events since the last Hazard Mitigation Plan Update
Demographics	• Updated data to the 2020 Census information
Economy	• Updated data and information
Government	• Updated verbiage
Transportation	• Updated verbiage
Climate	• Updated verbiage
Utilities	• Updated verbiage
NFIP Compliance	• Updated verbiage

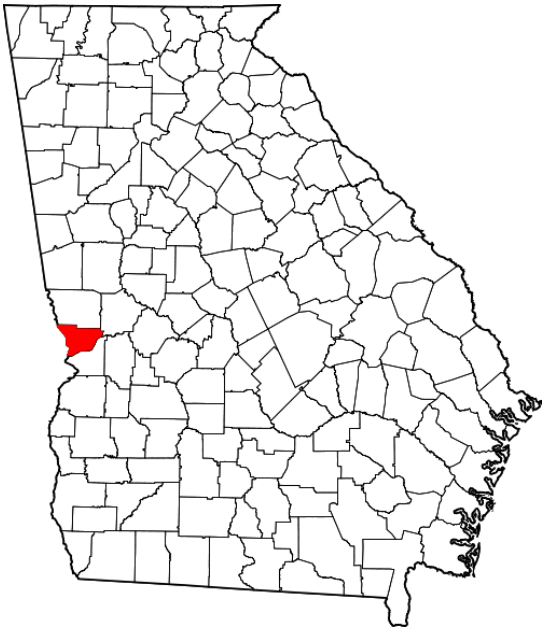
History

Muscogee County was established in 1825 from land ceded by the Creek Nation as part of the Treaty of Indian Springs. The county is named after the Muscogee who originally inhabited the area. Two years later, in 1827, the Georgia General Assembly called for the establishment of a trading town near Coweta Falls thus forming the City of Columbus. The City of Columbus served as the county seat, and in 1971, Muscogee County and the City of Columbus formed the first consolidated government in Georgia.

Early economy centered on agriculture, and the area quickly developed into a regional trade center. Trade was mostly cotton and steamboats loaded with the crop began departing from the City of Columbus even before the initial survey of the land was completed. In 1851, the first railroad was established in the area which furter expanded Columbus. Other industry began to develop along the river due to the power generated from the falls of the Chattahoochee. By 1860, Columbus-Muscogee County had three grist mills, several textile mills, and several small manufacturing operations. During the Civil War, the manufacturing interests turned towards wartime goods including swords, cannons, paper, and clothing.

The late nineteenth and early twentieth century saw a shift in the economy. Cotton was no longer the main trade and manufacturing began to shift towards merchant goods and industrial goods. Some of these manufactured products included clothing, industrial machinery, and soft drinks. The late twentieth century has seen another shift in the economy. Insurance, banking, and digital technology firms has slowly taken over as the main economial drive for the area. Columbus-Muscogee County is home to American Family Life Assurance Corporation (Aflac) and Synovus financial group which is one of the largest data processing and support systems in the world.

Columbus-Muscogee County is also home to several artists, musicians, and writers. Two notable musicians who made their home in Columbus are Thomas “Blind Tom” Wiggins, a blind African American pianist, and Gertrude “Ma” Rainey, the “Mother of the Blues.” Georgia Writers Hall of Fame member Carson McCullers was from Columbus-Muscogee County. Today her home is a center for writers and musicians. There are two institutions of higher learning in Columbus-Muscogee County: Columbus State University and Columbus Technical College.



Past Hazards

Columbus Consolidated Government, Georgia, has faced many natural hazards in its history. Severe thunderstorms have been the most prevalent of these hazards. In the last 50 years, Columbus Consolidated Government has been subjected to 253 documented severe thunderstorm events. These events include torrential rainfall, hail, thunderstorm-force winds, and lightning.

Tornadoes, which can sometimes spawn from severe thunderstorms, have also occurred, although with much less frequency. In Columbus Consolidated Government, there have been 13 documented tornados in the last 50 years.

Because of heavy rainfall, either within Columbus Consolidated Government or upstream, flooding has also occurred. In the National Climactic Data Center (NCDC) databases of the National Weather Service, there is documentation of 28 flooding events for Columbus Consolidated Government.

Winter storms and heavy snowfall have affected Columbus Consolidated Government on 6 occasions over the last 50 years, according to the NCDC record. Because these natural events are barely an annual occurrence, the pre-planning and preparedness component of emergency management is not as robust as northern or western states that routinely see this type of weather.

Columbus Consolidated Government has also been impacted by the following: drought, excessive heat, tropical cyclones, earthquakes, and wildfires.

Columbus Consolidated Government has had 11 Presidential Disaster Declarations (FEMA-declared major disasters) – two of which have occurred since the adoption of the 2018 Hazard Mitigation Plan (both for COVID-19 in 2020).

Notable Past Events

- **2020, Covid-19 (Federal Declaration x2)**
- 2019, Tornado (EF0)
- 2019, Tornado (EF0)
- 2019, Tornado (EF3)
- **2018, Hurricane Michael (Federal Declaration)**
- **2017, Hurricane Irma (Federal Declaration x2)**
- 2017, Tornado (EF1)
- 2017, Flash Flood
- **2016, Severe Storms and Flooding (Federal Declaration)**
- 2016, Thunderstorm Wind
- 2013, Thunderstorm Wind
- 2013, Hail
- 2012, Hail
- 2012, Thunderstorm Wind
- 2011, Thunderstorm Wind
- 2009, Tornado (EF1)
- **2007, Severe Storms and Tornadoes (EF1) (Federal Declaration)**
- 2006, Tornado (F0)
- 2005, Winter Storm
- 2005, Flood
- 2005, Thunderstorm Wind
- 2004, Flash Flood
- 2003, Flash Flood
- 2003, Flash Flood
- 2003, Thunderstorm Wind
- 2001, Thunderstorm Wind
- **1998, Severe Storms and Flooding (Federal Declaration)**
- 1997, Tornado (F1)
- **1995, Hurricane Opal (Federal Declaration)**
- 1992, Tornado (F1)
- 1991, Tornado (F1)
- 1991, Tornado (F0)
- **1990, Severe Storms, Tornadoes, Flooding (Federal Declaration)**
- 1983, Tornado (F1)
- 1978, Tornado (F2)

Demographics

Columbus Consolidated Government

	2000 Census	2010 Census	2020 Census	2022 US Estimated Census
Population	186,291	189,885	206,922	202,616
White	50.4%	46.3%	39.9%	43.9%
African American	43.7%	45.5%	46.5%	49.0%
Hispanic/Latino	4.5%	6.4%	8.0%	8.3%
Asian	1.5%	2.2%	2.7%	3.0%
American Indian	0.4%	0.4%	0.4%	0.5%
Two or More Races	1.9%	3.0%	7.1%	3.3%
Median Age	32.6	33.5	34.4	34.7
Median Household Income	$34,798	$37,564	$44,959	$52,734
Persons in Poverty	15.7%	19.8%	20.0%	20.4%
Homeowners	51.7%	57.2%	49.3%	47.6%

Social Vulnerability Information

Social vulnerability refers to a community's capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters, such as tornadoes or disease outbreaks, to human-caused threats, such as a toxic chemical spill. The Center for Disease Control and Prevention and the Agency for Toxic Substances and Disease Registry (CDC/ATSDR) rates social vulnerability on 16 variables.

These variables are:

- Percentage below the poverty level
- Unemployment rate
- Per capita income
- Percentage of population 25+ without a high school diploma
- Percentage of population below 65 without insurance
- Percentage of population under 18 years of age
- Percentage of population age 65 and over
- Percentage of the population age 5 or older with a disability
- Percentage of households with a single parent
- Percentage of population that is Hispanic or non-white race
- Percentage of population over the age of 5 who speak English less than "well"

- Number of large apartment buildings (10 or more housing units per building)
- Percentage of mobile homes
- Number of housing units with more than one person per room
- Number of households with no vehicle available
- Percentage of population living in group quarters

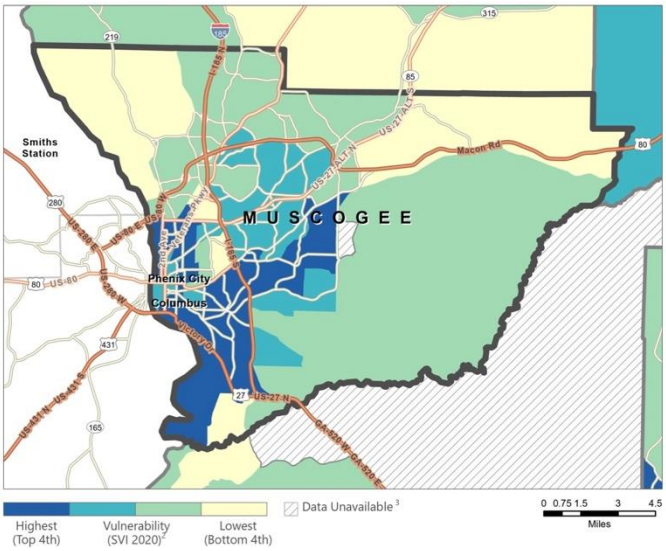
These 16 variables are aggregated into four overall factors: Socioeconomic Status, Household Characteristics, Racial and Ethnic Minority Status, and Household Type/Transportation. Each census tract is then mapped based upon each of these four factors and the overall SVI based upon the full 16 variables. A score is assigned based upon these variables from 0 (no social vulnerability) to 1 (very high social vulnerability).

Columbus Consolidated Government has an Overall SVI score of 0.7785, which indicates a high level of vulnerability. Columbus Consolidated Government also has high levels of vulnerability for Household Characteristics (0.8101), Racial/Ethnic Minority Status (0.8797), and Housing Type/Transportation (0.8228). Columbus Consolidated Government has a medium to high level of vulnerability for Socioeconomic Status (0.5949).

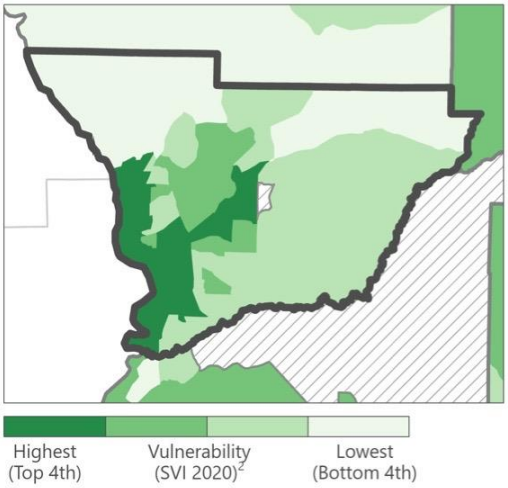
Columbus Consolidated Government does have particular areas that score higher on the SVI Index and higher on each of the four factors. Areas to the south and east of the City of Columbus score higher on all areas of the SVI Index and overall.

Some populations are particularly susceptible to specific hazards based upon a variety of factors related to social vulnerability. As such, these areas should be a focused on for mitigation efforts for these hazards. Hazards that particular populations are more susceptible include extreme temperatures, tropical cyclones, flooding, severe thunderstorms, and tornadoes. Areas that are particularly susceptible include census tracts 132150010204, 13215010701, 13215002500, 13215002700, 13215011500, 13215010501, and 13215011100. Most of these census tracts are in areas immediately to the east of downtown Columbus. These areas score higher than the average for all for aspects of social vulnerability – socioeconomic status, household characteristics, racial and ethnic minority status, and housing type/transportation.

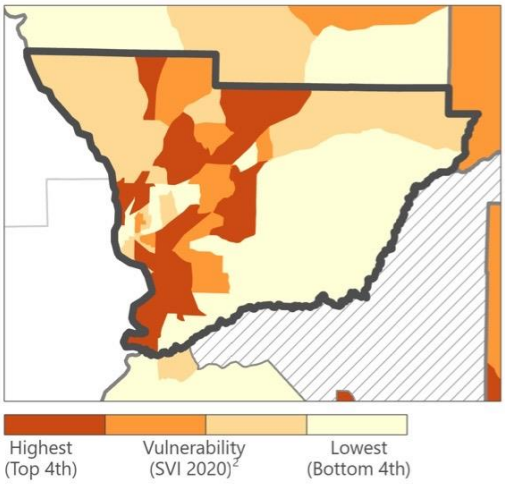
Overall Social Vulnerability



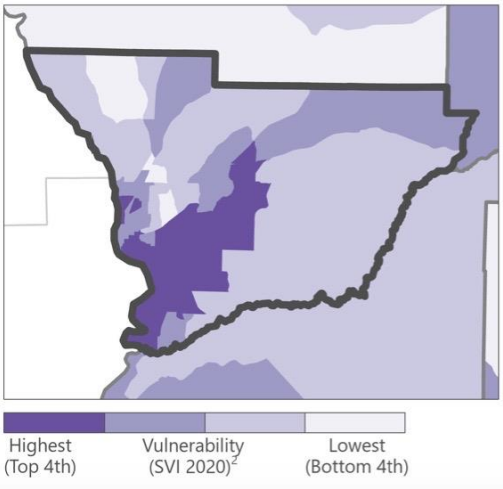
Socioeconomic Status



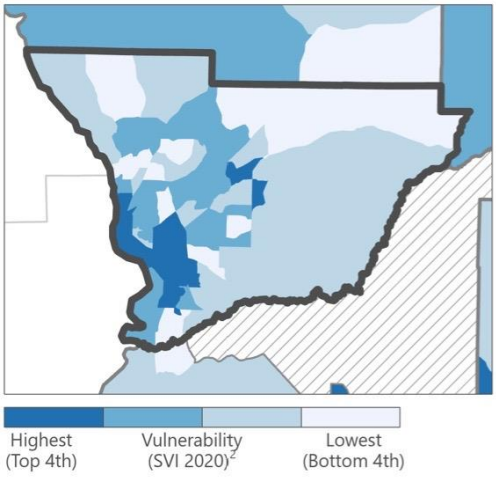
Household Characteristics



Racial and Ethnic Minority Status



Housing Type/Transportation



Economy

Columbus Consolidated Government's economy is primarily industrial with some agriculture. Columbus Consolidated Government's cost of living is 23.6% below the national average. The unemployment rate in Columbus Consolidated Government is 4.2%, which is above the State average of 3.2% and above the National average of 3.8%. Columbus Consolidated Government has a median household income of $52,734, which is well below the national average of $70,784. The list of the ten largest private employers is from the Georgia Department of Labor (2021) and is listed in alphabetical order – not in order of company size or impact on the community.

The ten largest private employers in Columbus Consolidated Government are:

Company	Product/Service
American Family Life Assurance Company	Health Insurance
Columbus State University	Education
Pratt & Whitney Aircraft	Manufacturing: Aircraft Engines
Saint Francis Hospital	Healthcare
Staffing Connections, LLC	Staffing
Synovus Financial Corp	Financial Services
The Medical Center, Inc	Healthcare
TSYS Campus	Financial Services
Walmart	Retail: General
Wellpoint, Inc.	Health Insurance

Utilities

Columbus Consolidated Government's utility needs are met by a variety of public and private entities. Electrical power in Columbus Consolidated Government is provided by the Diverse Power EMC, Flint EMC, and Georgia Power.

Water in Columbus Consolidated Government is provided by the Columbus Consolidated Government.

There are several Natural Gas suppliers in Columbus Consolidated Government including Liberty.

Transportation

Columbus Consolidated Government's transportation system consists primarily of state highways and county-maintained roads. Interstate 14, Interstate 185, US Highways 27, 80, and 280, as well as State highways 1, 22, 85, 219, 520, and 540 are major transportation routes that carry the majority of passenger and commercial traffic in and out of Columbus Consolidated Government. Congestion in these transportation corridors create traffic problems, primarily because of the significant population growth in Columbus Consolidated Government over the last 25 years and increased tourism in the area.

Government

The form of government specified in the County Charter is known as a Consolidated Government known as the Mayor-Council-City Manager form of government, which provides for an elected Mayor from the county at-large and ten city council members, eight of whom are elected from designated districts and two of whom are elected from the county at-large. Each council member serves a four-year term. The Mayor appoints a City Manager to oversee the day-to-day operations of the county.

The main duties of the consolidated government is to pass local laws, known as ordinances, that regulate a variety of things that promote the health, safety and welfare of the citizens covered by them; to pass a balanced budget each year that funds its own operations as well as to allocate funds to the Constitutional Officers, other elected officials, the courts and a variety of programs put in place by the State but funded locally; to ensure that necessary services are funded and provided; to set the millage rate for the County government and many other secondary duties.

The consolidated government sets the County millage rate each year to fund a portion of the County budget. They also receive the millage rate that is set by the Board of Education and an assessment by the State which is submitted to the Georgia Department of Revenue each year.

The consolidated government receives, deliberates, and passes local ordinances each year and amends many others to reflect the changing times. Both require that a public hearing be held, and these are normally held during the regular council meetings. They also pass several resolutions and proclamations throughout the year. Generally, with some exceptions, the consolidate government can pass any local law and ordinance they feel is needed for the County so long as it does not violate the laws of the State or Federal government or the Constitutional rights of any individual. These are researched thoroughly by legal staff before ever being brought to a hearing.

The consolidated government provides many services that citizens expect through the revenues that are raised annually. These include Fire and Ambulance protection; E-911 dispatch services; Zoning and Planning; Inspections; Code Enforcement; Animal Control; Public Library; Parks and Recreation; Public Works; Waste Management Collection Centers; and agencies that service all these such as Building Maintenance, Vehicle Maintenance, and Emergency Management Services. The budget also funds state mandated services such as Law Enforcement and Detention; Superior, Probate, Magistrate and Juvenile courts; Tax Assessment and Tax Collection services; Elections management; District Attorney (shared with other counties) and some smaller funding for local agencies under the State of Georgia.

Climate

Columbus Consolidated Government, like much of Georgia, enjoys a temperate climate with four well-defined seasons: warm to hot summers; brisk fall temperatures; relatively brief, cool winters; and a warm spring season. As a result, there exists a growing season in Georgia, perfect for ornamental and economic-boosting agricultural plants.

AVERAGE MONTHLY TEMPERATURES IN GEORGIA (FAHRENHEIT)

	Average Georgia Temperature	Average Columbus Consolidated Government Temperature
January	46	47
February	49	50
March	56	58
April	63	64
May	70	72
June	77	79
July	80	81
August	79	80
September	74	76
October	64	65
November	56	56
December	48	49

National Flood Insurance Program Compliance

JURISDICTION	PARTICIPATING?	PARTICIPATION DATE	EFFECTIVE MAP DATE
COLUMBUS CONSOLIDATED GOVERNMENT	YES	10/30/1970	4/19/2017

CHAPTER THREE – COUNTY PROFILE

Summary of Updates for Chapter Three

The following table provides a description of each section of this chapter, and a summary of the changes that have been made to the Columbus Consolidated Government Hazard Mitigation Plan 2018.

Chapter 3 Section	Updates
Risk Assessment	• Expanded the explanation of the Risk Assessment • Added an explanation of each part of the Hazard Information
Natural Hazard Severe Thunderstorm	• Updated and consolidated hazard profile with new data • Content revised
Natural Hazard Winter Storm	• Updated and consolidated hazard profile with new data • Content revised
Natural Hazard Flooding	• Updated and consolidated hazard profile with new data • Land Use and Development trends updated to include NFIP information • Content revised
Natural Hazard Tornado	• Updated and consolidated hazard profile with new data • Content revised
Natural Hazard Drought	• Updated and consolidated hazard profile with new data • Content revised
Natural Hazard Wildfire	• Updated and consolidated hazard profile with new data • Content revised
Natural Hazard Earthquake	• Updated and consolidated hazard profile with new data • Content revised
Natural Hazard Tropical Cyclone	• Updated and consolidated hazard profile with new data • Content revised
Natural Hazard Extreme Temperatures	• New Section – Not in 2018 Plan
Natural Hazard Landslide	• New Section – Not in 2018 Plan
Technological Hazard Hazardous Materials	• Updated hazard description

	• Updated and consolidated hazard profile data • Content revised
Technological Hazard Dam Failure	• Updated hazard description • Updated and consolidated hazard profile data • Content revised
Technological Hazard Transportation Incident	• Updated and consolidated hazard profile with new data • Content revised
Technological Hazard Terrorism	• Updated and consolidated hazard profile with new data • Content revised
Technological Hazard Critical Infrastructure Failure	• New Section – Not in 2018 Plan • Incorporated Communications Failure from 2018 Plan
Technological Hazard Emergent Infectious Diseases	• Updated and consolidated hazard profile with new data • Content revised

Risk Assessment

Requirement §201.6(c)(2)(i and ii)
Requirement §201.6(d)(3)

The Columbus Consolidated Government Hazard Mitigation Planning Committee conducted a comprehensive Threat and Hazard Identification and Risk Assessment (THIRA) for Columbus-Muscogee County. This assessment developed the hazard basis for this plan. The assessment includes the following components for each hazard:

1. *Hazard Identification*: The Columbus Consolidated Government Hazard Mitigation Planning Committee identified ten natural hazards and seven technological hazards for this Hazard Mitigation Plan. This is an increase of one natural hazard and two technological hazards from the previous iteration of the plan. Each hazard was identified using statistical data and records from a variety of sources. The list of hazards is based upon frequency, severity of impact, probability, potential losses, and vulnerability.

2. *Hazard Description*: Each hazard was described in detail. Many hazard descriptions came from the Georgia Hazard Mitigation Plan since many of the hazards that could impact the state could also potentially impact Columbus-Muscogee County.

3. *Profile of Hazards*: Each hazard was profiled as to how it could potentially impact the County.

4. *Assets Exposed to the Hazard*: The plan considers critical facilities and infrastructure as part of the vulnerability assessment. This assessment determines the vulnerability of all jurisdictions and attempts to identify populations most vulnerable to each hazard, although many have potential countywide impacts.

5. *Estimated Potential Losses*: Using critical facility and past history data, an estimation of potential losses due to a particular hazard event were determined.

6. *Land Use and Development Trends*: Land use trends were considered when determining the potential future impacts of each hazard. This is of importance regarding flooding and dam failure events.

7. *Multi-Jurisdictional Concerns*: Each jurisdiction was considered when determining the potential hazard impact.

The National Risk Index was utilized as a database of risk potential for how natural hazards have impacted Columbus-Muscogee County in the past and for how they could impact Columbus-Muscogee County in the future. The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Here is how Columbus-Muscogee County scored in each category overall:

Risk Index is **Relatively Low** — Score **69.2**

Expected Annual Loss is **Relatively Low** — Score **65.1**

Social Vulnerability is **Very High** — Score **95.0**

Community Resilience is **Relatively Moderate** — Score **50.9**

These scores indicate that Columbus-Muscogee County has relatively low overall risk and expected annual loss. It also indicates relatively very high values of social vulnerability and relatively moderate levels of community resilience.

In addition to the overall scores, a matrix for each hazard is also produced by the National Risk Index.

Hazard Type	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Score
Hurricane	$3,142,454	Very High	Relatively Moderate	1.29	$4,026,400	79.7
Tornado	$1,923,704	Very High	Relatively Moderate	1.29	$2,473,550	70.8
Earthquake	$884,742	Very High	Relatively Moderate	1.29	$1,136,476	80.4
Hail	$716,422	Very High	Relatively Moderate	1.29	$922,789	87.7
Heat Wave	$677,292	Very High	Relatively Moderate	1.29	$875,149	87.1
Lightning	$624,299	Very High	Relatively Moderate	1.29	$814,012	92.3
Riverine Flooding	$451,933	Very High	Relatively Moderate	1.29	$621,959	56
Strong Wind	$263,029	Very High	Relatively Moderate	1.29	$339,516	45.9
Landslide	$136,608	Very High	Relatively Moderate	1.29	$176,781	90.6
Winter Weather	$121,010	Very High	Relatively Moderate	1.29	$156,299	74.6
Ice Storm	$62,461	Very High	Relatively Moderate	1.29	$79,996	53.7
Wildfire	$30,605	Very High	Relatively Moderate	1.29	$33,861	47
Drought	$4,078	Very High	Relatively Moderate	1.29	$5,920	34.4
Cold Wave	$0	Very High	Relatively Moderate	1.29	$0	0

As the above graphic indicates, Hurricanes have the highest expected annual loss score of any potential hazard. As far as overall risk score, lightning is considered to be a higher risk event than any other hazard identified.

At the first meeting of the Columbus Consolidated Government Hazard Mitigation Plan Update Committee, the attendees participated in a risk assessment of hazard for Columbus-Muscogee County.

This risk assessment was based upon two primary factors: 1. How likely is a hazard to occur; 2. How prepared the committee meeting participants felt the community was for each hazard. This risk assessment relied on the committee meeting attendees to identify the hazards and then rank them by those two factors. As a result, the risk assessment could be skewed by the meeting participants, recency bias, and/or how the hazard would directly impact the organizations represented at this meeting. After additional discussion with the Columbus Consolidated Government Hazard Mitigation Plan Update committee at future meetings, the hazards in this chapter were the agreed upon list. Several of the hazards identified by the committee members were consolidated into expanded hazard descriptions. Those incorporations are notated in the below hazard ranking.

Hazard	Likelihood Score	Preparedness Score	Impact Score	Total Score
Terrorism	25	63	56	**144**
Severe Thunderstorm	99	2	10	**111**
Tornado	69	3	28	**100**
Financial System Failure*	0	27	19	**48**
Earthquake	2	38	8	**48**
Electromagnetic Pulse**	0	28	18	**46**
Utility Failure***	11	15	9	**45**
Severe Winter Weather	18	16	8	**42**
Flooding	33	0	5	**38**
Emergent Infectious Disease	4	9	22	**35**
Infrastructure Failure ***	2	9	11	**22**
Hazardous Materials Incident	1	12	8	**21**
Transportation Incident	0	18	3	**21**
Drought	3	15	2	**20**
Supply Chain Issues******	4	8	5	**17**
Dam Failure	3	4	8	**15**
Industrial Incident*******	6	4	4	**14**
Wildfire	4	5	4	**13**
Water Contamination*******	0	4	9	**13**
Environmental/Ag Incident********	0	6	6	**12**
Landslide	0	11	0	**11**
Extreme Temperatures	5	6	0	**11**
Tropical Cyclone	0	0	6	**6**

** Financial System Failure was incorporated into many of the other hazards on the list, including Terrorism*

*** Electromagnetic Pulse was incorporated into Terrorism, Critical Infrastructure Failure, and Hazardous Materials Incident*

**** Utility Failure and Infrastructure Failure were combined into Critical Infrastructure Failure*

***** Supply Chain Issues were incorporated into many other hazards, such as Transportation Incident and Critical Infrastructure Failure*

****** Industrial Incident and Water Contamination were incorporated into Transportation Incident and Hazardous Materials Incident*

******* Environmental/Ag Incident was incorporated into Hazardous Materials Incident and Emergent Infectious Disease*

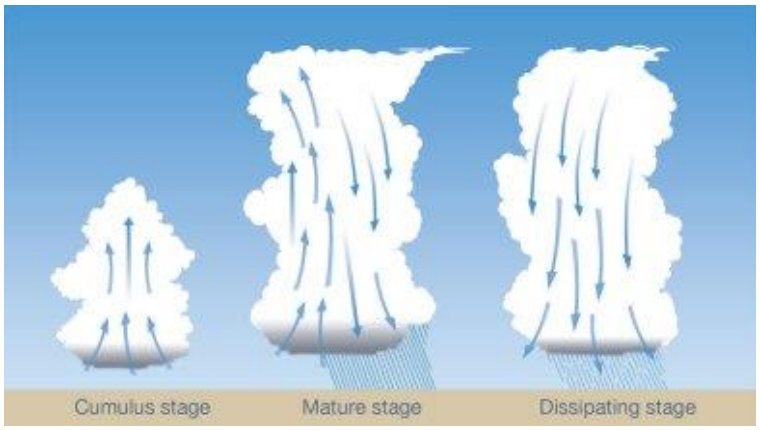
Natural Hazard: **Severe Thunderstorm**

Hazard Description

This section provides general and historical information about thunderstorms, including high wind, lightning, and hail. Other elements of thunderstorms, such as tornadoes and flooding, are addressed in their own sections.

Thunderstorms are formed when moist air near the earth's surface is forced upward through some catalyst (convection or frontal system). As the moist air rises, the air condenses to form clouds. Because condensation is a warming process, the cloud continues to expand upward. When the initial updraft is halted by the upper troposphere, both the anvil shape and a downdraft form. This system of up-drafting and down-drafting air columns is termed a "cell."

As the process of updrafts and downdrafts feeds the cell, the interior particulates of the cloud collide and combine to form rain and hail, which falls when the formations are heavy enough to push through the updraft. The collision of water and ice particles within the cloud creates a large electrical field that must discharge to reduce charge separation. This discharge is the lightning that occurs from cloud to ground or cloud to cloud in the thunderstorm cell. In the final stage of development, the updraft weakens as the downdraft-driven precipitation continues until the cell dies.



Each thunderstorm cell can extend several miles across its base and to reach 40,000 feet in altitude. Thunderstorm cells may compound and move abreast to form a squall line of cells, extending farther than any individual cell's potential.

In terms of temporal characteristics, thunderstorms exhibit no true seasonality in that occurrences happen throughout the year. Convectively, driven systems dominate the summer while frontal driven systems dominate during the other seasons. The rate of onset is rapid in that a single cell endures only 20 minutes.

However, various cells in different stages of development may form a thunderstorm that lasts up to a few hours as it moves across the surface.

In terms of magnitude, the National Weather Service defines thunderstorms in terms of severity as a severe thunderstorm that produces winds greater than 57 mph and/or hail of at least 1 inch in diameter and/or a tornado. The National Weather Service chose these measures of severity as parameters more capable of producing considerable damage. Therefore, these are measures of magnitude that may project intensity.

Lightning

Lightning occurs when the difference between the positive and negative charges of the upper layers of the cloud and the earth's surface becomes great enough to overcome the resistance of the insulating air. The current flows along the forced conductive path to the surface (in cloud to ground lightning) and reaches up to 100 million volts of electrical potential. In Georgia, lightning strikes peak in July, with June and August being second highest in occurrence.

Hail

Hail is a form of precipitation that forms during the updraft and downdraft-driven turbulence within the cloud. The hailstones are formed by layers of accumulated ice (with more layers creating larger hailstones) that can range from the size of a pea to the size of a grapefruit. Hailstones span a variety of shapes but usually take a spherical form. Hailstorms mostly endanger cars but have been known to damage aircraft and structures.

Hazard Profile

Severe thunderstorms, including high winds, hail, and lightning, are a serious threat to the residents and infrastructure of Columbus-Muscogee County. Severe thunderstorms are one of the most frequently occurring natural hazard in Columbus-Muscogee County. Many of these storms include high winds, lightning, and hail. Hail up to 2.0 inches was recorded in Columbus-Muscogee County on several occasions, most recently in 2013. Thunderstorm winds of 100 mph have been reported in Columbus-Muscogee County, with the most recent occurring in 1974. While there have been dozens of documented thunderstorm events affecting Columbus-Muscogee County over the last 50 years, it is likely that the official number is a low estimate due to poor record keeping in decades past. For example, only 54 thunderstorm events were recorded between 1974 and 1993, likely a vast underestimation of actual events.

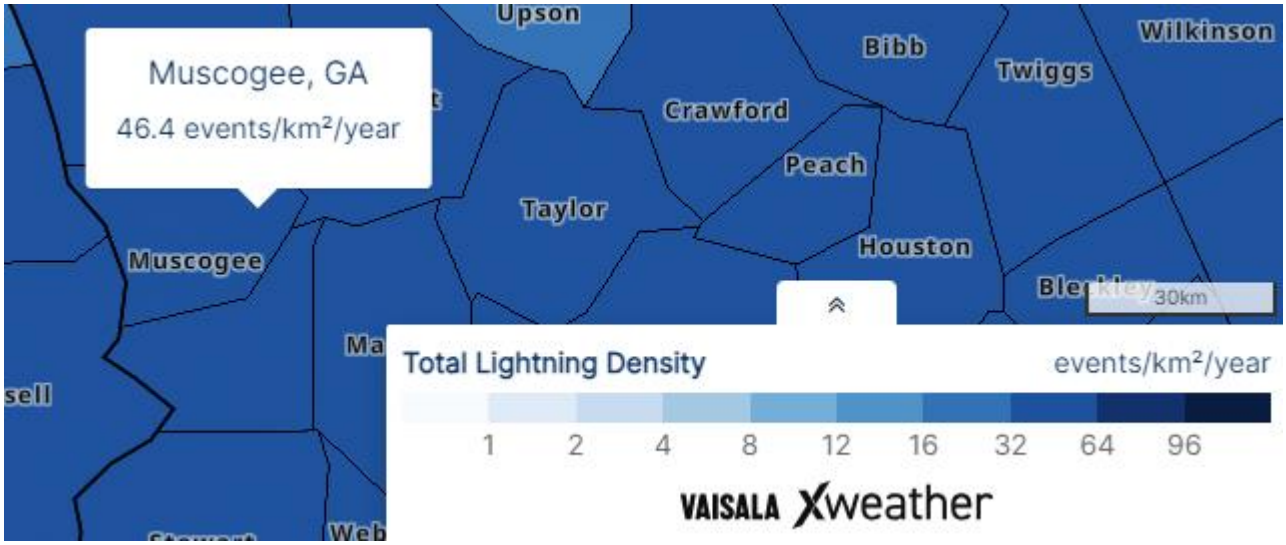
Most of the available information relating to severe thunderstorm events in Columbus-Muscogee County fails to describe damage estimates in any detail. With each thunderstorm event, there are likely unreported costs related to infrastructure costs, public safety response costs, utility repair costs, and personal home and business repair costs. Thunderstorms have occurred during all parts of the day and night and in every month in Columbus-Muscogee County.

The Columbus Consolidated Government Hazard Mitigation Plan Update Committee utilized data from the National Climatic Data Center, the National Weather Service, numerous weather-related news articles, and the Columbus Consolidated Government LEOP in researching severe thunderstorms and their potential impacts on the county. All information has been gathered on a countywide basis. All thunderstorm hazard data included for Columbus-Muscogee County is limited to countywide data.

During the last 50 years, 203 thunderstorm events were recorded in Columbus-Muscogee County, with 149 of those occurring in the last 30 years. This number includes 44 hail events and only 6 lightning reports. According to these records, Columbus-Muscogee County has a 1.4% daily chance of a thunderstorm event based upon data from the last 30 years. Over the last 10 years, Columbus-Muscogee County has averaged 5.2 thunderstorm events per year (52 events). Due to improved record keeping protocols, the Columbus Consolidated Government Hazard Mitigation Plan Update Committee believes the data from the last ten years provides a more accurate representation of the thunderstorm threat to the county.

Hailstone size	Measurement		Updraft Speed	
	in.	cm.	mph	km/h
bb	< 1/4	< 0.64	< 24	< 39
pea	1/4	0.64	24	39
marble	1/2	1.3	35	56
dime	7/10	1.8	38	61
penny	3/4	1.9	40	64
nickel	7/8	2.2	46	74
quarter	1	2.5	49	79
half dollar	1 1/4	3.2	54	87
walnut	1 1/2	3.8	60	97
golf ball	1 3/4	4.4	64	103
hen egg	2	5.1	69	111
tennis ball	2 1/2	6.4	77	124
baseball	2 3/4	7.0	81	130
tea cup	3	7.6	84	135
grapefruit	4	10.1	98	158
softball	4 1/2	11.4	103	166

The Columbus Consolidated Government Hazard Mitigation Plan Update Committee has also determined that the lightning threat is severely under-reported, as shown in the NCDC data numbers. As indicated by the below graphics, Columbus-Muscogee County averages 46.4 flashes of cloud to ground lightning per square kilometer per year. That equals a 12.7% chance of a cloud-to-ground lightning strike on any given day. This shows a much higher indication of lightning occurrences than has been reported to the National Weather Service and the National Climatic Data Center. It is the determination of the Columbus Consolidated Government Hazard Mitigation Plan Update Committee that this data shows a more accurate representation of the scope of the threat that lightning poses to the citizens and infrastructure of Columbus-Muscogee County.



Severe thunderstorm winds, which are defined as winds of at least 58 mph in conjunction with a convective event, have occurred with many thunderstorms that have affected Columbus-Muscogee County. These winds can exceed 100 mph and cause damage comparable to weak tornadoes.

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

Assets Exposed to the Hazard

In evaluating assets that are susceptible to severe thunderstorms, the Columbus Consolidated Government HMPC determined that all public and private property is at threat by severe thunderstorms, including all critical facilities. This is due to the lack of spatially prejudice of severe thunderstorm events.

Estimated Potential Losses

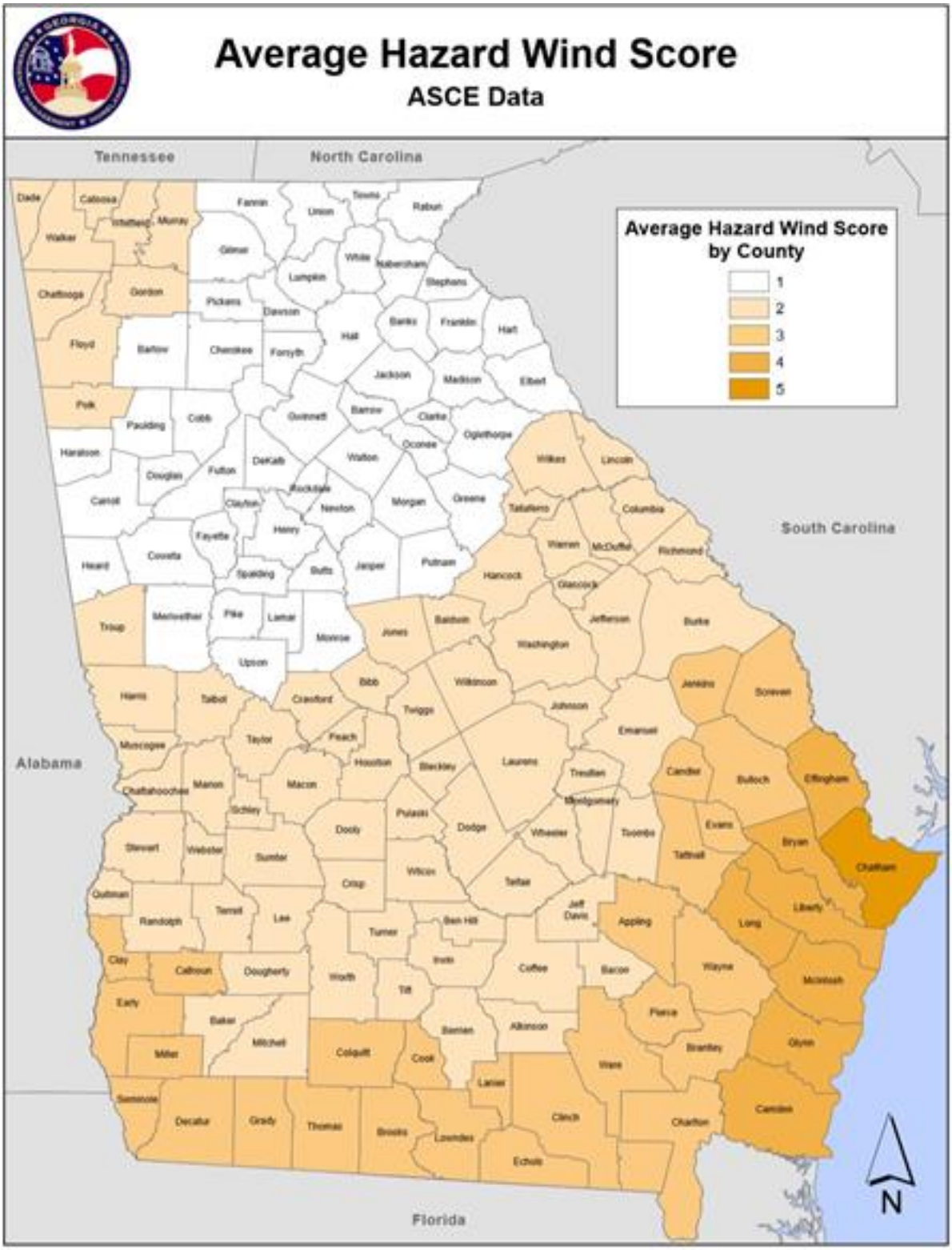
Estimates of damage for the past events of the last 50 years are over $7.4 million, or $148,880 annually. However, all estimated damages reported have occurred over the last 30 years. When extrapolated over 30 years, the annual average increases significantly to $248,133. These numbers are thought to be a gross underestimation of actual past damages. According to the National Risk Index, Columbus-Muscogee County has an estimated annual loss of $1,603,750 for lightning, hail, and strong winds.

Land Use & Development Trends

Columbus-Muscogee County currently has no land use trends related to Thunderstorms beyond continued population growth – particularly in the northern areas near the Harris County line.

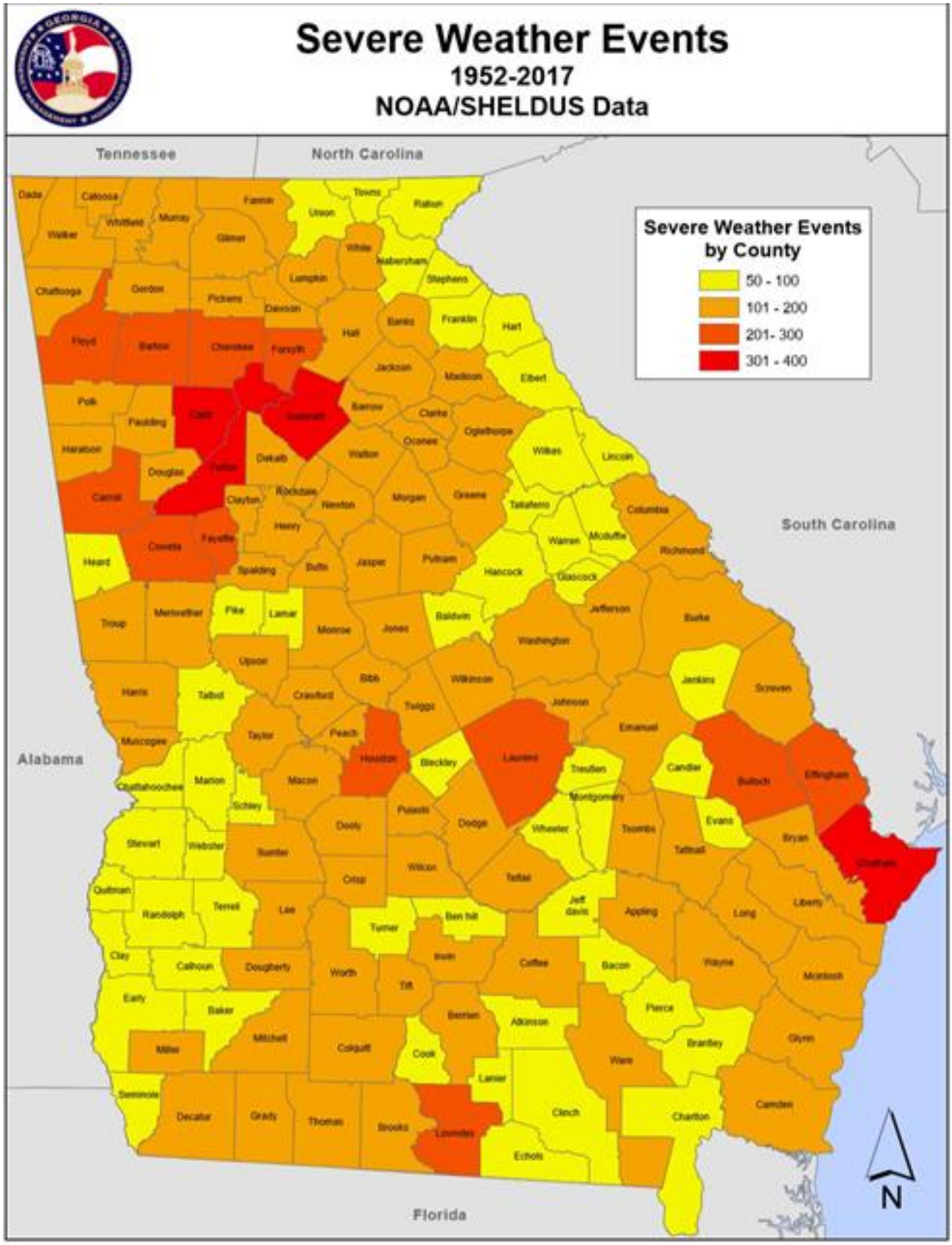
Multi-Jurisdictional Considerations

Thunderstorm events have occurred across all areas of Columbus-Muscogee County. Property damage numbers would be highest in more heavily populated areas due to greater population density. Thunderstorms have the potential to impact all areas of Columbus-Muscogee County.



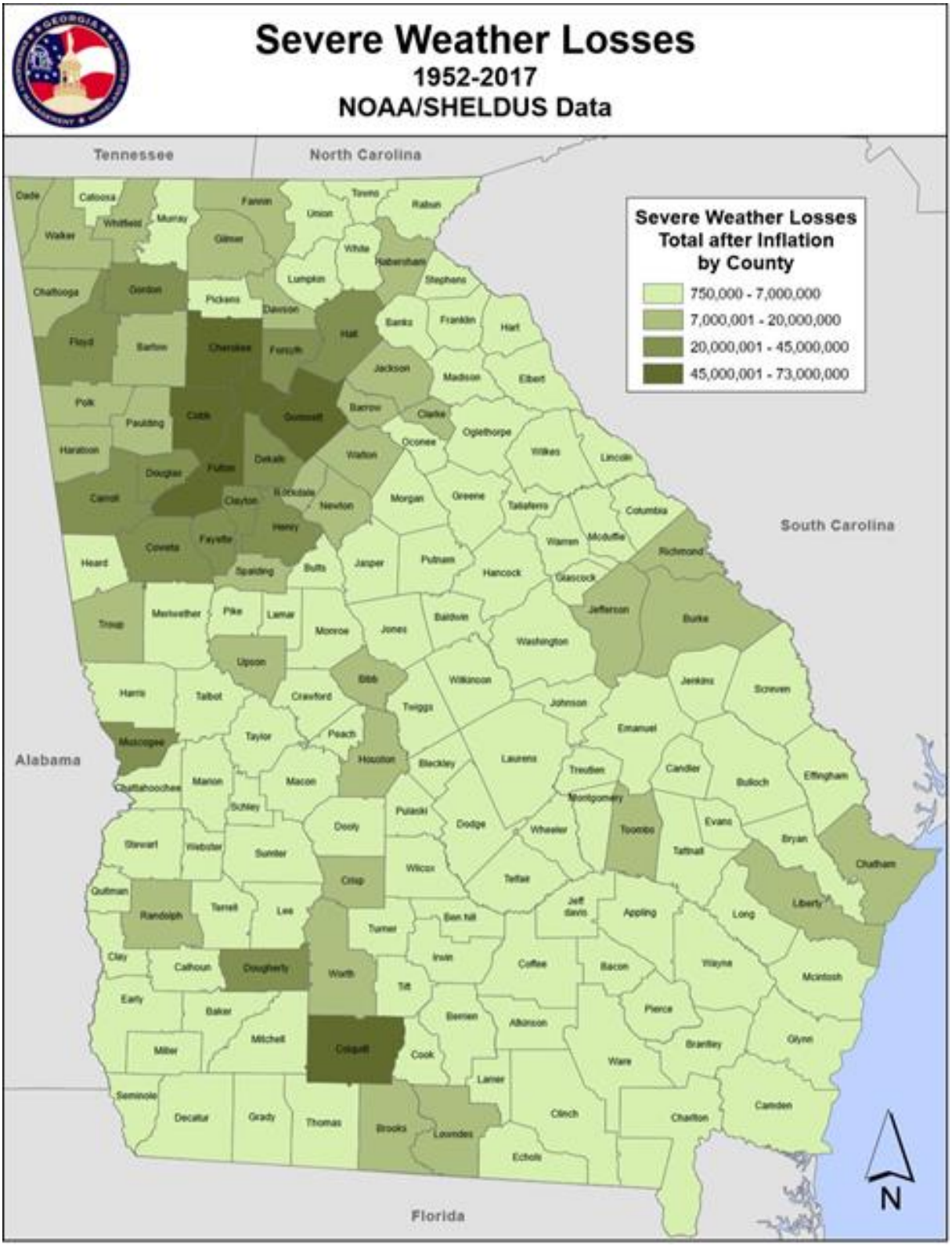
Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan

Natural Hazard: **Severe Thunderstorm**



Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan

Natural Hazard: **Severe Thunderstorm**



Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan

Natural Hazard: **Severe Thunderstorm**

Climate Change Considerations

How climate change impacts severe thunderstorms in Columbus-Muscogee County in the future has yet to be determined. It is possible that severe thunderstorms could increase, decrease, or remain the same in frequency and/or increase, decrease, or remain the same in severity.

Hazard Summary

Thunderstorm events pose one of the greatest threats of property damage, injuries, and loss of life in Columbus-Muscogee County. Thunderstorm events are the most frequently occurring weather event that threatens Columbus-Muscogee County. As a result, the Columbus Consolidated Government HMPC recommends that the mitigation measures identified in this plan for thunderstorms should be aggressively pursued due to the frequency of this hazard and the ability for this hazard to affect any part of Columbus-Muscogee County.

Thunderstorm Events Since 2018 in Columbus-Muscogee County

Location	County/Zone	St.	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
FLAT ROCK	MUSCOGEE CO.	GA	06/21/2018	17:00	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
WYNNTON	MUSCOGEE CO.	GA	06/22/2018	19:10	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	02/12/2019	13:26	Thunderstorm Wind	50 kts. EG	0	0	6.00K	0.00K
BIBB CITY	MUSCOGEE CO.	GA	06/07/2019	14:36	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	07/05/2019	14:10	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	01/11/2020	17:13	Thunderstorm Wind	45 kts. EG	0	0	1.00K	0.00K
BAKER VILLAGE	MUSCOGEE CO.	GA	06/10/2020	16:20	Thunderstorm Wind	45 kts. EG	0	0	1.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	07/12/2020	16:38	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
SCHATULGA	MUSCOGEE CO.	GA	07/25/2020	17:05	Hail	1.00 in.	0	0	0.00K	0.00K
ALLENDALE	MUSCOGEE CO.	GA	07/25/2020	17:11	Thunderstorm Wind	50 kts. EG	0	0	4.00K	0.00K
ALLENDALE	MUSCOGEE CO.	GA	07/25/2020	17:20	Thunderstorm Wind	52 kts. MG	0	0	0.00K	0.00K
ALLENDALE	MUSCOGEE CO.	GA	08/03/2020	15:05	Thunderstorm Wind	50 kts. EG	0	0	12.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/12/2020	16:54	Thunderstorm Wind	45 kts. EG	0	0	1.00K	0.00K

DOUBLE CHURCHES	MUSCOGEE CO.	GA	06/11/2021	15:33	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/27/2021	15:30	Thunderstorm Wind	45 kts. EG	0	0	1.00K	0.00K
FORTSON	MUSCOGEE CO.	GA	08/10/2021	13:55	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
WYNNTON	MUSCOGEE CO.	GA	12/11/2021	16:23	Thunderstorm Wind	39 kts. EG	0	0	1.00K	0.00K
GREEN IS HILLS	MUSCOGEE CO.	GA	12/30/2021	15:58	Hail	1.00 in.	0	0	0.00K	0.00K
NANKIPOOH	MUSCOGEE CO.	GA	12/30/2021	16:00	Hail	1.00 in.	0	0	0.00K	0.00K
FLAT ROCK	MUSCOGEE CO.	GA	12/30/2021	16:03	Hail	1.00 in.	0	0	0.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	12/30/2021	16:14	Hail	1.00 in.	0	0	0.00K	0.00K
ALTA VISTA	MUSCOGEE CO.	GA	12/30/2021	16:15	Hail	1.75 in.	0	0	0.00K	0.00K
FOXRUN	MUSCOGEE CO.	GA	04/06/2022	16:00	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	06/15/2022	17:35	Hail	1.00 in.	0	0	0.00K	0.00K
GLENNS	MUSCOGEE CO.	GA	08/07/2022	16:53	Thunderstorm Wind	57 kts. MG	0	0	0.00K	0.00K
WYNNTON	MUSCOGEE CO.	GA	08/10/2022	15:10	Thunderstorm Wind	43 kts. EG	0	0	1.00K	0.00K
BAKER VILLAGE	MUSCOGEE CO.	GA	03/26/2023	15:54	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
BROOKHAVEN	MUSCOGEE CO.	GA	03/26/2023	15:55	Hail	1.00 in.	0	0	0.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	03/26/2023	16:16	Hail	1.25 in.	0	0	0.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	03/26/2023	16:21	Hail	1.50 in.	0	0	0.00K	0.00K
BEAVER RUN	MUSCOGEE CO.	GA	06/14/2023	12:20	Thunderstorm Wind	43 kts. EG	0	0	1.00K	0.00K
GLENNS	MUSCOGEE CO.	GA	06/25/2023	19:48	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	06/30/2023	15:15	Thunderstorm Wind	39 kts. EG	0	0	1.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	07/21/2023	18:54	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
(CSG)COLUMBUS METRO	MUSCOGEE CO.	GA	07/30/2023	13:57	Thunderstorm Wind	43 kts. EG	0	0	1.00K	0.00K

Natural Hazard: **Winter Storm**

Hazard Description

Severe winter storms bring the threat of ice and snow. There are many types of frozen precipitation that could create a severe winter weather event. Freezing rain consists of super cooled falling liquid precipitation freezing on contact with the surface when temperatures are below freezing. This results in an ice glazing on exposed surfaces including buildings, roads, and power lines. Sleet is easily discernable from freezing rain in that the precipitation freezes before hitting the surface. Often this sleet bounces when hitting a surface and does not adhere to the surface. However, sleet can compound into enough depths to pose some threat to motorists and pedestrians.

A heavy accumulation of ice, which is often accompanied by high winds, can devastate infrastructure and vegetation. Destructiveness in the southern states is often amplified due to the lack of preparedness and response measures. Also, the infrastructure was not designed to withstand certain severe weather conditions such as weight build-up from snow and ice. Often, sidewalks and streets become extremely dangerous to pedestrians and motorists. Primary industries, such as farming and fishing, suffer losses through winter seasons that produce extreme temperatures and precipitation.

Within Georgia, the impacts of winter storms are often contained within the northern part of the State. However, events like the 1993 "storm of the century" illustrated the vast impacts that one storm can have on the entire state. The winter storms with the greatest impacts on Georgia are the result of coastal storms coming up from the Gulf of Mexico, including the winter storms in 1973 and 1993. The 1973 storm produced snowfalls of up to 19 inches in parts of Central Georgia including the City of Thomaston in Upson County. Also, a major ice storm occurred in 2014, bringing up to 1 inch of ice to the eastern portion of the State near Augusta.

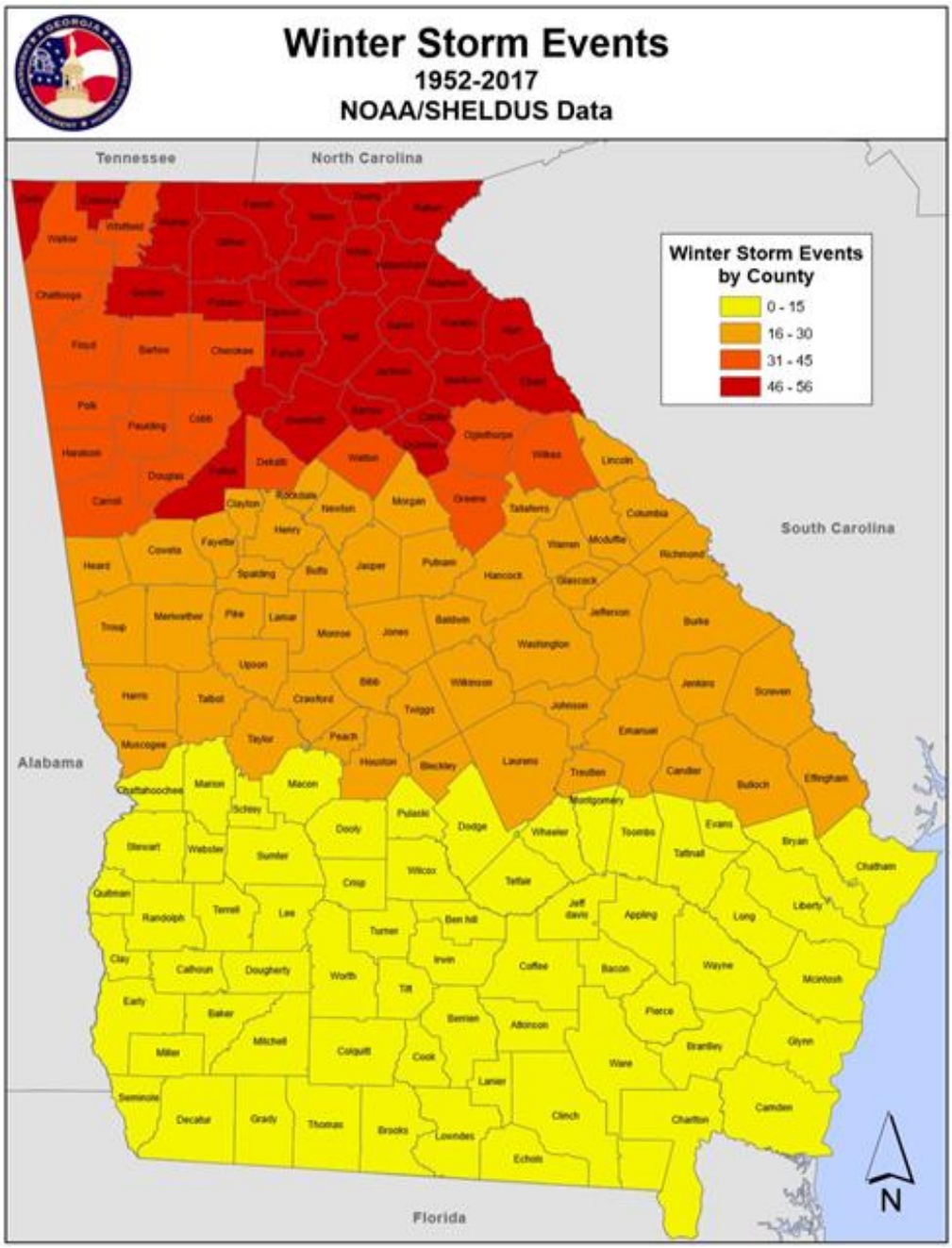
Severe winter weather exhibits seasonal qualities in that most occur within the months of January to March, with the highest probability of occurrence in February. The rate of onset and duration varies from storm to storm, depending on the weather system driving the storm. Severe winter weather rarely frequents the State of Georgia. However, the impacts of the storms substantiate severe winter weather's inclusion in the risk assessment.

Hazard Profile

While winter storms are not as frequent of an occurrence in Columbus-Muscogee County as they are in areas in the Northern US, they still have the potential to wreak havoc on the community when they do occur. Winter storms in Columbus-Muscogee County typically cause drastic damage to infrastructure, such as roads, power lines, and bridges.

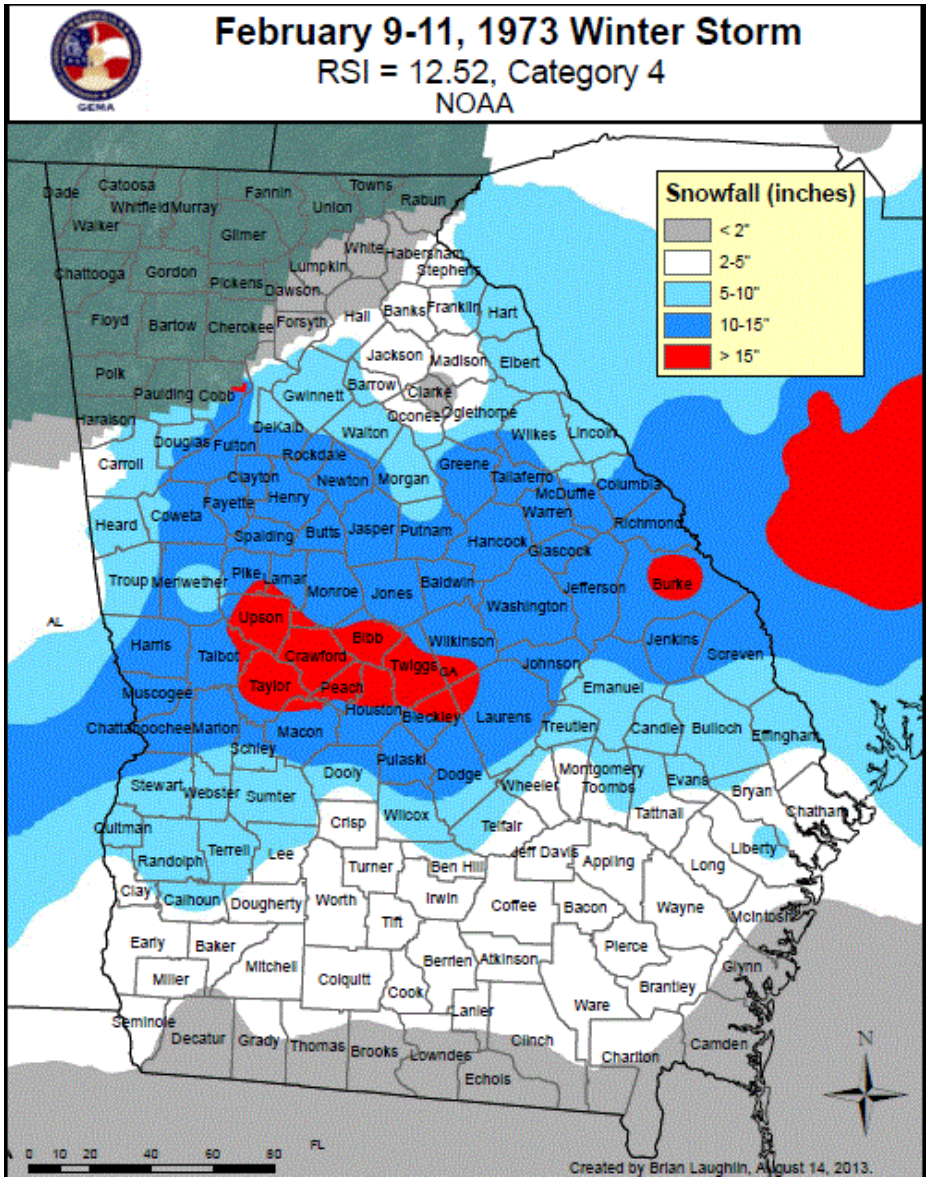
Winter storms can also cause damage to private property, businesses, and trees throughout the county. The large number of trees in Columbus-Muscogee County can become a hazard when the tree limbs become weighed down with snow and ice and begin to break and fall to the ground, potentially damaging private property, public property, or injuring people and animals.

During the past twenty years, documentation exists for 9 winter storm events in Columbus-Muscogee County. This equates to a winter storm every 2.2 years in Columbus-Muscogee County. No consolidated data can be located prior to this timeframe. All winter storm data has been gathered on a countywide basis. For additional historical data, please see Appendix D. All winter storm hazard data included for Columbus-Muscogee County is limited to countywide data.



Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan

Individual events of Winter Weather can be drastically different depending on many factors, including the duration of the event, the type of precipitation involved, and the depth of the precipitation. Winter Storm events can be a light dusting of snow, ¼ inch of ice, or over a foot of snow. During the 1973 snow event, parts of Columbus-Muscogee County reported over 15 inches of snow and all areas received at least 10 inches of snow. Ice event are another type of winter storm that has impacted Columbus-Muscogee County in the past. These types of winter storms can be particularly crippling due to the increased threat of tree falls related to the weight of accumulated ice and subsequent utility infrastructure failure.



Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan

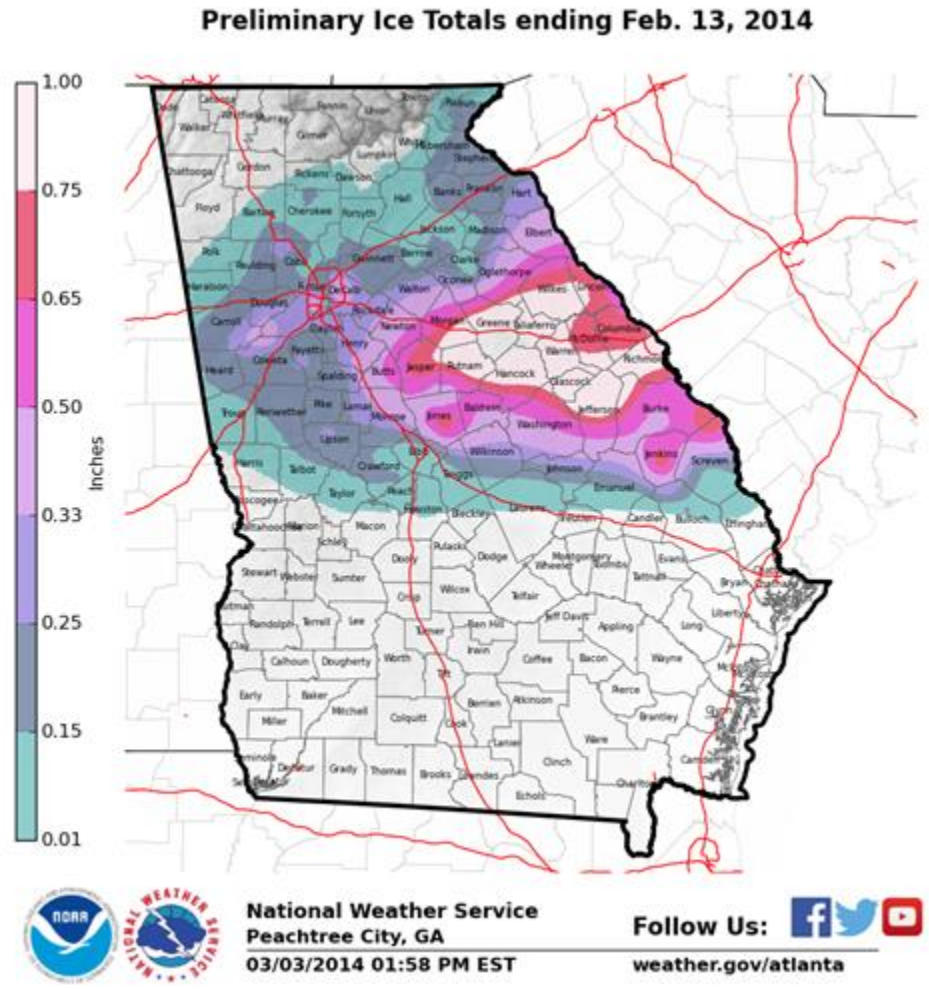
During the 2005 Ice Storm event, parts of eastern Columbus-Muscogee County received up to 0.5 inch of ice. Approximately 7,000 residents were without power as a result of this event, which brought down numerous trees throughout the jurisdiction.

Assets Exposed to the Hazard

Since winter storms are indiscriminate regarding location, the Columbus Consolidated Government HMPC determined that all public and private property, including all critical infrastructure, are susceptible to impacts from winter storms. Areas with higher concentrations of tree coverage would likely see more direct impacts due to fallen limbs and trees.

Estimated Potential Losses

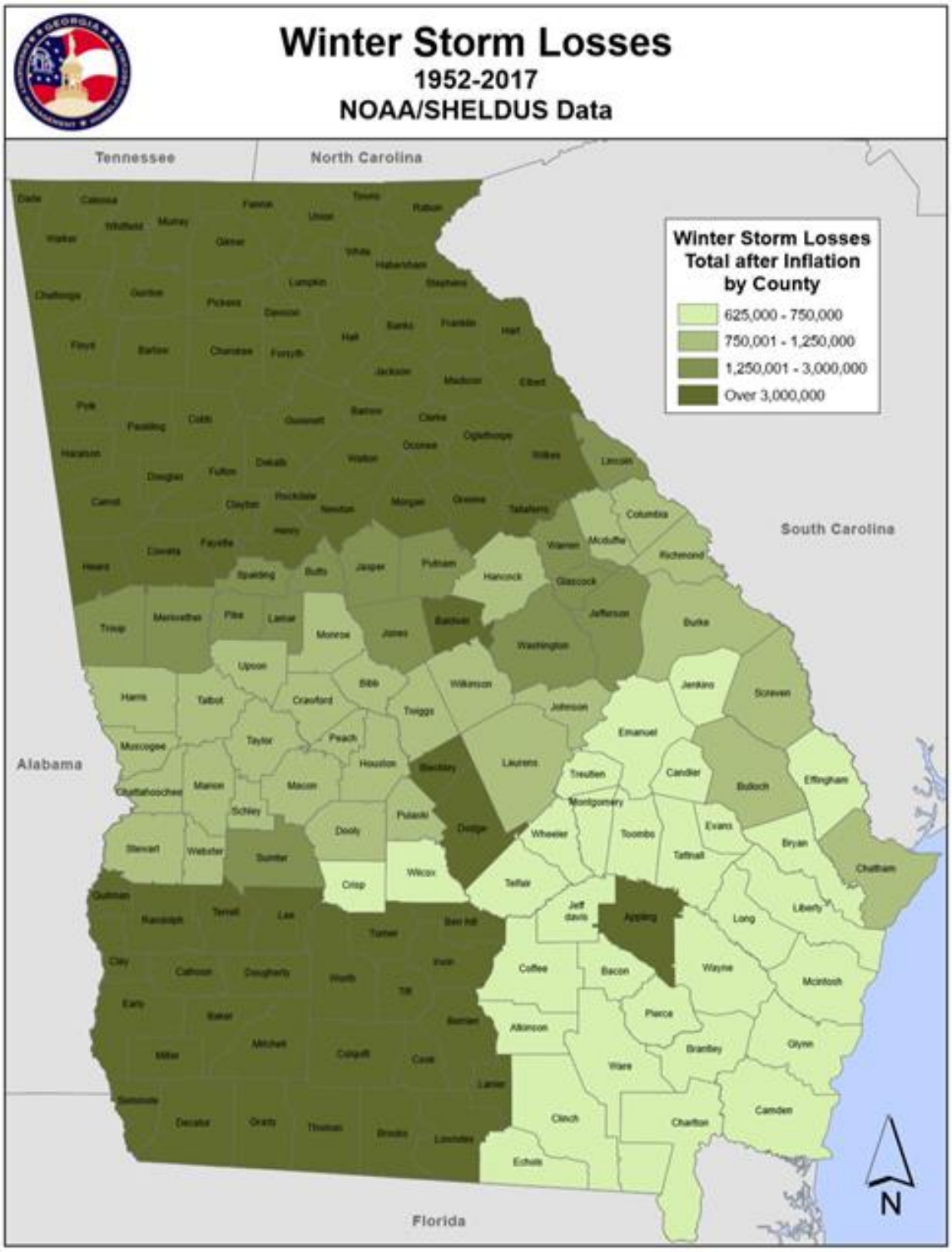
Over the last 50 years, over $150,000 in damages have been reported in Columbus-Muscogee County from winter storm events. This equates to $3,060 annually in damages. However, all reported damages have been from the last 20 years. When extrapolated over 20 years, the annual damage amount more than doubles to $7,650. However, this is likely a gross underestimation of the damages winter storms have caused in Columbus-Muscogee County in the past. According to the National Risk Index, Columbus-Muscogee County has an estimated annual loss of $121,010 related to severe winter weather.



Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan

Land Use & Development Trends

Columbus-Muscogee County currently has no land use trends related to Winter Storms beyond continued population growth – particularly in northern areas of Columbus-Muscogee County near the Harris County line.



Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan

Assets Exposed to the Hazard

Since winter storms are indiscriminate regarding location, the Columbus Consolidated Government HMPC determined that all public and private property, including all critical infrastructure, are susceptible to impacts from winter weather.

Multi-Jurisdictional Considerations

All portions of Columbus-Muscogee County could potentially be impacted by a winter storm, including freezing rain, sleet, and snow. Therefore, all mitigation actions identified regarding winter storms should be pursued on a countywide basis.

Climate Change Considerations

How climate change impacts winter storms in Columbus-Muscogee County in the future has yet to be determined. It is possible that winter storms could increase, decrease, or remain the same in frequency and/or increase, decrease, or remain the same in severity.

Hazard Summary

Winter storms, which can include freezing rain, sleet, or snow, typically afford communities some advance warning, which is different from many other severe weather phenomena. The National Weather Service issues winter storm watches, advisories, and warnings as much as a day before the storm's impacts begin. Unfortunately, communities in the Southern United States are not equipped to handle winter storms due to their relative infrequent nature. Oftentimes, communities can face severe impact from these storms. The Columbus Consolidated Government HMPC recognizes the potential threats winter storms could have on the community and have identified specific mitigation actions as a result.

Winter Storm Events since 2018 in Columbus-Muscogee County

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	01/17/2018	01:00	EST-5	Winter Storm		0	0	0.00K	0.00K

Natural Hazard: **Flooding**

Requirement §201.6(c)(2)(ii)

Requirement §201.6(c)(3)(ii)

Hazard Description

Flooding is a temporary overflow of water on normally dry lands adjacent to the source of water, such as a river, stream, or lake. The causes of flooding include mass sources of precipitation, such as tropical cyclones, frontal systems, and isolated thunderstorms combined with other environmental variables, such as changes to the physical environment, topography, ground saturation, soil types, basin size, drainage patterns, and vegetative cover. Adverse impacts may include structural damages, temporary backwater effects in sewers and drainage systems, death of livestock, agricultural crop loss, loss of egress and access to critical facilities due to roads being washed-out or over-topped and unsanitary conditions by deposition of materials during recession of the floodwaters.

Floods are loosely classified as either coastal or riverine. Coastal flooding occurs when normally dry, low-lying land is flooded by sea water. Coastal flooding is usually associated with tropical cyclones in Georgia. Riverine flooding occurs from inland water bodies such as streams and rivers. Riverine flooding is often classified based on rate of onset. The first is slow to build, peak, and recede, often allowing enough time for evacuations. The other type of riverine flood is referred to as a "flash" flood, which rapidly peaks and recedes, thus giving insufficient time for evacuations. Flash floods are typically considered the most dangerous of these types.

On a broad scale, flooding can occur around any body of water or low-lying surface given enough precipitation or snowmelt. The spatial extent of the flooding event depends on the amount of water overflow but can usually be mapped because of existing floodplains (areas already prone to flooding).

Flooding in Georgia is highly dependent on precipitation amounts and is highly variable. Certain seasons are more prone to flooding to a greater likelihood of excessive precipitation. Typically, the wet seasons are during the winter, early spring, and midsummer. Late spring and fall are usually drier seasons.

Hazard Profile

The Columbus Consolidated Government HMPC researched flooding information for the last fifty years. The main sources of information used by the Columbus Consolidated Government HMPC came from the National Climatic Data Center, the Columbus Consolidated Government Emergency Operations Plan, and news media sources. It was determined that flooding has caused significant damage on many occasions over the last 25 years.

One significant flooding event that affected Columbus-Muscogee County occurred in 2005. This event caused over $50,000 in reported damages according to the National Climactic Data Center. During this event, a flash flooding initial event occurred with approximately 3 inches of rain falling in a 90-minute period. Most notably, a home on Flintlock Drive was flooded with over 1 foot of water due to an overwhelmed storm drain. Overall, Columbus-Muscogee County has had over $375,000 in damages from flooding events in the last 25 years. Extrapolated over 25 years, the equates to $15,100 in annual damages. While data was collected for the entire 50-year timeframe, little information was available regarding flood events prior to 1996, possibly due to poor record keeping. All flood data was gathered on a countywide basis.

Natural Hazard: **Flooding**

Flood events within Columbus-Muscogee County are typically associated with areas of special flood hazard as identified on Flood Rate Insurance Maps (FIRMs) published by FEMA. With each flooding event, it is likely that significant costs arose related to road repair, infrastructure repair, and public safety response operations. Most of the flood damage in Columbus-Muscogee County's history appears to be related to roads and culverts washing out because of flood waters. Columbus-Muscogee County's significant elevation changes also increases the impact of short duration, heavy rain events leading to flash flooding.

Columbus-Muscogee County has one flood gage that provide recent historical data and potential flood levels. One such gage is located along the Chattahoochee River at 14th Street. At 27 feet, flood stage is reached and minor flooding occurs along the banks north and south of the 14th Street bridge. At 28 feet, portions of the River Walk in Columbus would be flooded with up to 1 foot of water and would be closed to the public. At 30 feet, large portions of the River Walk in Columbus would flood, some places with up to 3 feet of water. Water would reach the top of the boat ramp at the Columbus Convention and Trade Center at this point. At 32 feet, water reaches the maintenance doors underneath the Columbus Convention and Trade Center. At 35 feet, the Columbus River Walk would be under 8 feet of flowing water and a maintenance room in the Columbus Convention and Trade Center would be inundated with up to 3 feet of water. At 36 feet, the bathrooms at the Columbus River Walk would begin to flood. At 42 feet, moderate flood level is reached. The Columbus River Walk would be covered with up to 15 feet of flowing water. The Weracoba Creek will begin to back up and flood roads in south Columbus. At 44 feet, portions of Bay Avenue will begin to flood. Roads near Weracoba and Bull Creeks will flood. Some homes in low-lying areas near these two creeks will begin to flood. At 47 feet, major flood stage is reached. The Columbus River Walk would be covered with up to 20 feet of flowing water. Widespread inundation would occur on Bay Avenue and 14th Street. At 49 feet, damage to homes and businesses in Columbus would be widespread. Portions of the Colonial Park area would also begin to flood. At 52 feet, most bridges would be closed. Extensive flooding would impact homes and businesses near the Weracoba and Bull Creeks. Portions of Colonial Park would be under 5 feet of water. This gage has a recorded high water level of 55.2 feet, which occurred in March of 1929. In the last 50 years, the record is 39.95, which occurred in May of 2003.

There are 21 documented flood events over the last 50 years. Based on the 50-year record, it can be inferred that such an event is likely to occur every 2.4 years in Columbus-Muscogee County. This relates to a 42% chance of a flood event occurring in a given year. However, all identified flood events have occurred over the last 25 years. When extrapolated over 25 years, Columbus-Muscogee County has averaged a flood event every 1.2 years and has a 84% annual chance of a flood event of some magnitude occurring. For additional historical data, please see Appendix D.

Assets Exposed to the Hazard

To evaluate the assets that would potentially be impacted by flooding, the Columbus Consolidated Government HMPC attempted to identify known structures within, or close to, the 100-year floodplain. There are approximately 935 buildings identified in the flood plain.

Estimated Potential Losses

The flooding events in Columbus-Muscogee County over the last 50 years have led to over $375,000 in damages. Extrapolated over 50 years, this results in an annual average of $7,550 per year. However, all reported damages have occurred in the last 25 years. As a result, the average over the last 25 years is

$15,100 annually. These estimations are believed to be a gross underestimation of both prior and potential damages from flood events. Based upon the estimations from the 2024 Columbus-Muscogee County HAZUS Report, a flood equivalent to the 1% riverine flood levels could result in estimated losses of more than $38 million (935 buildings). However, it is possible that some areas may not experience total losses while others not designated in the 1% annual risk areas may be inundated with flood water. According to the National Risk Index, Columbus-Muscogee County has an estimated annual loss of $451,933 related to Riverine Flooding events.

Land Use & Development Trends

The Columbus Consolidated Government participates in the National Flood Insurance Program (NFIP) and follows the program's guidelines to ensure future development is carried out in the best interests of the public. The Columbus Consolidated Government (CID No. 135158B) first entered the NFIP on October 30, 1970. According to the NFIP guidelines, the County has executed a Flood Damage Prevention Ordinance. This ordinance attempts to minimize the loss of human life and health as well as minimize public and private property losses due to flooding. The ordinance requires any potential flood damage be evaluated at the time of initial construction and that certain uses be restricted or prohibited based on this evaluation. The ordinance also requires that potential homebuyers be notified that a property is located in a flood area. In addition, all construction must adhere to the Georgia State Minimum Standard Codes and the International Building Codes, which is the 2018 International Building Codes.

The provisions of the Columbus Consolidate Government Flood Damage Prevention codes are located in Chapter 8, Article 5 of the Columbus Consolidated Government Code of Ordinances. Administration of the provisions of the ordinance is the responsibility of the Director of Engineering. The duties and responsibilities of the administrator of this ordinance are:

(1)Review proposed development to assure that the permit requirements of this ordinance have been satisfied.
(2)Review proposed development to assure that all necessary permits have been received from governmental agencies from which approval is required by Federal or State law, including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334. Require that copies of such permits be provided and maintained on file.
(3)Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding.
(4)When Base Flood Elevation data or floodway data have not been provided in accordance with Section 8.5.2.B, then the Director of Engineering shall obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other sources in order to administer the provisions of Section 8.5.4.
(5)Review and record the actual elevation in relation to mean sea level (or highest adjacent grade) of the lowest floor, including basement, of all new or substantially improved structures in accordance with Section 8.5.3.B(2).
(6)Review and record the actual elevation, in relation to mean sea level to which any new or substantially improved structures have been floodproofed, in accordance with 8.5.3.B(2).
(7)When floodproofing is utilized for a structure, the Director of Engineering shall obtain certification of design criteria from a registered professional engineer or architect in accordance with Section 8.5.3.B(1)(c) and Section 8.5.4.B(2) or D(2).
(8)Make substantial damage determinations following a flood event or any other event that causes damage to structures in flood hazard areas.

(9)Notify adjacent communities and the Georgia Department of Natural Resources prior to any alteration or relocation of a watercourse and submit evidence of such notification to the Federal Emergency Management Agency (FEMA).
(10)For any altered or relocated watercourse, submit engineering data/analysis within six months to the FEMA to ensure accuracy of community flood maps through the Letter of Map Revision process. Assure flood carrying capacity of any altered or relocated watercourse is maintained.
(11)Where interpretation is needed as to the exact location of boundaries of the Areas of Special Flood Hazard (for example, where there appears to be a conflict between a mapped boundary and actual field conditions) the Director of Engineering shall make the necessary interpretation. Any person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in this ordinance.
(12)All records pertaining to the provisions of this ordinance shall be maintained in the office of the Director of Engineering and shall be open for public inspection.

For the substantial damage portion of the flood prevention ordinance, the floodplain administrator will utilize tax assessor's data to determine market value for all damaged structures. Substantial damage will be determined by assessing whether the repairs needed to bring a structure back to pre-damage conditions exceeds 50% of the market value of the structure. If so, then the structure will be determined to be of "substantial damage." This determination will be communicated to the property owners and any appeals will be held in accordance with established appeals procedures for permit applications. Once appeals are resolved, permitting will commence and inspections will occur as normally scheduled. Any technical assistance needed will be requested from the State of Georgia and/or the Federal Emergency Management Agency.

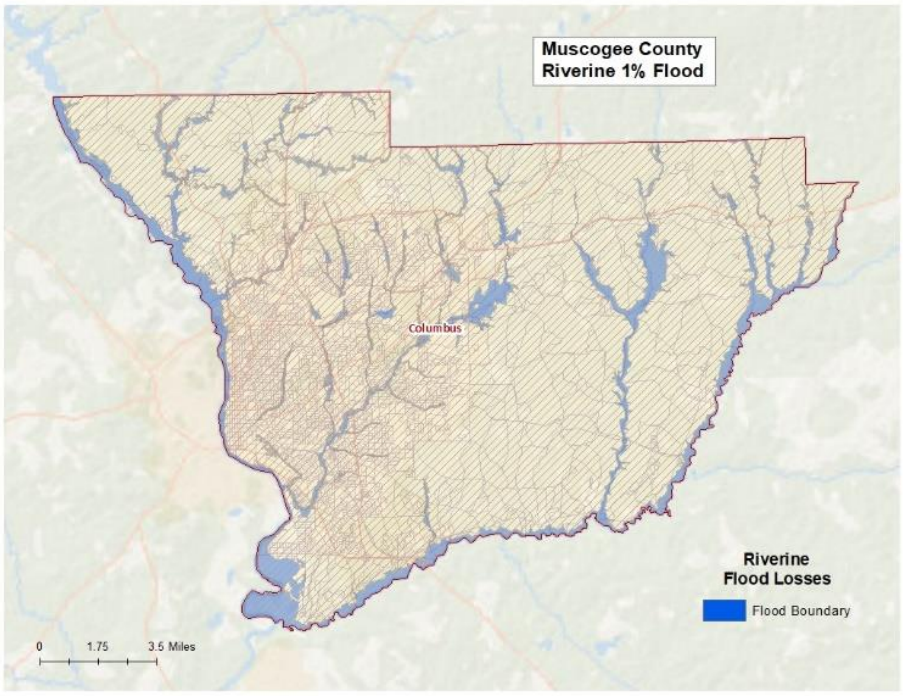
There are ten repetitive loss residential properties identified in Columbus-Muscogee County. These properties have a total repetitive loss of $669,542.98. Four of the Repetitive loss properties are NFIP insured. One of the repetitive loss properties has been mitigated. There is one residential property that has been designated as a severe repetitive loss and has a total repetitive loss of $317,583.47.

Multi-Jurisdictional Considerations

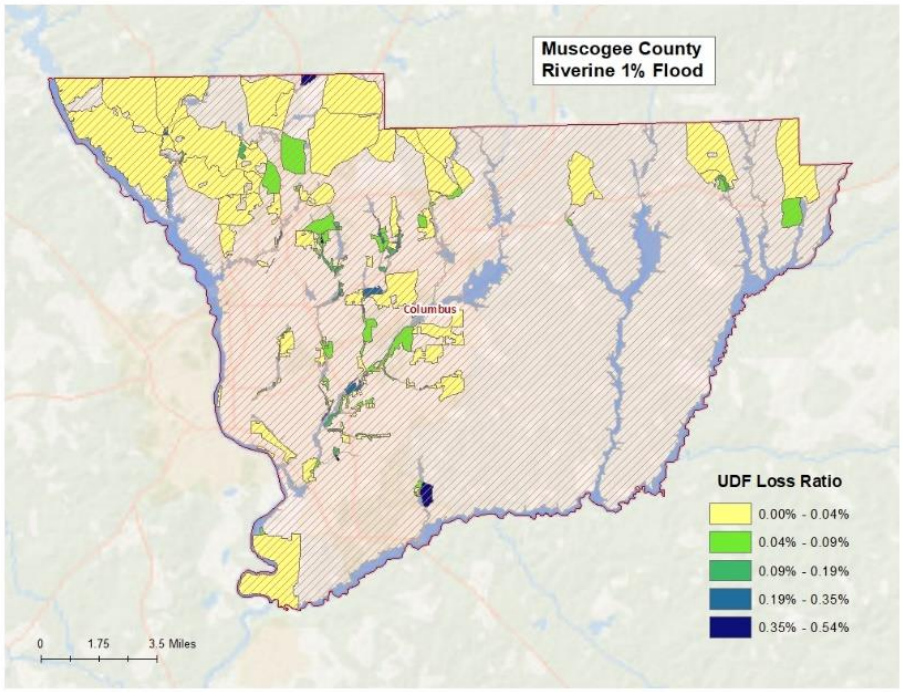
During a large-scale flood event, many portions of Columbus-Muscogee County would potentially be impacted by flooding. However, the area's most prone to flooding have historically been those areas located within the 100-year floodplain – particularly those areas along the Chattahoochee River, Bull Creek, Lindsay Creek, Weracoba Creek, Cooper Creek and Cooper Branch and their tributaries and distributaries. All of Columbus-Muscogee County could potentially be impacted.

Climate Change Considerations

Climate change could also play a role in the future of how flooding events impact Columbus-Muscogee County. According to the 2019-2024 Georgia Hazard Mitigation Strategy and Enhanced Plan, increased heavy rainfall events would likely lead to a greater threat of future flood and flash flood events in Columbus-Muscogee County.

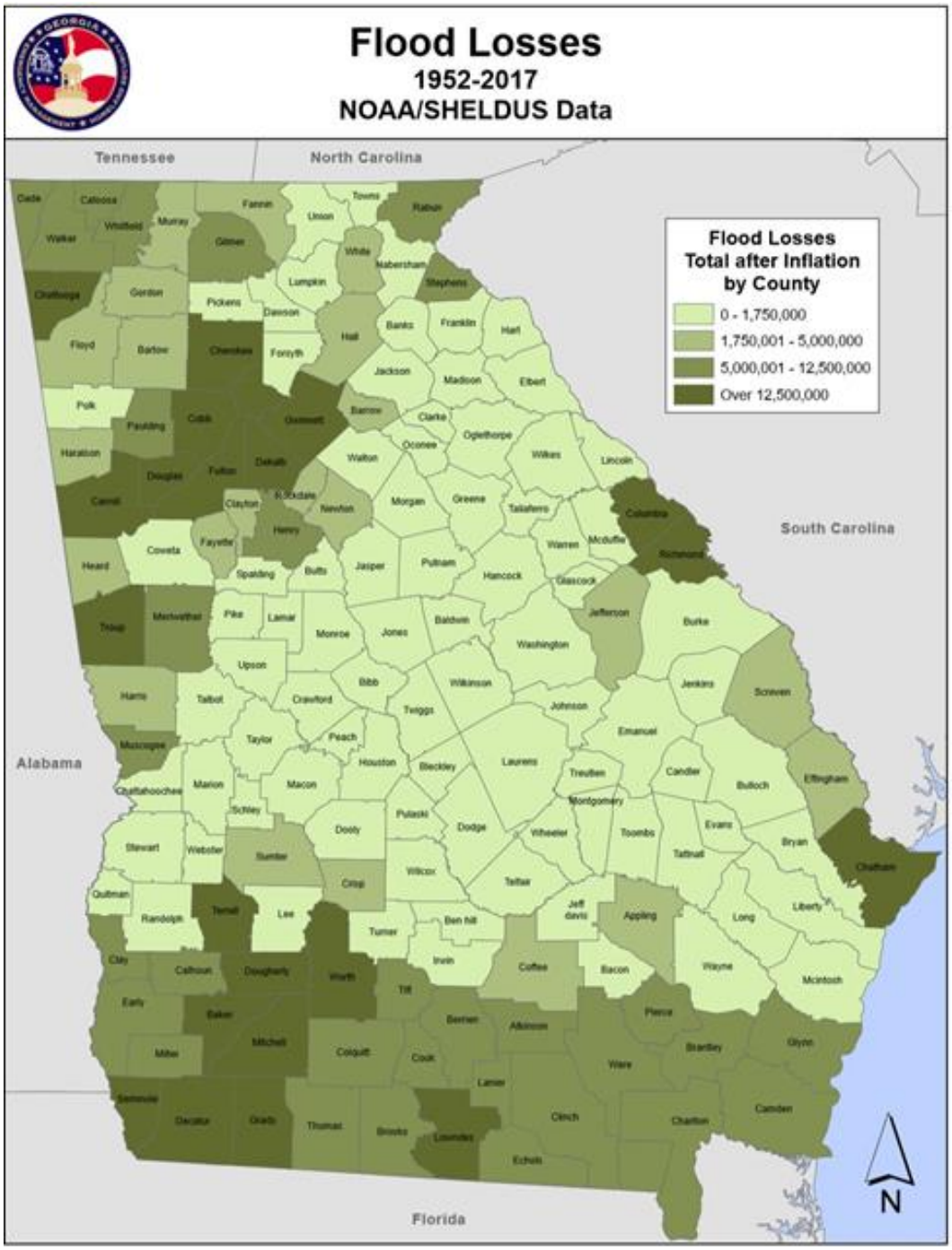


Source: 2024 Muscogee County HAZUS Report



Source: 2024 Muscogee County HAZUS Report

Natural Hazard: **Flooding**



Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan

Natural Hazard: **Flooding**

Hazard Summary

Flooding has the potential to inflict significant damage within Columbus-Muscogee County, particularly along the Chattahoochee River, Bull Creek, Lindsay Creek, Weracoba Creek, Cooper Creek and Cooper Branch. Mitigation of flood damage requires the community to be aware of flood-prone areas, including roads, bridges, and critical facilities. The Columbus Consolidated Government HMPC identified flooding as a hazard requiring mitigation measures and identified specific goals, objectives, and action items they deemed necessary to lessen the impact of flooding for their communities.

Flood Events in Columbus-Muscogee County since 2018

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	05/23/2018	10:30	EST-5	Flash Flood		0	0	0.00K	0.00K
BIBB CITY	MUSCOGEE CO.	GA	04/19/2020	21:06	EST-5	Flash Flood		0	0	0.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	04/19/2020	21:06	EST-5	Flash Flood		0	0	0.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	09/16/2020	21:53	EST-5	Flash Flood		0	0	0.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	10/04/2021	11:15	EST-5	Flash Flood		0	0	0.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	10/04/2021	11:20	EST-5	Flash Flood		0	0	0.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	10/04/2021	12:30	EST-5	Flash Flood		0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	10/04/2021	12:30	EST-5	Flash Flood		0	0	0.00K	0.00K
MUSCOGEE	MUSCOGEE CO.	GA	10/04/2021	13:25	EST-5	Flash Flood		0	0	0.00K	0.00K

Columbus-Muscogee County

Note: All "light blue" shaded areas indicate the extent of the 100-year (or 1% annual) flood risk

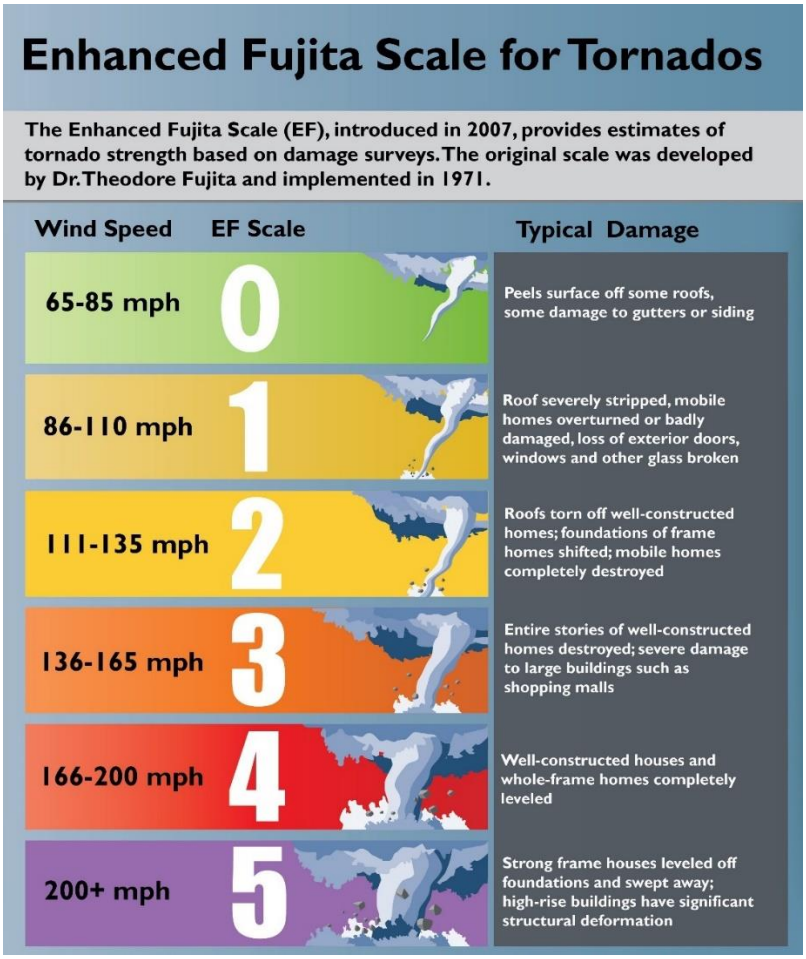
All Flood Maps are from the Georgia DFIRM Flood Map Program

Natural Hazard: **Tornado**

Hazard Description

A tornado is a violently rotating column of air (seen only when containing condensation, dust, or debris) that is in contact with the surface of the ground. Exceptionally large tornadoes may not exhibit the classic "funnel" shape, but may appear as a large, turbulent cloud near the ground or a large rain shaft. Destructive because of strong winds and windborne debris, tornadoes can topple buildings, roll mobile homes, uproot vegetation, and launch objects hundreds of yards.

Most significant tornadoes (excluding some weak tornadoes and waterspouts) stem from the right rear quadrant of large thunderstorm systems where the circulation develops between 15,000 and 30,000 feet. As circulation develops, a funnel cloud, a rotating air column aloft, or tornado descends to the surface. These tornadoes are typically stronger and longer-lived. The weaker, shorter-lived tornadoes can develop along the leading edge of a singular thunderstorm. Although tornadoes can occur in most locations, most of the tornado activity in the United States in the Midwest and Southeast. Tornadoes can occur anywhere within the State of Georgia.



Source: International Code Council

In terms of the continuum of area of impact for hazard events, tornadoes are fairly isolated. Typically ranging from a few hundred to one or two miles across, tornadoes affect far less area than larger

meteorological events such as tropical cyclones, winter storms and severe weather events. An exact season does not exist for tornadoes. However, most occur between early spring to mid-summer (February-June). The rate of onset of tornado events is rapid. Typically, the appearance of the first signs of the tornado is the descending funnel cloud. This sign may be only minutes from the peak of the event, giving those in danger minimal sheltering time. However, meteorological warning systems attempt to afford those in danger more time to shelter. The frequency of specific tornado intensities is undetermined because no pattern seems to exist in occurrence. Finally, the duration of tornado events ranges from the few minutes of impact on a certain location to the actual tornado lasting up to a few hours.

Tornadoes are measured after the occurrence using the subjective intensity measures. The Enhanced Fujita Scale describes the damage and then gives estimates of magnitude of peak 3-second gusts in miles per hour.

Hazard Profile

All areas within Columbus-Muscogee County are vulnerable to the threat of a tornado. Due to the indiscriminate and unpredictable nature of tornadoes, there is no reliable method to determine where or when a tornado will strike. There have been 12 documented tornadoes in the last 50 years in Columbus-Muscogee County. It is likely that other tornadoes have occurred within this timeframe, but available records are limited in nature.

Based on the 50-year information available for Columbus-Muscogee County, a tornado occurs every 4.2 years. On an annual basis, Columbus-Muscogee County has a 24% chance of being impacted from a tornado event. When only the last twenty-five years are considered, the likelihood of a tornado affecting Columbus-Muscogee County remains the same at 24% (6 tornadoes since 1998).

Individual tornado events can cause extreme damage to an area. The strongest tornado to impact Columbus-Muscogee County was an EF3 in 2019. This tornado caused approximately $500,000 in damages and impacted a mostly wooded area of far northern Columbus-Muscogee County before entering Harris County and, eventually, Talbot County. The costliest tornado to impact Columbus-Muscogee County was an EF2 in 2007. This storm caused over $28 million in damages. The storm caused damage in the Green Island Hills, Brookstone, Autumn Ridge, Hamilton Station, and Old Moon Road areas of Columbus-Muscogee County. Overall, the tornado patch was approximately 9 miles in Columbus-Muscogee County. All tornado hazard data included for Columbus-Muscogee County is limited to countywide data and is not broken down by jurisdiction.

Assets Exposed to the Hazard

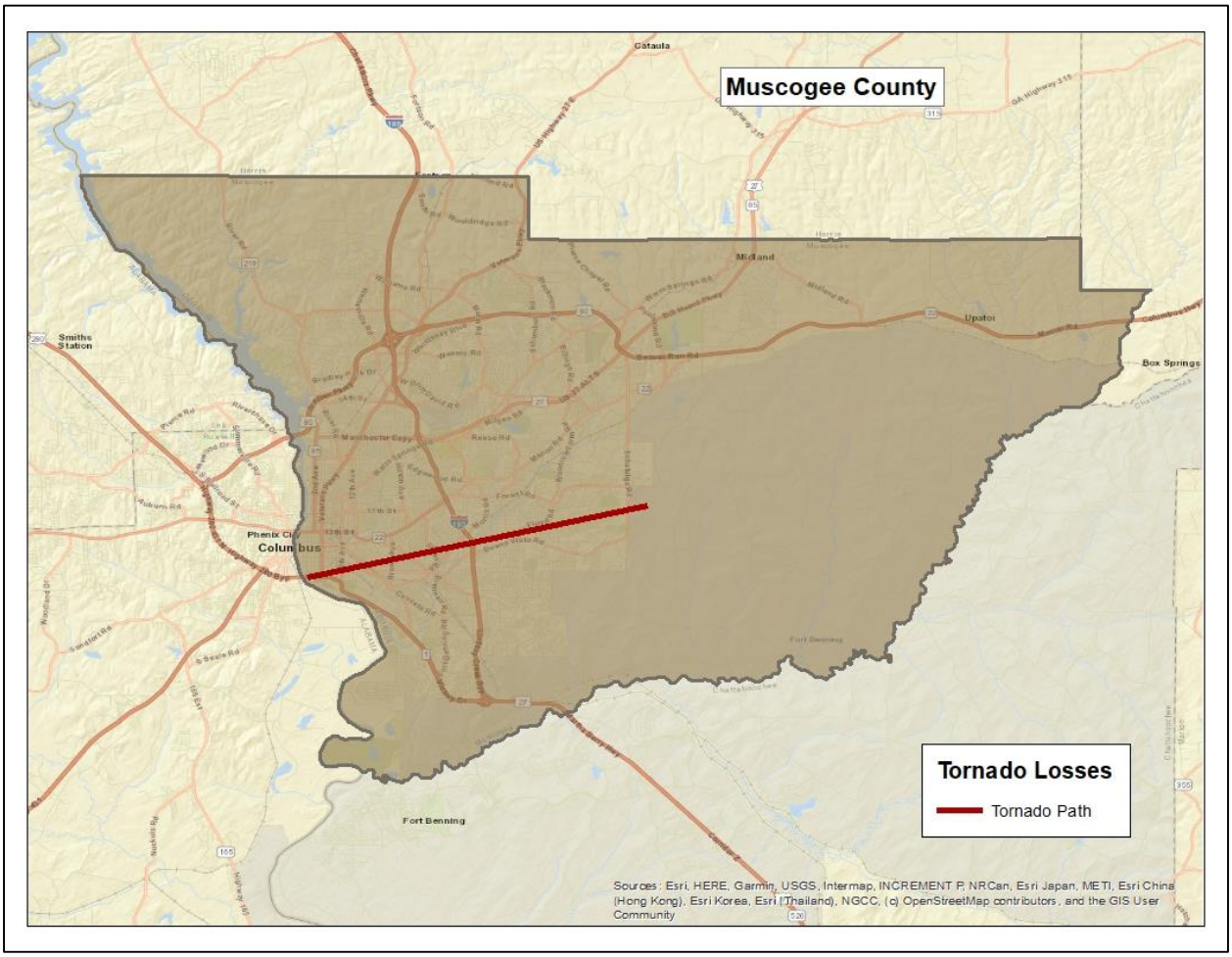
In evaluating assets that are susceptible to tornadoes, the Columbus Consolidated Government HMPC determined that all public and private property is threatened by tornadoes, including all critical facilities. This is due to the lack of spatial prejudice of tornadoes.

Estimated Potential Losses

Estimates of damage for the past events of the last 50 years are over $35 million, or $715,560 annually. However, singular events can cause a significant impact in the amount of losses. Documented damage estimates for tornado events in Columbus-Muscogee County have varied wildly depending on what was damaged. According to the National Risk Index, Columbus-Muscogee County has an estimated annual loss of $1,923,704 related to tornado events.

Natural Hazard: **Tornado**

Within the 2024 Columbus-Muscogee County HAZUS report, a theoretical tornado path for an EF3 was identified that would inflict maximum damage. HAZUS estimated that this theoretical tornado would cause damage to approximately 3,028 buildings and result in losses more than $76 million with the greatest losses being related to residential structures (over $51 million).



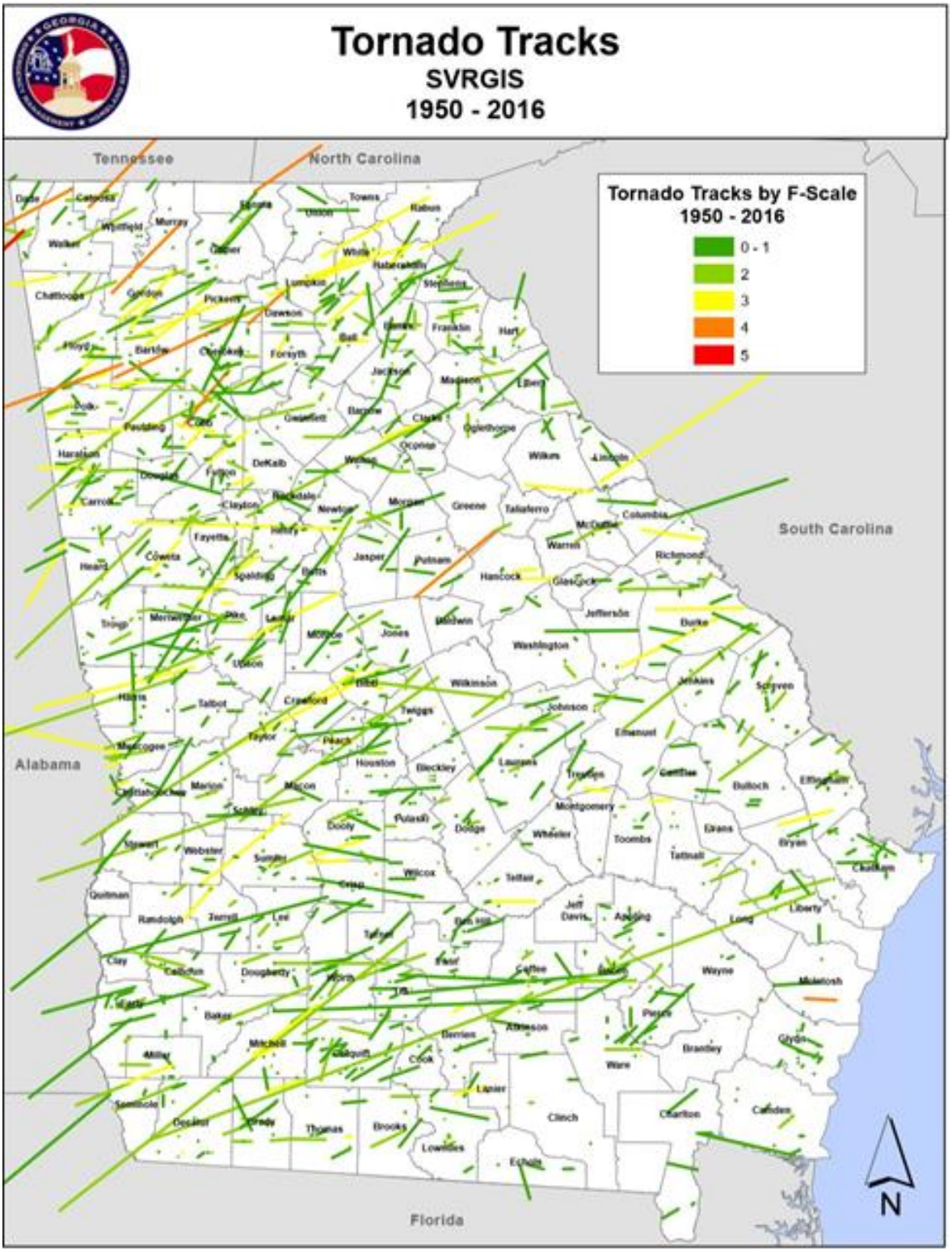
Source: 2024 Muscogee County HAZUS Report

Land Use & Development Trends

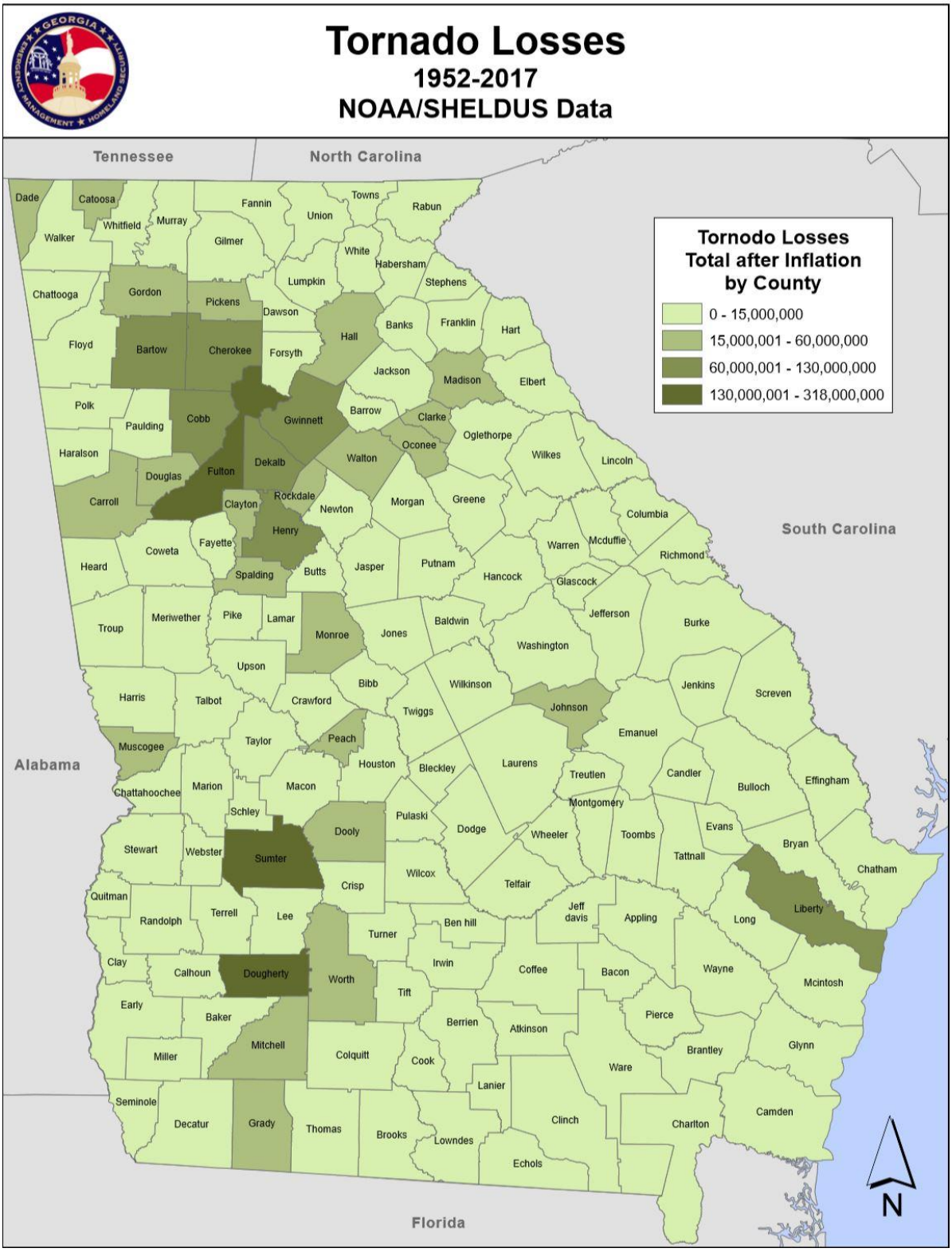
Columbus-Muscogee County main land use trend related to Tornadoes involves continued population growth – particularly in the northern areas of Columbus-Muscogee County near the Harris County line.

Multi-Jurisdictional Considerations

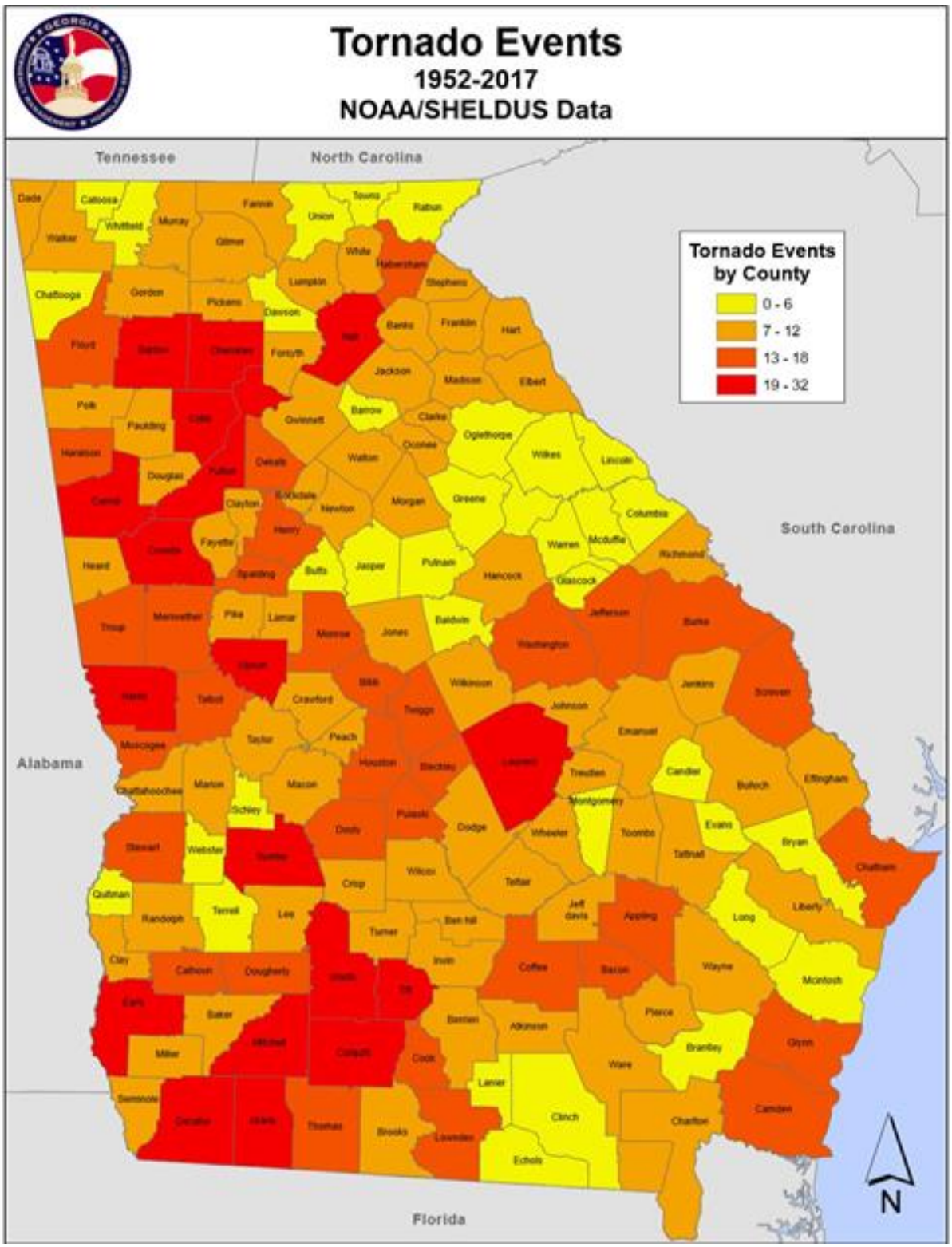
All portions of Columbus-Muscogee County could potentially be impacted by a tornado due to the indiscriminate nature of tornadic events. Therefore, all mitigation actions identified regarding tornadoes should be pursued on a countywide basis.



Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan



Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan



Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan

Climate Change Considerations

How climate change impacts tornadoes in Columbus-Muscogee County in the future has yet to be determined. It is possible that tornadoes could increase, decrease, or remain the same in frequency and/or increase, decrease, or remain the same in severity.

Hazard Summary

Columbus-Muscogee County remains at risk to potential damage from tornadoes, especially considering the average of one tornado every 50 years over the last 50 years. Should a tornado strike in densely populated areas of the county, significant damage or loss of life could occur. Due to the destructive power of tornadoes, it is essential that the mitigation measures identified in this plan regarding tornado activity receive full consideration.

Tornado Events in Columbus-Muscogee County since 2018

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
DOUBLE CHURCHES	MUSCOGEE CO.	GA	03/03/2019	15:29	EST-5	Tornado	EF3	0	0	500.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	04/14/2019	09:16	EST-5	Tornado	EF0	0	0	150.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	04/14/2019	09:46	EST-5	Tornado	EF0	0	0	25.00K	0.00K

Natural Hazard: **Drought**

Hazard Description

Drought is a normal, recurrent feature of climate consisting of a deficiency of precipitation over an extended period (usually a season or more). This deficiency results in a water shortage for some social or environmental sector. Drought should be judged relative to some long-term average condition of balance between precipitation and evapotranspiration in a particular area that is considered "normal." Drought should not be viewed as only a natural hazard because the demand people place on water supply affects perceptions of drought conditions. From limited water supplies in urban areas to insufficient water for farmland, the impacts of drought are vast.

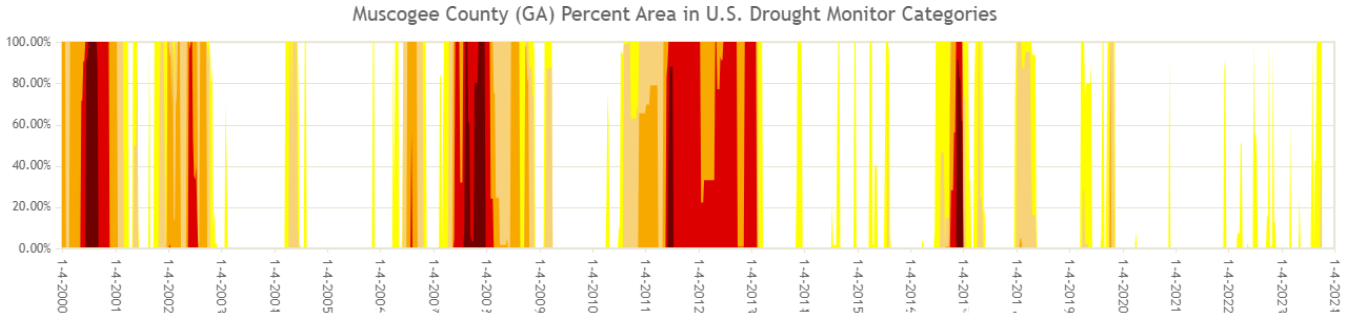
Droughts occur in virtually every climatic zone and on every continent. Because the impacts of drought conditions are largely dependent on the human activity in the area, the spatial extent of droughts can span a few counties to an entire country.

Temporal characteristics of droughts are drastically different from other hazards due to the possibility of extremely lengthy durations as well as a sluggish rate of onset. Drought conditions may endure for years or even decades. This factor implicates drought as having a high potential to cause devastation on a given area. The duration characteristic of droughts is so important that droughts are classified in terms of length of impact. Droughts lasting 1 to 3 months are considered short term, while droughts lasting 4 to 6 months are considered intermediate and droughts lasting longer than 6 months are long term. With the slow rate of onset, most populations have some inkling that drought conditions are increasingly present. However, barring drastic response measures, most only have to adapt to the changing environment.

Seasonality has no general impact on droughts in terms of calendar seasons. However, "wet" and "dry" seasons obviously determine the severity of drought conditions. In other words, areas are less susceptible to drought conditions if the area is experiencing a wet season. The frequency of droughts is undetermined, because the hazard spans such a long period of time. However, climatologists track periods of high and low moisture content similarly to the tracking of cooling and warming periods.

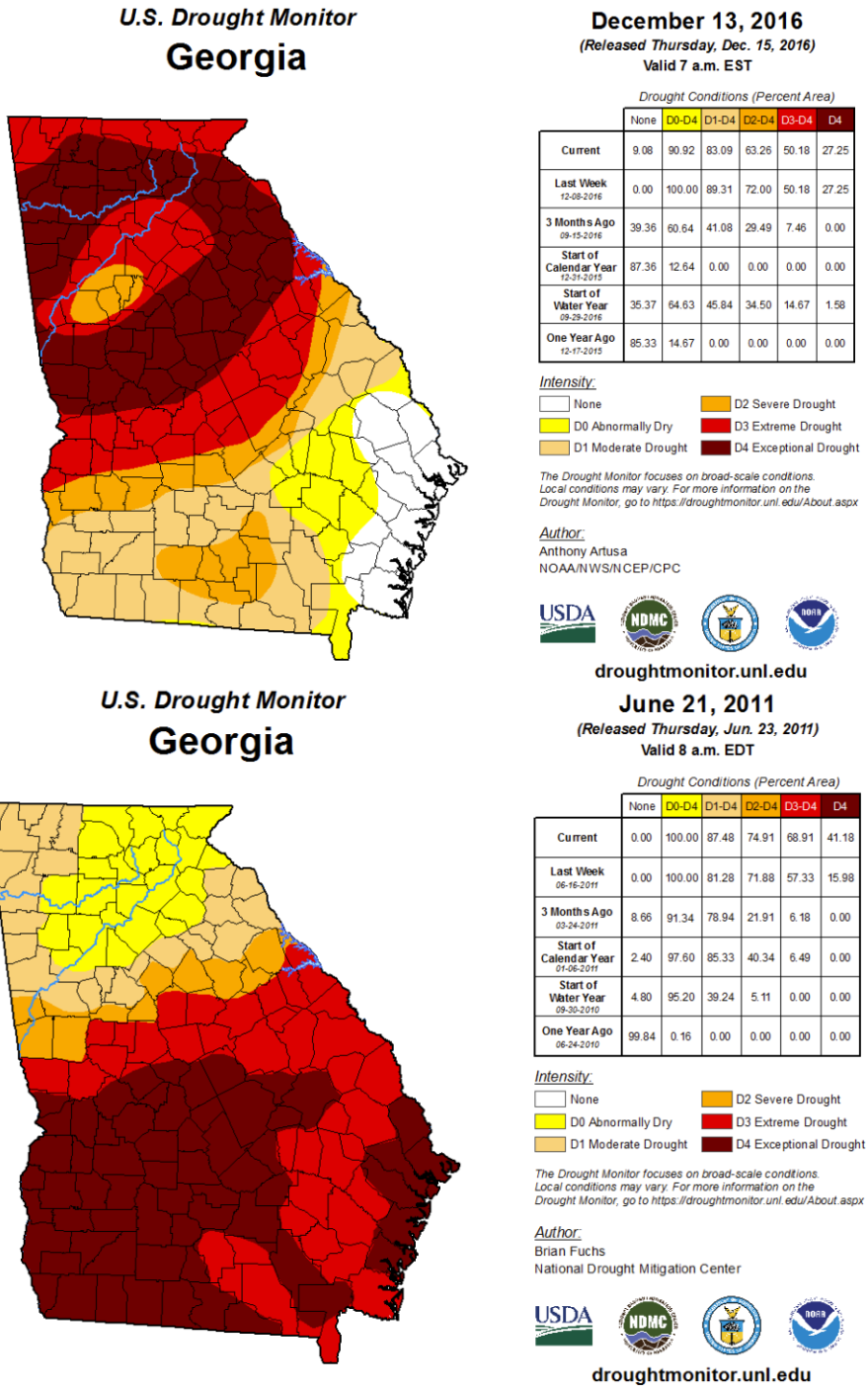
Hazard Profile

The Columbus Consolidated Government HMPC reviewed data for the last 50 years regarding drought conditions. Historically, agricultural losses have accounted for the vast amount of losses related to drought conditions. Due to poor record keeping and the unpredictable nature of drought conditions, reliability of historical data for the last 50 years is low. Columbus-Muscogee County has been impacted by 9 drought events in the last 25 years, according to data from the National Climatic Data Center. This amounts to a 36% chance of a drought for a given year over the last 25 years. The economic impact of these droughts, including crop damage, is not available.



All drought hazard data included for Columbus-Muscogee County is limited to countywide data and is not broken down by jurisdiction.

There have been two recent examples of "exceptional" drought events affecting Columbus-Muscogee County. These events occurred in 2016 and 2011. Both events reached the D4 (Exceptional Drought) designation, according to data from the United States Drought Monitor. Below are maps of these two events.



Source: USDA Drought Monitor – University of Nebraska-Lincoln

Events of this extent can cause water shortages for residential and corporate needs, as well as affecting the ability for firefighting operations to be properly effective. Of particular concern to Columbus-Muscogee County is the impact drought can have on wildfire. Drought can exacerbate the impacts of a wildfire by increasing fire load and overall fire danger. Drought conditions of this extent can have devastating effects on the local agricultural industries, which has occurred in previous D4 level droughts.

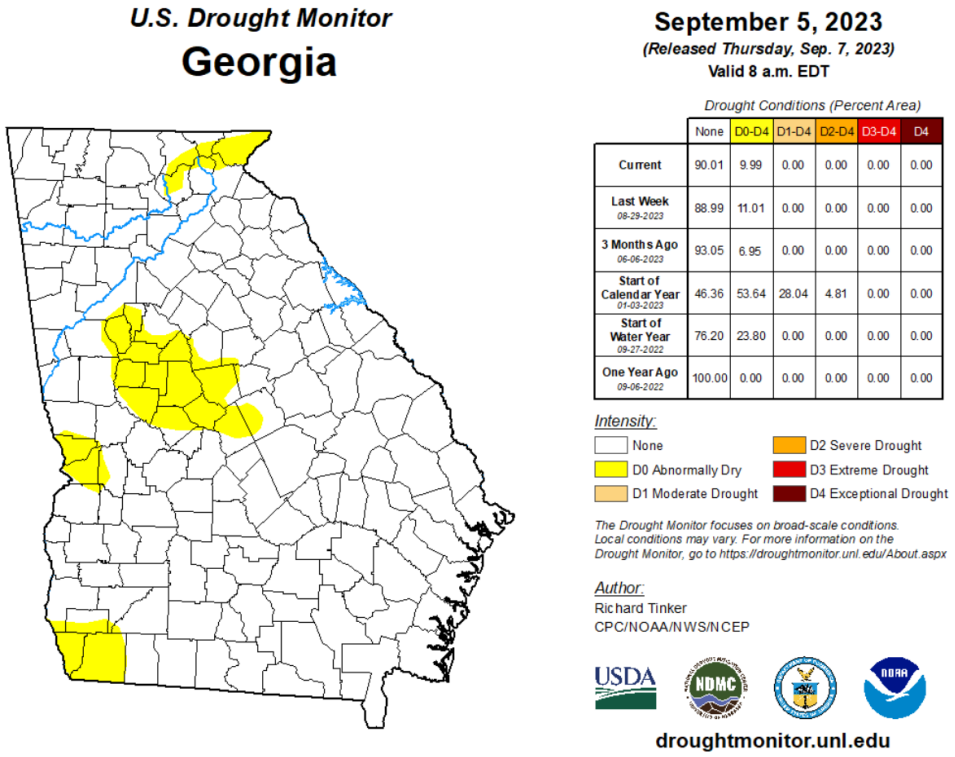
Assets Exposed to the Hazard

While drought conditions do not typically pose a direct threat to structures, secondary hazards from drought such as increased wildfire threat, does pose a significant threat to all public and private property in Columbus-Muscogee County, including all critical facilities. Water resources could also become scarce during a drought, a condition that would potentially affect all Columbus-Muscogee County residences and critical facilities.

Estimated Potential Losses

No damage to structures or critical facilities is expected as a direct result of drought conditions. However, crop damage and subsequent losses can be expected to occur because of drought conditions. The degree of losses would depend on the duration of the drought, severity of the drought, temperatures during the drought, season in which the drought occurs, and the specific needs of the involved crops. Water system shortages and need for supply assistance for those systems could also lead to economic losses associated with the drought.

According to the National Risk Index, Columbus-Muscogee County has an estimated annual loss of $4,078 related to drought events. Additionally, according to the 2017 Agriculture Census data, Columbus-Muscogee County's market value of products sold was $196,000.



Source: United States Drought Monitor (University of Nebraska-Lincoln)

Land Use & Development Trends

As growth continues, drought can become a larger threat for Columbus-Muscogee County due to the increased reliance on water infrastructure. This increased pull on these resources in Columbus-Muscogee County could quicken or deepen the impacts of a drought for residential, commercial, and industrial areas.

Multi-Jurisdictional Considerations

All portions of Columbus-Muscogee County could potentially be impacted by a drought, but agricultural areas of the county are potentially more at risk. Therefore, all mitigation actions identified regarding drought should be pursued on a countywide basis.

Climate Change Considerations

It is unclear how climate change could impact droughts in the future. According to the 2019-2024 Georgia Hazard Mitigation Strategy and Enhanced Plan, droughts could become more frequent and more severe, although significant changes in the frequency and severity of droughts are not expected. Increased temperatures could lead to quicker evaporation rates for crops and wetland areas, which could have ecological and economic impacts for Columbus-Muscogee County.

Hazard Summary

Drought conditions can cause significant economic stress on the agriculture and forestry interests of Columbus-Muscogee County. The potential negative secondary impacts of drought are numerous. They include increased wildfire threat, decreased water supplies for residential and industrial needs, stream-water quality, and water recreation facilities. The Columbus Consolidated Government HMPC recognizes the potential threats drought conditions could have on the community and have identified specific mitigation actions as a result.

Hazard Description

A wildfire is an uncontained fire that spreads through the environment. Wildfires can consume large areas, including infrastructure, property, and resources. When massive fires, or conflagrations, develop near populated areas, evacuations could possibly ensue. Not only do the flames impact the environment, but the massive volumes of smoke spread by certain atmospheric conditions also impact the health of nearby populations.

Wildfires result from the interaction of three crucial elements: fuel, ignition (heat), and oxygen. Natural and manmade forces cause the three crucial elements to coincide in a manner that produces wildfire events. Typically, fuel consists of natural vegetation. However, as the urban and suburban footprint expands, wildfires may utilize other means of fuel, such as buildings. In terms of ignition or source of heat, the primary source is lightning. However, humans are more responsible for wildfires than lightning. Manmade sources vary from the unintentional, such as fireworks, campfires, or machinery, to intentional arson. With these two elements provided, the wildfires may spread as long as oxygen is present.

Weather is the most variable factor affecting wildfire behavior. Strong winds propel wildfires quickly across most landscapes unless firebreaks are present. Shifting winds create erratic wildfires, which can complicate fire management efforts. Dry conditions provide faster-burning fuels, either making the area more vulnerable to wildfire or increasing the mobility of preexisting wildfires.

Wildfires are notorious for spawning secondary hazards, such as flash flooding and landslides, long after the original fire is extinguished. Both flash flooding and landslides result from fire consuming the natural vegetation that provides precipitation interception and infiltration as well as slope stability.

All of Georgia is prone to wildfire due to the presence of wildland fuels associated with wildfires. Land cover associated with wildland fuels includes coniferous, deciduous, and mixed forest; shrubland; grassland and herbaceous; transitional; and woody and emergency herbaceous wetlands. The spatial extent of wildfire events greatly depends on both the factors driving the fire as well as the efforts of fire management and containment operations.

In terms of seasonality, wildfires can occur during any season of the year. However, drier seasons, which vary within the State of Georgia, are more vulnerable to severe wildfires because of weather patterns and the abundant quick-burning fuels. In terms of rate of onset and duration, wildfires vary depending on the available fuels and weather patterns. Some wildfires can engulf an area in a matter of minutes from the first signs whereas others may be slower burning and moving. The frequency of wildfires is not typically measured because of the high probability of human ignition being statistically unpredictable. Magnitude and intensity are typically only measured by size of the wildfire and locations of burning.

Three classes of fires include understory, crown, and ground fires. Naturally induced wildfires burn at relatively low intensities, consuming grasses, woody shrubs, and dead trees. These understory fires often play an important role in plant reproduction and wildlife habitat renewal and self-extinguish due to low fuel loads or precipitation. Crown fires, which consist of fires consuming entire living trees, are low probability but high consequence events due to the creation of embers that can be spread by the wind. Crown fires typically match perceptions of wildfires. In areas with high concentrations of organic materials in the soil, ground fires may burn, sometimes persisting undetected for long periods until the surface is ignited.

Hazard Profile

Wildfires pose a serious threat to Columbus-Muscogee County. This is a result of the high amount of forestland and vegetation available to fuel potential wildfires, the significant elevation changes within the county, and the high percentage of inaccessible areas. The latter two make wildland firefighting operations significantly more difficult. Also, there is an increasing amount of wildland-urban interface (WUI) in Columbus-Muscogee County, which is defined as areas where structures and other human development meets undeveloped wildland properties. 98.9% of Columbus-Muscogee County's population lives within the WUI. All wildfire hazard data included for Columbus-Muscogee County is limited to countywide data and is not broken down by jurisdiction.

Wildfire statistics were not available for the 50-year timeframe at the time of this profile. Georgia Forestry Commission, Columbus-Muscogee County had 25 wildfires from 2012 to 2023 that consumed a total of 169.6 acres. This equates to an average of 2.1 wildfires per year and these fires consume an average of 14.13 acres per year. Columbus-Muscogee County has a 0.6% daily chance of a wildfire. Historically, children and campfires have been the top reasons for wildfires in Columbus-Muscogee County. In 2015, a single large fire on public land burned a total of 40 acres – accounting for nearly 25% of all acreage burned in Columbus-Muscogee County since 2012. This single fire occurred at Rigdon Park along the Chattahoochee River near the Oakland Park subdivision.

Assets *Exposed to the Hazard*

All public and private property located within the Wildland-Urban Interface, including critical infrastructures, are susceptible to impacts from wildfires. Due to the large area of wildland area in Columbus-Muscogee County and the large amount of WIU, all public and private property, including critical infrastructures, could be directly or indirectly impacted by the threat of wildfire. Additionally, the large portion of eastern Muscogee County encompassed by Fort Moore is mostly undeveloped and could cause a significant wildfire concern.

Jurisdiction	Percentage of Population in WUI
Columbus-Muscogee County	*83.1%*

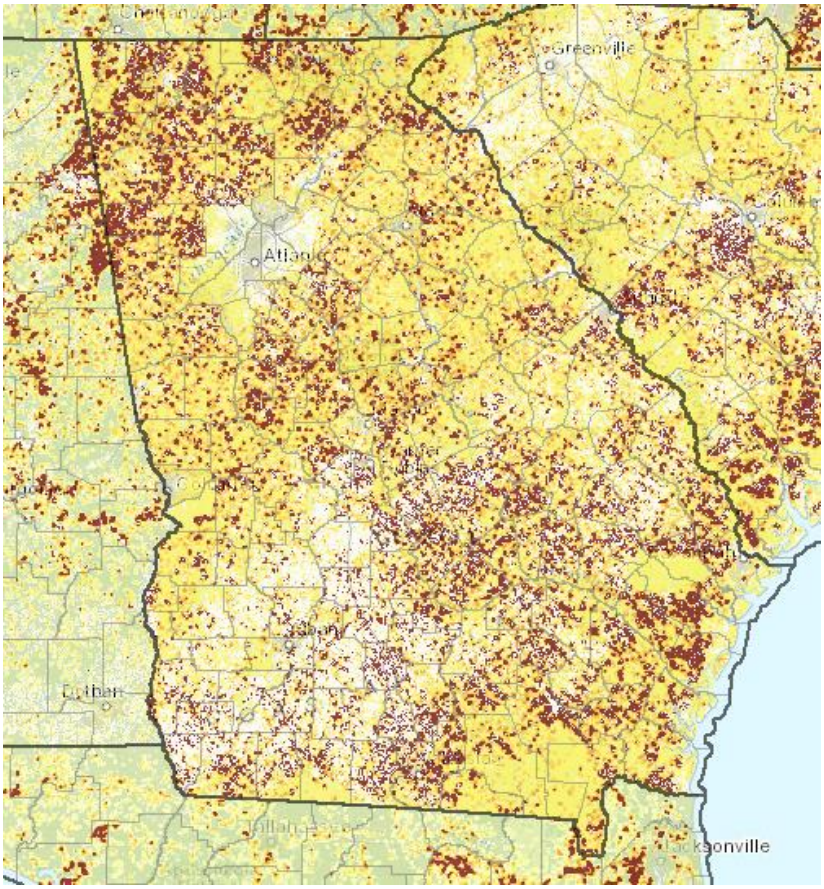
Estimated Potential Losses

Little information is available regarding damages, in terms of dollars, for wildfire losses in Columbus-Muscogee County. According to the 2017 Ag Census by the USDA, Columbus-Muscogee County has nearly $200,000 in annual agriculture sales. These areas would potentially be impacted by a wildfire event. According to the National Risk Index, Columbus-Muscogee County has an estimated annual loss of $4,078 related to wildfire events.

Land Use & Development Trends

With the continued increase in population, Wildland-Urban Interface (WUI) is increasing in Columbus-Muscogee County. This is particularly true in northern Columbus-Muscogee County. The WUI creates areas where fire can easily move from wildland areas into developed areas and threaten structures and human life. The expansion of the WUI in Columbus-Muscogee County complicated wildland fire management operations and planning initiatives. This development trend is expected to continue in the future.

Georgia Wildfire Ignition Density



Source: Southern Group of State Foresters Wildfire Risk Assessment Portal

Multi-Jurisdictional Considerations

All portions of Columbus-Muscogee County could potentially be impacted by a wildfire due to the large amount of Wildland-Urban Interface, but the less developed areas of the county are more vulnerable. Therefore, all mitigation actions identified regarding wildfires should be pursued on a countywide basis.

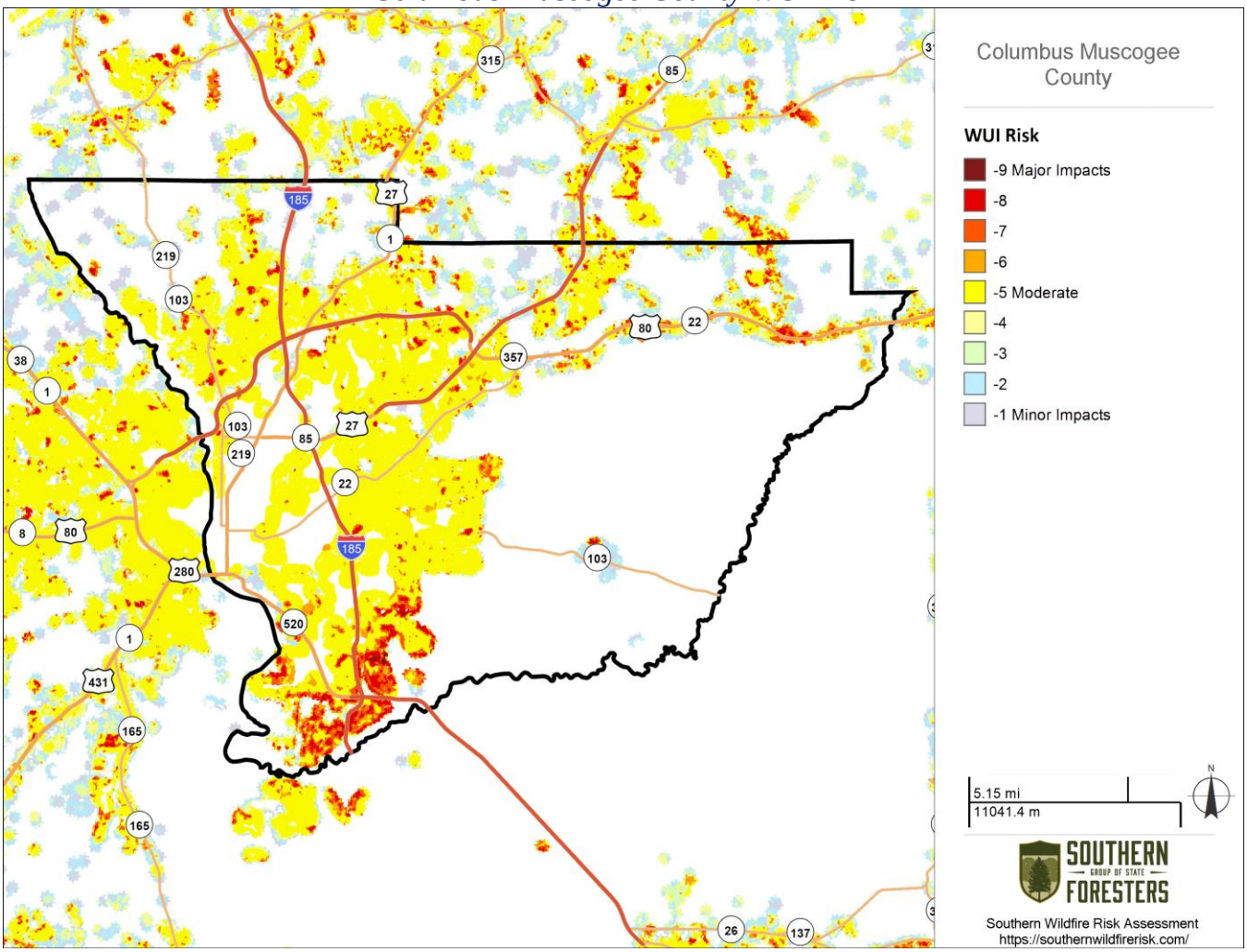
Climate Change Considerations

It is not clear how climate change could potentially impact wildfire development in Columbus-Muscogee County. Increased temperatures and increased evaporation rates could lead to a larger fire load for wildland fires in Columbus-Muscogee County.

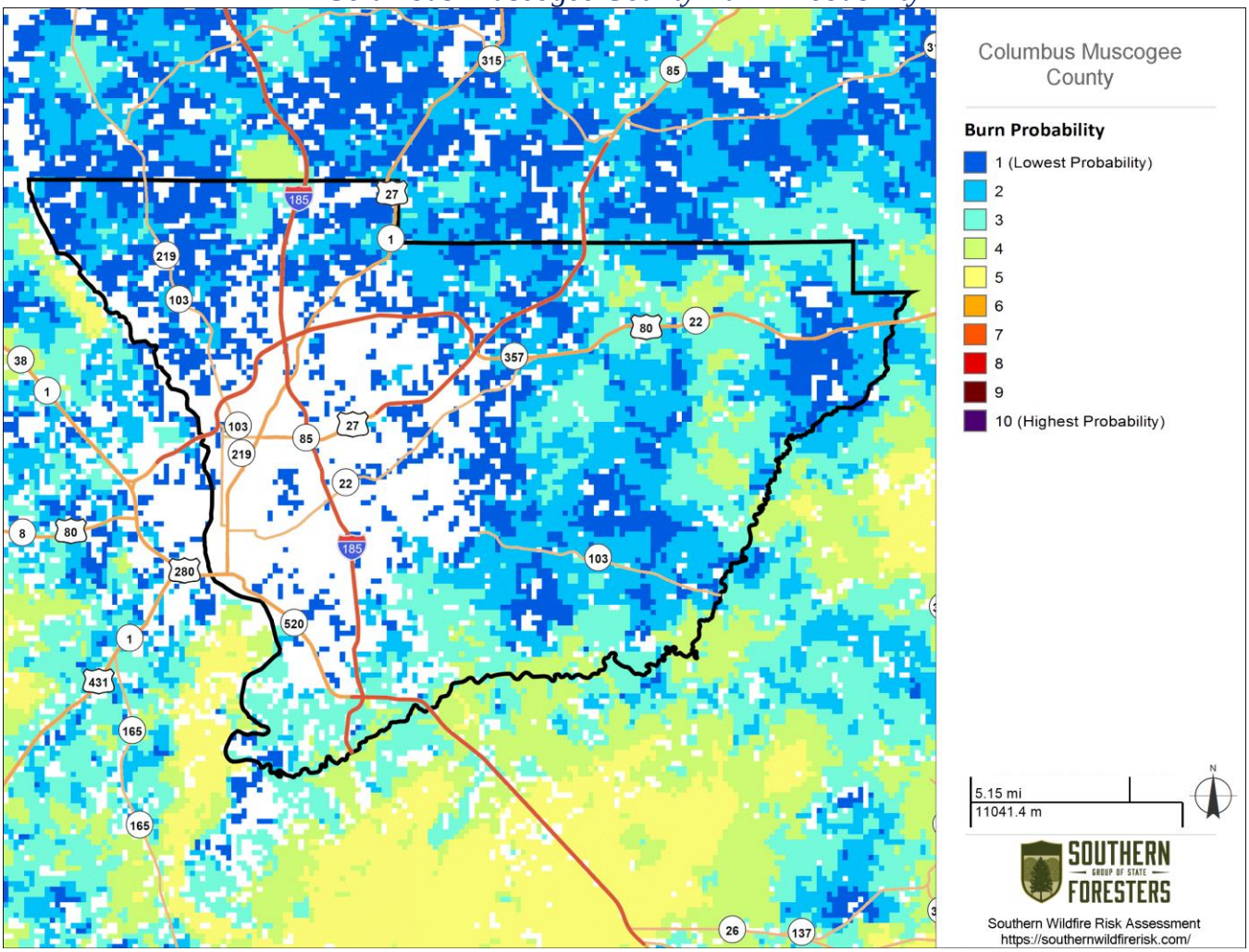
Hazard Summary

Wildfire is a significant threat to Columbus-Muscogee County due to the increased amount of Wildland-Urban Interface. The increasing amount of area where structures and other human development meets undeveloped, wildland property is where 83.1% of Columbus-Muscogee County's population lives. The mitigation measures identified in this plan should be aggressively pursued based on the high frequency of this hazard and the ability for wildfires to inflict devastation anywhere in Columbus-Muscogee County.

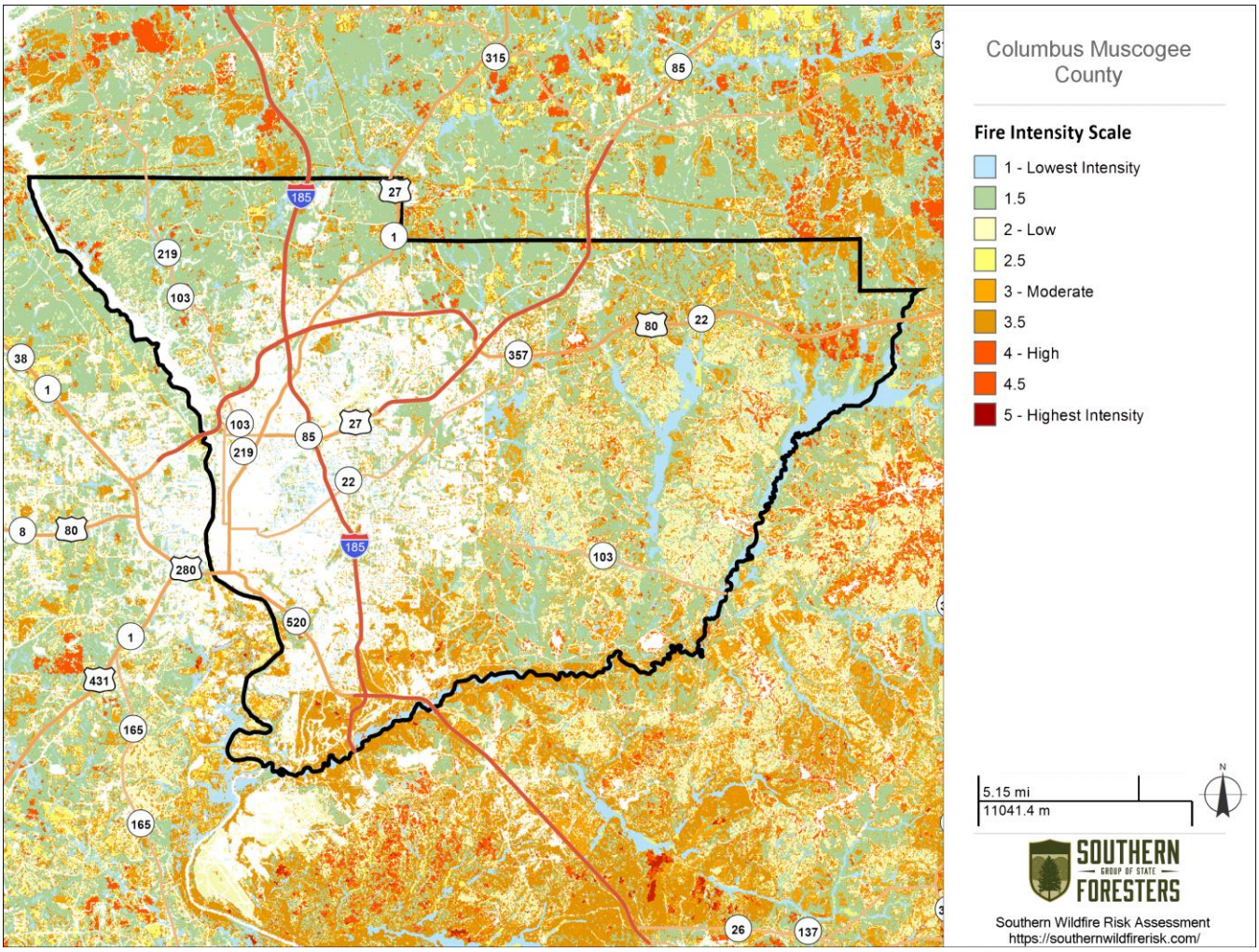
Columbus-Muscogee County WUI Risk



Columbus-Muscogee County Burn Probability



Columbus-Muscogee County Fire Intensity Scale



All maps in this section are from the Southern Group of State Foresters Wildfire Risk Assessment Portal

Hazard Description

Earthquakes are generally defined as the sudden motion or trembling of the Earth's surface caused by an abrupt release of slowly accumulated strain. This release typically manifests on the surface as ground shaking, surface faulting, tectonic uplifting and subsidence, or ground failures, and tsunamis. In the United States, earthquake activity east of the Rocky Mountains is relatively low compared to the Western states because it is away from active plate boundaries and the plate interior strain rates are known to be very low.

The physical property of earthquakes that causes most of the damage within the United States is ground shaking. The vibrations from the seismic waves that propagate outward from the epicenter may cause failure in structures not adequately designed to withstand earthquakes. Because the seismic waves have different frequencies of vibration, the waves disseminate differently through sub-surface materials. For example, high frequency compression and shear waves arrive first, whereas lower frequency Rayleigh and love waves arrive later. Not only are the speeds varied between seismic waves, but also the types of movement. The surface vibration may be horizontal, vertical, or a combination of the two, which causes a wider array or structures to collapse.

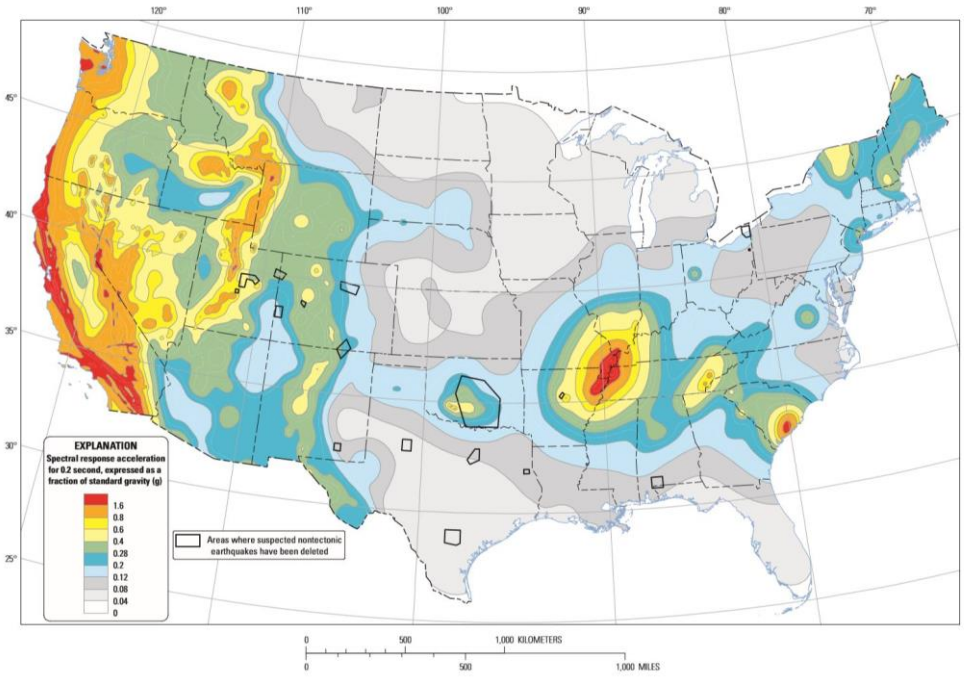
Another manifestation of earthquakes is surface faulting. This phenomenon is defined as the offset or tearing of the earth's surface by a differential movement across a fault. Structures built across active faults tend to sustain damage regularly. There are no active faults within or near Georgia. Distinct inactive faults are known within the state north or the Columbus to Macon to Augusta fall line and running generally northeast-southwest.

The third earthquake phenomenon that causes damage is tectonic uplift and subsidence. Tectonic uplift can cause shallowing of the harbors and waterways while tectonic subsidence can cause permanent or intermittent inundation. Due to the association of tectonic uplift and subsidence with active faults, Georgia is not at risk to these phenomena.

The fourth earthquake damage-causing phenomena are earthquake-induced ground failures, including liquefaction and landslides. During an earthquake, the areas that are rich in sand and silt have groundwater within 30 feet of the surface temporarily behave as viscous fluids during strong ground shaking. Structures built on these materials can settle, topple, or collapse as the ground "liquefies" beneath it. Landslides can also form when earthquake shaking or seismic activity dislodges rock and debris on steep slopes, triggering rock falls, avalanches, and slides.

Also, unstable, or nearly unstable, slopes consisting of clay soils may lose shear strength when disturbed by ground shaking and fail, resulting in a landslide. Georgia is at very low risk of seismic induced liquefaction or landslides. The last of the earthquake-induced phenomena are tsunamis, which are large, gravity-driven waves triggered by the sudden displacement of a large volume of water. The waves produced travel in all directions from the origin at speeds of up to 600 miles per hour. In deep water, tsunamis normally have small wave heights. However, as the waves reach shallower water near land, the wave speed diminishes, and the amplitude drastically increases. Upon impact with a shoreline, the waves can inundate land rapidly, engulfing everything in its path. Successive wave crests follow, typically arriving minutes to hours later, frequently with later arrivals being more dominant. Frequently, the first tsunami waves are downward, causing dramatic exposure of the beach. Because of this, people are often killed trying to collect newly exposed seashells when the positive waves then arrive.

Although large tsunamis are rare in the eastern coast of the US, the possibility of such events occurring anywhere along the Atlantic and Gulf coast exists.



Two-percent probability of exceedance in 50 years map of 0.2 second spectral response acceleration

Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan

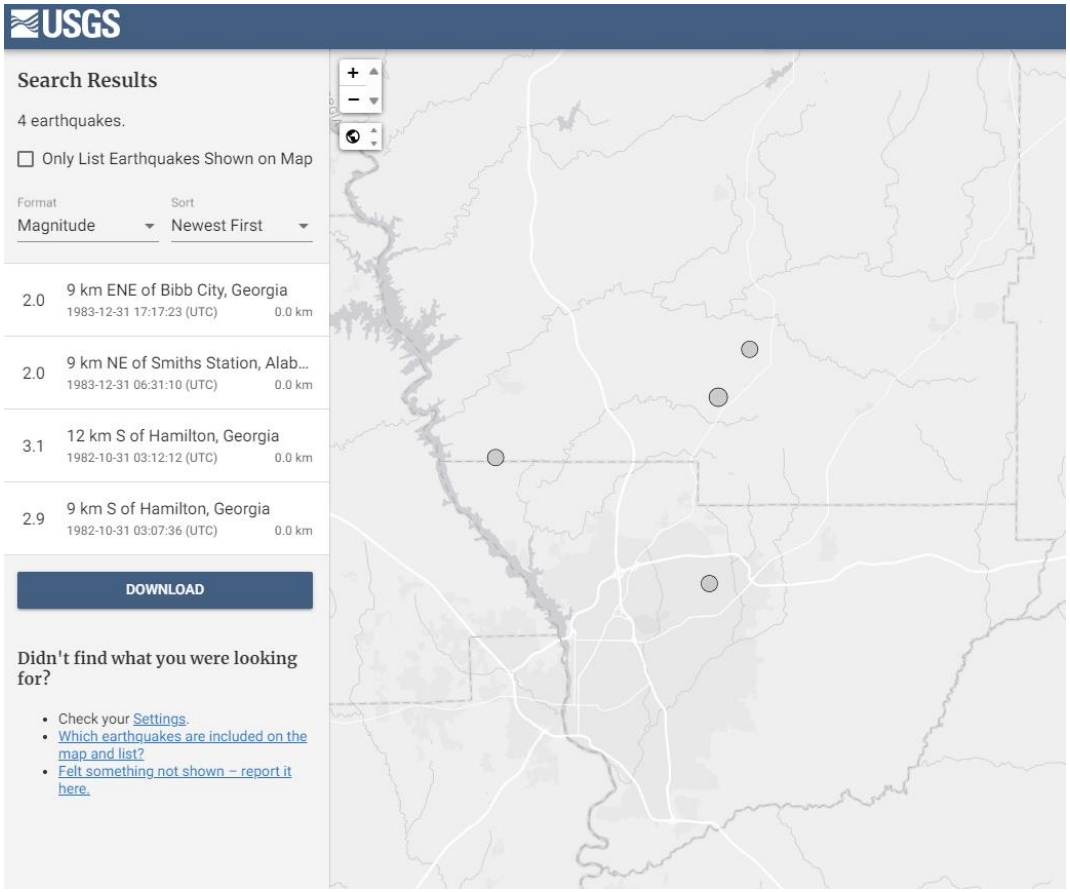
Hazard Profile

Columbus-Muscogee County is not one of the 37 Georgia counties with the highest earthquake risk, according to Georgia Emergency Management Agency. In reviewing data of the last 50 years, one earthquake has originated from within Columbus-Muscogee County. This earthquake was a 2.0 magnitude and occurred 9 km east-northeast of the Bibb City area on December 31, 1983. Overall, 4 earthquakes have originated within 75 kilometers of Columbus, GA in the last 50 years. The strongest earthquake to occur within the 75-kilometer radius was a 3.1 that occurred 12 km south of Hamilton, GA in 1982. Columbus-Muscogee County averages one earthquake every 12.5 years occurring within 75 kilometers of Columbus, GA. This equates to a 0.02% daily chance of an earthquake occurring within 75 kilometers of Columbus, GA. According to the National Risk Index, Columbus-Muscogee County has a 0.034% annual chance of an earthquake. Historically, the 1886 Charleston, SC earthquake, estimated to be between 6.6 and 7.3 on the modern Richter Scale, likely caused impacts to Columbus-Muscogee County. Although no historical records exist exhibiting any damages, Columbus-Muscogee County was estimated to be in a level VI area of the Modified Mercalli Intensity scale for this event. This would indicate strong shaking felt by everyone inside and outside at the time of the event and characterized by broken windows, movement of heavy furniture, and slight to moderate damage for poorly built buildings. Even with this low number of occurrences, it was determined that if earthquakes occur within or close to the jurisdiction of Columbus-Muscogee County, significant damage could occur. Therefore, the Columbus Consolidated Government HMPC has determined the threat of earthquakes to be higher than the statistics would indicate. All earthquake hazard data included for Columbus-Muscogee County is limited to countywide data and is not broken down by jurisdiction.

Instrumental Intensity	Acceleration (%g)	Velocity (cm/s)	Perceived Shaking	Potential Damage
I	< 0.17	< 0.1	Not Felt	None
II-III	0.17 - 1.4	0.1 - 1.1	Weak	None
IV	1.4 - 3.9	1.1 - 3.4	Light	None
V	3.9 - 9.2	3.4 - 8.1	Moderate	Very light
VI	9.2 - 18	8.1 - 16	Strong	Light
VII	18 - 34	16 - 31	Very Strong	Moderate
VIII	34 - 65	31 - 60	Severe	Moderate to Heavy
IX	65 - 124	60 - 116	Violent	Heavy
X+	> 124	> 116	Extreme	Very Heavy

Assets Exposed to the Hazard

The Columbus Consolidated Government HMPC determined that all critical facilities and all public and private property within Columbus-Muscogee County are susceptible to the impacts of an earthquake due to the lower building codes with regards to earthquakes when compared to other parts of the country.



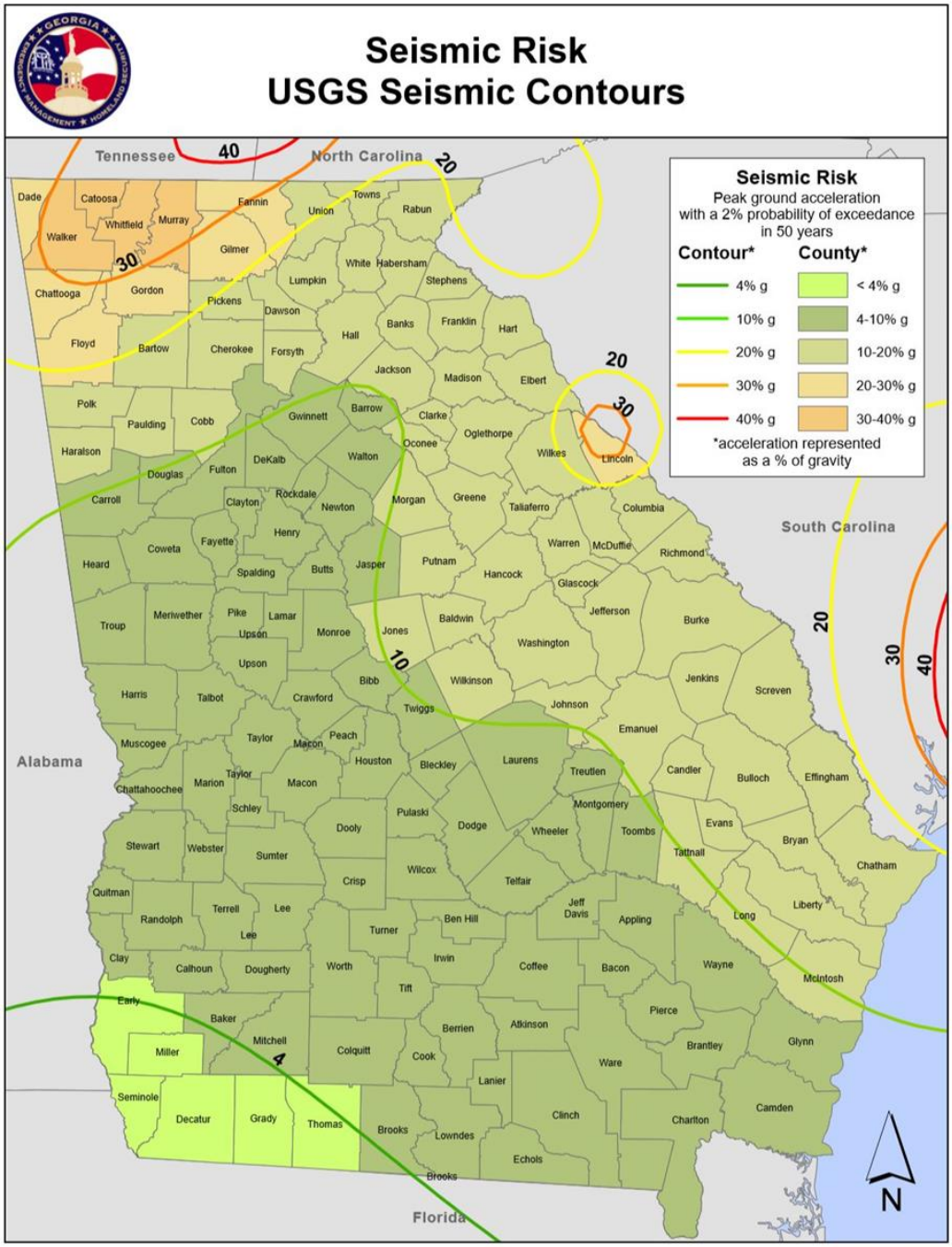
Source: United States Geological Survey (USGS) Earthquake Hazards Program

Estimated Potential Losses

Little information is available regarding damages, in terms of dollars, for earthquake losses in Columbus-Muscogee County. According to the National Risk Index, Columbus-Muscogee County has an estimated annual loss of $884,742 related to earthquake events.

Land Use and Development Trends

Columbus-Muscogee County currently has no land use trends related to earthquakes.



Source: 2019-2024 State of Georgia Hazard Mitigation Strategy and Enhanced Plan

Multi-Jurisdictional Considerations

All of Columbus-Muscogee County potentially could be threatened by earthquakes. As such, all earthquake mitigation actions should be pursued on a countywide basis.

Climate Change Considerations

Climate change is expected to have no impact on the future risk of earthquakes in Columbus-Muscogee County.

Hazard Summary

Even with the infrequency of earthquake impacts in Columbus-Muscogee County, the potential losses and impacts associated with the event would severely damage the infrastructure and economic viability of the City. Secondary impacts, such as landslides during or after an earthquake, are also of a great concern, particularly in areas along the Chattahoochee River. The mitigation measures identified in this plan should be pursued based on the high impact potential of this hazard and the ability for earthquakes to inflict widespread devastation anywhere in Columbus-Muscogee County.

Natural Hazard**: Tropical Cyclone**

Hazard Description

The National Weather Service describes tropical cyclones systems in the Atlantic Basin, including the Gulf of Mexico and Caribbean Sea, into four types based on strength.

Tropical Disturbance: A discrete tropical weather system of apparently organized thunderstorms – generally 100 to 300 nautical miles in diameter – originating in the tropics or subtropics, and maintaining its identity for 24 hours or more.

Tropical Depression: An organized system of clouds and thunderstorms with a defined circulation and maximum sustained winds of 38 mph (33 knots) or less.

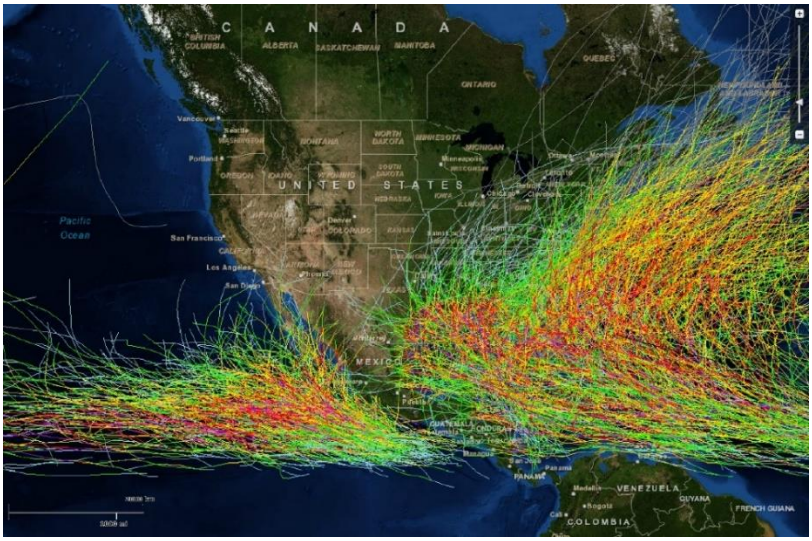
Tropical Storm: An organized system of strong thunderstorms with a defined circulation and maximum sustained winds of 39 mph to 73 mph (34-63 knots).

Hurricane: An intense tropical weather system with a well-defined circulation, producing maximum sustained winds of 74 mph (64 knots) or greater. Hurricane intensity is classified into five categories using the Saffir-Simpson Hurricane scale. Winds in a hurricane range from 74-95 mph for a Category 1 hurricane to greater than 156 mph for a Category 5 hurricane.

Saffir-Simpson Scale for Hurricane Classification				
Strength	**Wind Speed (Kts)**	**Wind Speed (MPH)**	**Pressure (Millibars)**	**Pressure**
Category 1	64- 82 kts	74- 95 mph	>980 mb	28.94 "Hg
Category 2	83- 95 kts	96-110 mph	965-979 mb	28.50-28.91 "Hg
Category 3	96-113 kts	111-130 mph	945-964 mb	27.91-28.47 "Hg
Category 4	114-135 kts	131-155 mph	920-944 mb	27.17-27.88 "Hg
Category 5	>135 kts	>155 mph	919 mb	27.16 "Hg
Tropical Cyclone Classification				
Tropical Depression	20-34kts			
Tropical Storm	35-63kts			
Hurricane	64+kts or 74+mph			

Tropical cyclones can cause catastrophic damage to coastlines and areas several hundred miles inland. Tropical cyclones can produce sustained high winds and spawn tornadoes and microbursts. Additionally, tropical cyclones can create storm surges along the coast and cause extensive damage from heavy rainfall. Floods and flying debris from the excessive winds are often the deadly and destructive results of these weather events.

Slow moving tropical cyclones traveling into mountainous regions tend to produce especially heavy rain. Excessive rain can trigger landslides or mudslides. Flash flooding can also occur due to intense rainfall. Each of these hazards present unique characteristics and challenges; therefore, the following have been separated and analyzed as individual hazards: Tropical cyclones, Thunderstorms, Tornadoes, and Flooding. This section will focus on the direct effects of tropical cyclones.



Hazard Profile

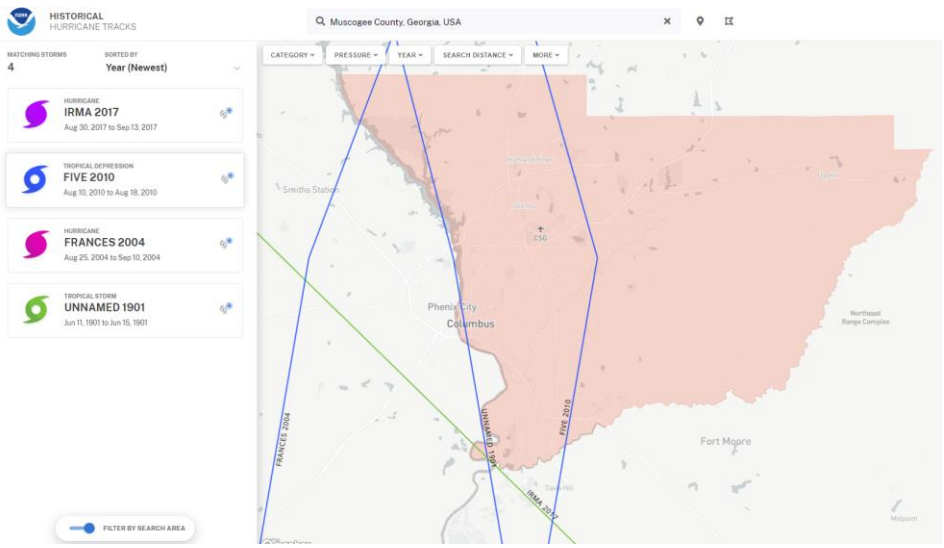
Tropical cyclones have directly impacted Columbus-Muscogee County on an infrequent basis over the last 50 years. However, the possibility of a hurricane or tropical storm retaining their wind strength as far inland as Columbus-Muscogee County is possible. According to the National Centers for Environmental Information, there has been 15 documented impacts from Topical Cyclones in Columbus-Muscogee County over the last 20 years. This equates to a 75% chance of a tropical cyclone impacting Columbus-Muscogee County in any given year. The more likely impacts of a tropical cyclone on Columbus-Muscogee County would be secondary impacts, such as flooding, tornadoes, and severe thunderstorms.

Three tropical cyclones – Hurricane Frances in 2004, Tropical Depression Five in 2010, and Hurricane Irma in 2017 – have had a track that directly dissected Columbus-Muscogee County in the last 50 years. Of these storms, only Hurricane Irma was still at a Tropical Storm strength with max sustained winds of 35 knots. Hurricane Irma dropped 3-4 inches of rain on Columbus-Muscogee County and wind gusts up to 49 mph (tropical storm-strength) were reported in the county.

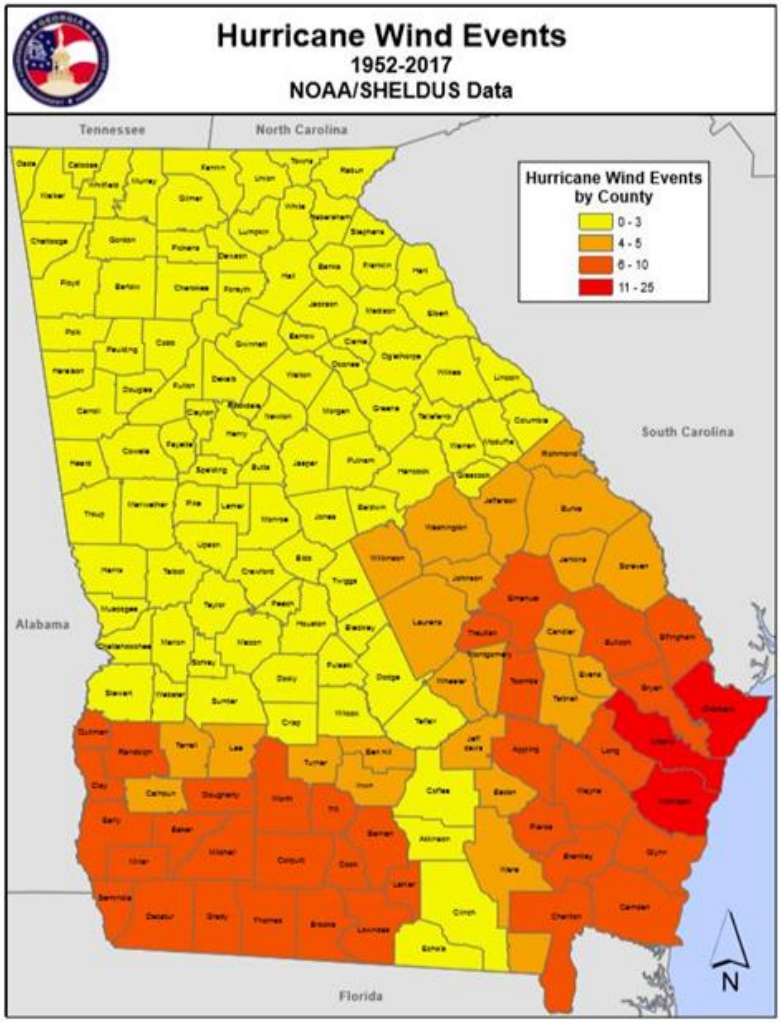
The impacts that would result from hurricane or tropical storm forces on the citizens, infrastructure, and critical facilities of Columbus-Muscogee County could be potentially catastrophic in nature. All tropical cyclone hazard data included for Columbus-Muscogee County is limited to countywide data and is not broken down by jurisdiction.

Assets Exposed to the Hazard

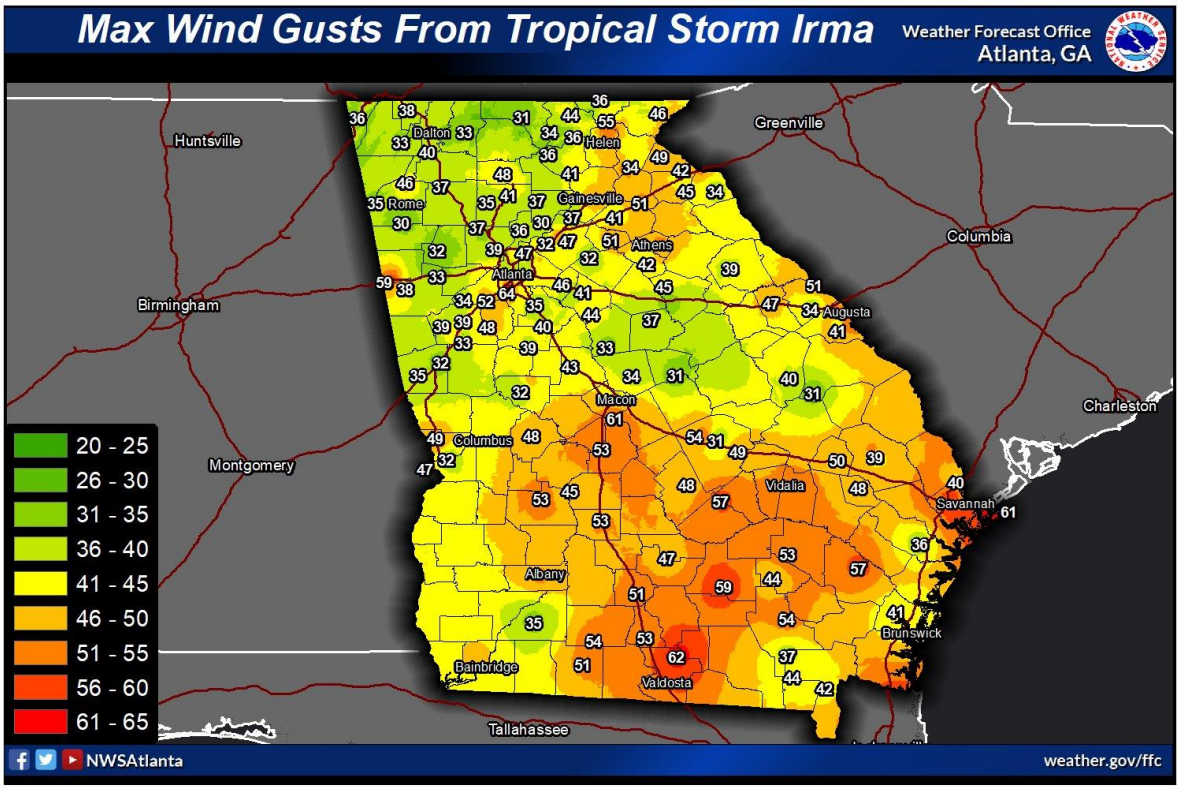
The Columbus Consolidated Government HMPC determined that all critical facilities and all public and private property within Columbus-Muscogee County are susceptible to the direct and indirect impacts of a tropical cyclone.

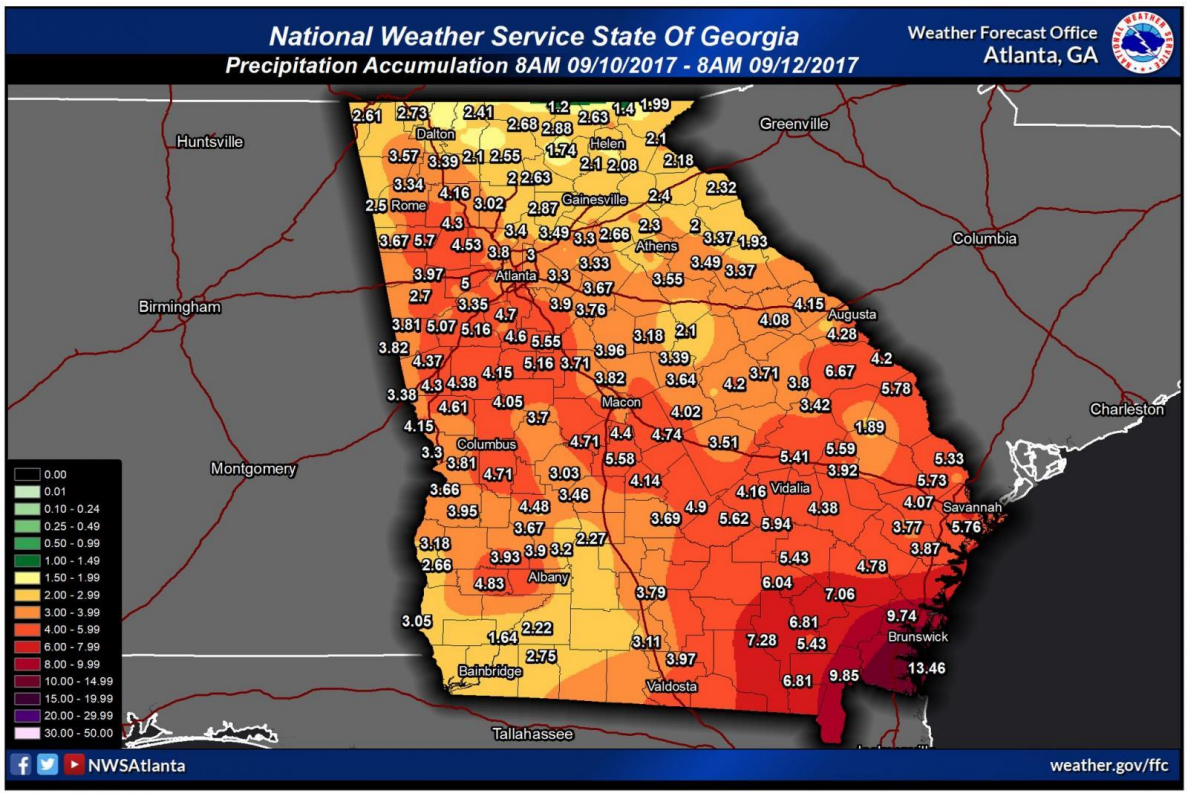


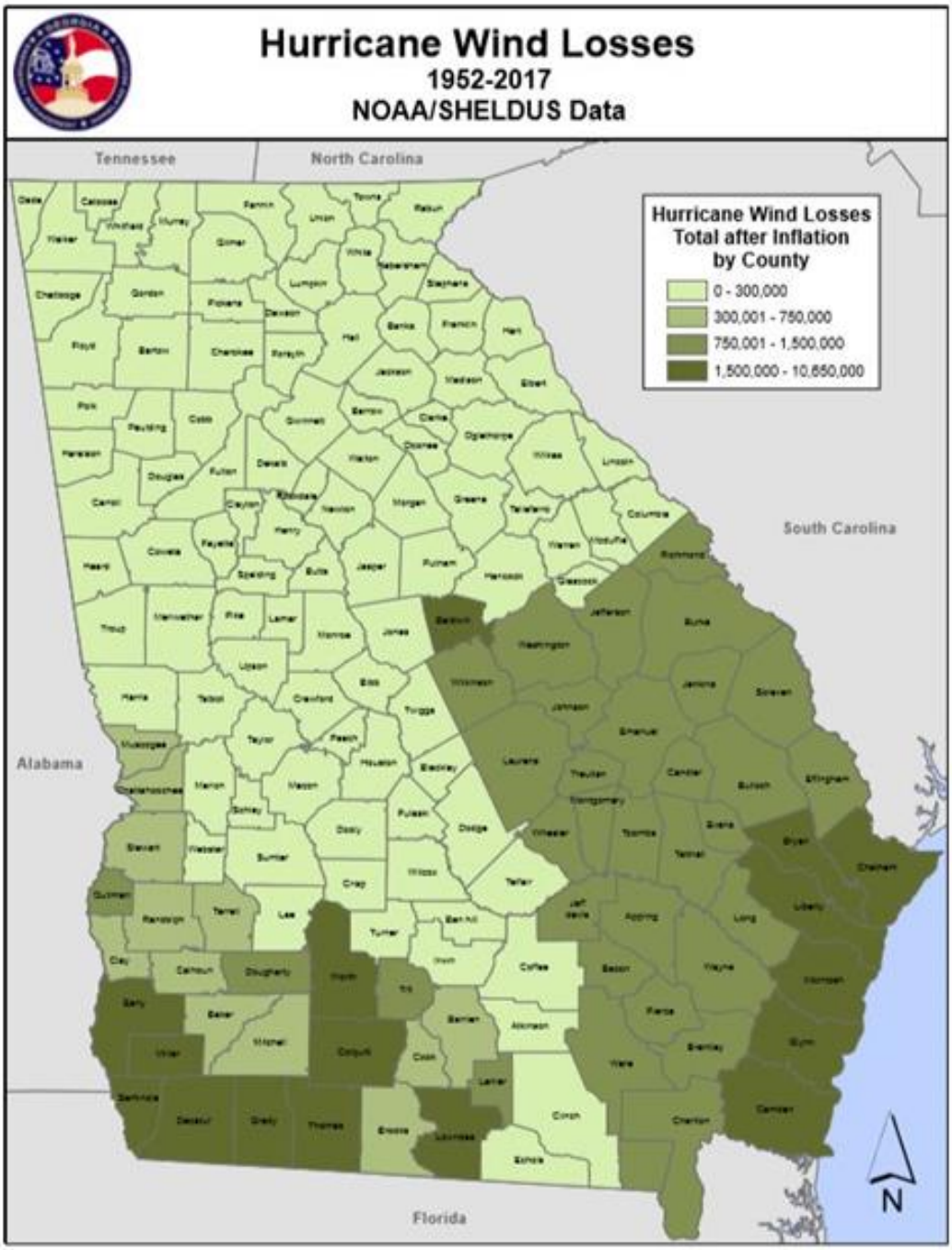
Source: NOAA Office for Coastal Management



Source: 2019-2024 Georgia Hazard Mitigation Strategy and Enhanced Plan


Max Wind Gusts From Tropical Storm Irma
Weather Forecast Office
Atlanta, GA
Huntsville
Birmingham
Montgomery
Tallahassee
Greenville
Columbia
Charleston
Savannah
Augusta
Athens
Atlanta
Gainesville
Dalton
Rome
Helen
Macon
Columbus
Albany
Bainbridge
Valdosta
Brunswick
Vidalia
20 - 25
26 - 30
31 - 35
36 - 40
41 - 45
46 - 50
51 - 55
56 - 60
61 - 65
NWSAtlanta
weather.gov/ffc


National Weather Service State Of Georgia
Precipitation Accumulation 8AM 09/10/2017 - 8AM 09/12/2017
Weather Forecast Office
Atlanta, GA
Huntsville
Birmingham
Montgomery
Tallahassee
Greenville
Columbia
Charleston
Savannah
Augusta
Athens
Atlanta
Gainesville
Dalton
Rome
Helen
Macon
Columbus
Albany
Bainbridge
Valdosta
Brunswick
Vidalia
0.00
0.01
0.10 - 0.24
0.25 - 0.49
0.50 - 0.99
1.00 - 1.49
1.50 - 1.99
2.00 - 2.99
3.00 - 3.99
4.00 - 5.99
6.00 - 7.99
8.00 - 9.99
10.00 - 14.99
15.00 - 19.99
20.00 - 29.99
30.00 - 50.00
NWSAtlanta
weather.gov/ffc

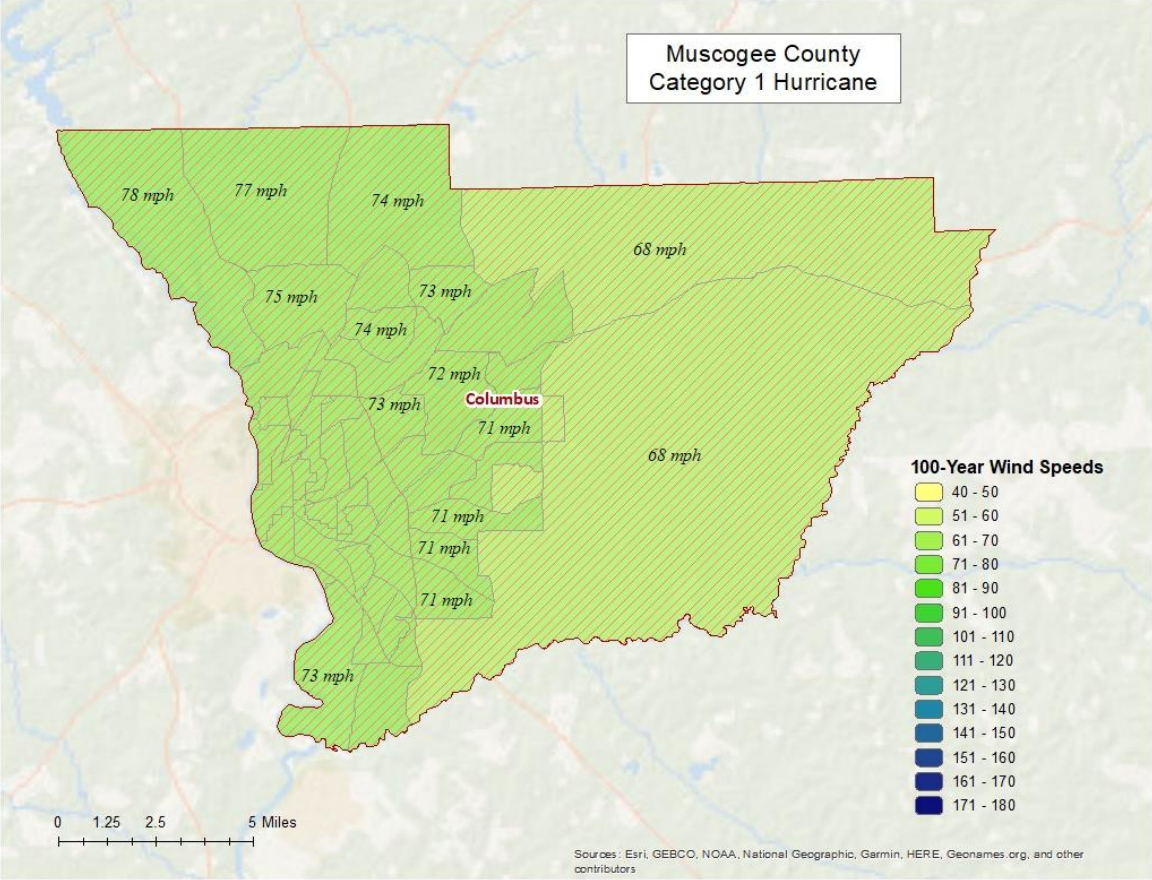


Source: 2019-2024 Georgia Hazard Mitigation Strategy and Enhanced Plan

Estimated Potential Losses

Little information is available regarding damages, in terms of dollars, is available for tropical cyclone losses in Columbus-Muscogee County. Most losses for these events have been labeled under other impacts, such as tornadoes and flooding. According to the National Risk Index, Columbus-Muscogee County has an estimated annual loss of $3,142,454 related to hurricane events. This is the highest estimated annual loss of any hazard listed in the National Risk Index for Columbus-Muscogee County.

According to the 2024 Columbus-Muscogee County HAZUS Report, a 1% annual risk tropical cyclone event would produce winds up to 78 mph in Columbus-Muscogee County, which would be a Category 1 Hurricane. A storm of this magnitude would create more than $13 million in damages and a total economic loss of over $17 million, which equates to a 0.15% loss ratio. A storm of this magnitude would create nearly 17,000 tons of debris.



Source: 2024 Muscogee County HAZUS Report

Land Use and Development Trends

Columbus-Muscogee County currently has no land use trends related to Tropical Cyclones.

Multi-Jurisdictional Considerations

All of Columbus-Muscogee County could potentially be threatened by tropical cyclones. As such, all tropical cyclone mitigation actions should be pursued on a countywide basis.

Climate Change Considerations

Climate change could, potentially, have a significant impact on the expected impacts of tropical cyclones on Columbus-Muscogee County. Tropical cyclones could become more frequent and/or more severe as a result of climate change. Some studies, however, have projected fewer, but stronger, tropical cyclones in the future. With either an increase in severity or an increase in frequency, tropical cyclones could pose a greater risk to Columbus-Muscogee County in the future.

Natural Hazard: **Tropical Cyclone**

Hazard Summary

Even with the relative infrequency of tropical cyclone impacts in Columbus-Muscogee County in the recent past, the potential losses and impacts associated with the event would severely damage the infrastructure and economic viability of Columbus-Muscogee County. The mitigation measures identified in this plan for tropical cyclones should be pursued based on the high impact potential of this hazard and the ability for tropical cyclones to inflict widespread devastation anywhere in Columbus-Muscogee County. Columbus-Muscogee County has had four Federally Declared Disaster related to Tropical Cyclones, most recently in 2018 (Hurricane Michael).

Natural Hazard: **Extreme Temperatures**

Hazard Description

Extreme temperatures – both hot and cold – can pose a significant threat to an underprepared population. This is particularly true in areas where a population has a large elderly population, a large population of small children, and a population with lower socioeconomic status.

The term extreme heat can be subjective to a degree. FEMA, in their "Mitigation Ideas" publication defines extreme heat as "the condition where temperatures consistently stay ten degrees or more above a region's average high temperature for an extended period." The key to this definition is, extreme heat is relative to the average temperature, regardless of the time of year. For example, the National Center for Environmental Information (NCEI) records heat events in Georgia with 60- and 70-degree temperatures in December and January, simply because they are significantly higher than the average temperature for that time of year. According to www.ready.gov/heat, FEMA also offers another definition of extreme heat: "In most of the United States, extreme heat is defined as a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees." This definition can also lead to some subjectivity in the term "extreme." For example, people that live in the southern parts of the country are more adapted to temperatures in the 90s and 100s than people that live in the more northern tiers. This is not to say those temperatures are not still dangerous. Notably, in recent years, more heat related deaths have occurred in the southern tier states than the northern tiers. The National Weather Service, however, focuses on "Excessive Heat," defining it as heat indices of 105 degrees or more using a combination of temperature and humidity as a "real feel."

Just as extreme heat can be subjective, so can extreme cold. Just as the National Weather Service utilizes heat index to attempt to quantify extreme heat, wind chill is often utilized to quantify extreme cold. Prolonged and/or unprotected exposure to extreme cold can be detrimental to people and animals. Additionally, it can be detrimental to exposed infrastructure, as well.

Hazard Profile

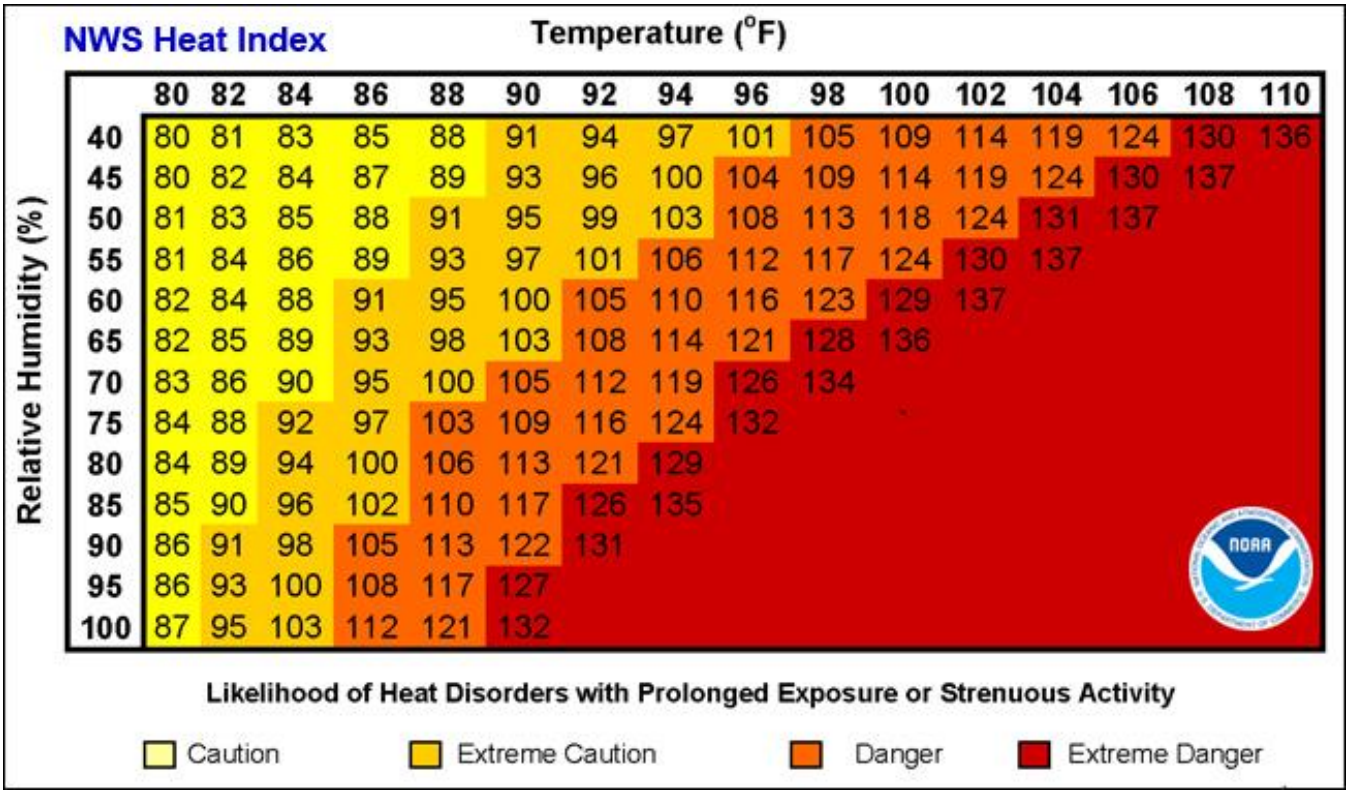
According to the National Climactic Data Center, Columbus-Muscogee County have been exposed to extreme cold/wind chill and excessive heat events on 51 occasions since 1996. This means that Columbus-Muscogee County has averaged 1.9 extreme temperature event every year since 1996. This included 10 extreme cold events and 41 excessive heat events. This averages out to an extreme cold event every 2.7 years (37% annual chance) and 1.5 excessive heat events every year .

In August of 2007, Athens had 6 days that cleared 100 degrees and set four maximum temperature records during the month. On August 10th, temperatures reached 104 degrees, which tied the record for the warmest temperature ever recorded in Columbus. The 2nd all-time high minimum temperature was set on August 11th when temperatures only got down to 81 degrees. This was only 1 degree away from the record (82), which was set in 1999.

Due to the large elderly population (14.8% of total population above the age of 65) and large percentage of the population that is under the poverty line (20.4%), Columbus-Muscogee County's population is particularly susceptible to heat-related illnesses.

Columbus-Muscogee County has also been exposed to many extreme cold events. In 2022, an artic front sent temperatures below 20 degrees across central Georgia, including Columbus-Muscogee County. This

event was accompanied by high winds, which pushed wind chills below 10 degrees in the early morning hours. The wind chill in Columbus was in the single degrees on December 24, 2022.



Source: 2019-2024 Georgia Hazard Mitigation Strategy and Enhanced Plan

Assets Exposed to the Hazard

The Columbus Consolidated Government HMPC determined that all critical facilities and all public and private property within Columbus-Muscogee County are susceptible to the direct and indirect impacts of an extreme temperature event.

Estimated Potential Losses

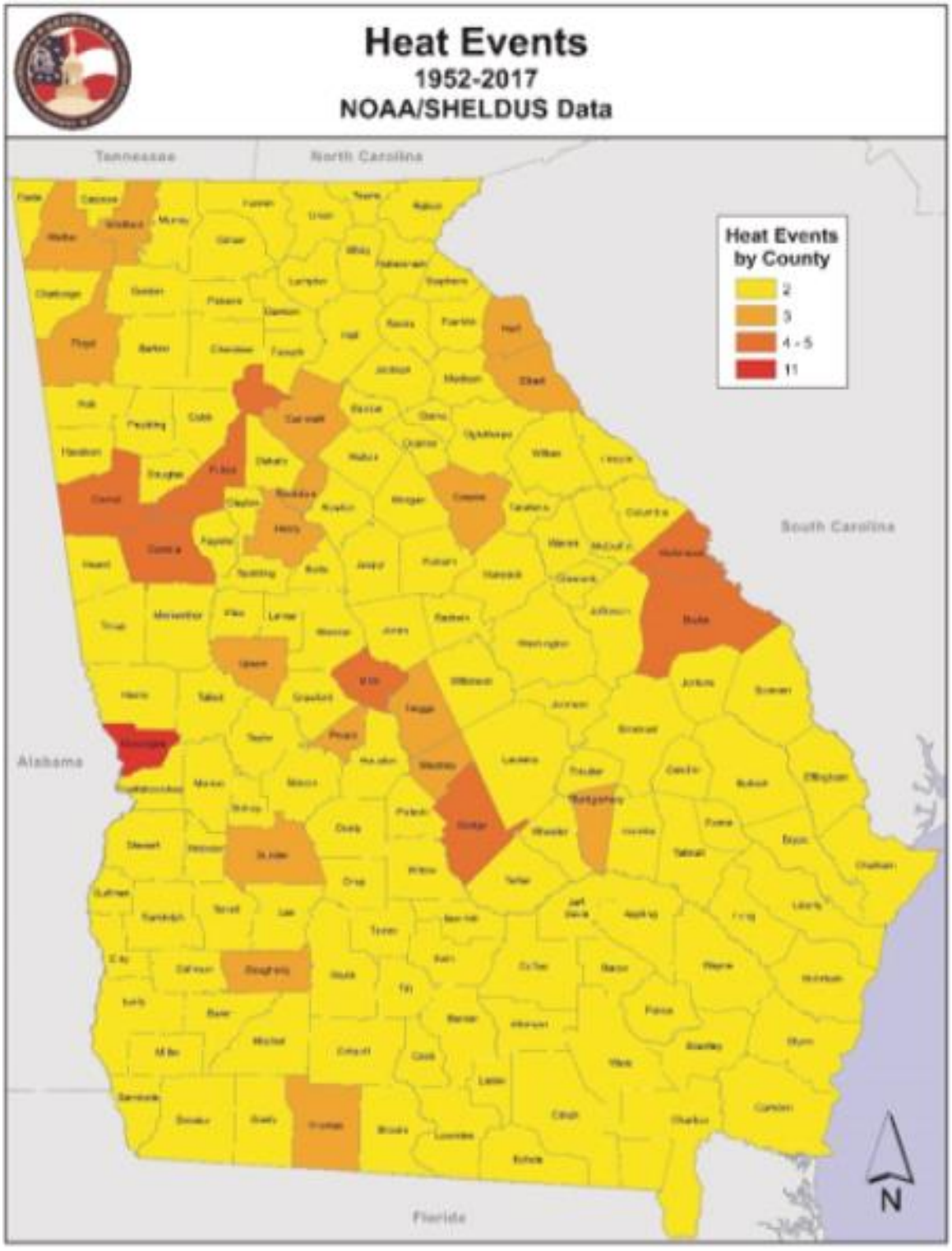
Little information is available regarding damages, in terms of dollars, is available for excessive temperature losses in Columbus-Muscogee County. Most losses for these events have been labeled under other impacts, such as drought and severe winter storms. According to the National Risk Index, the estimated annual loss for Heat Wave in Columbus-Muscogee County is $677,292

Land Use and Development Trends

Columbus-Muscogee County currently has no land use trends related to extreme temperatures beyond increased population growth.

Multi-Jurisdictional Considerations

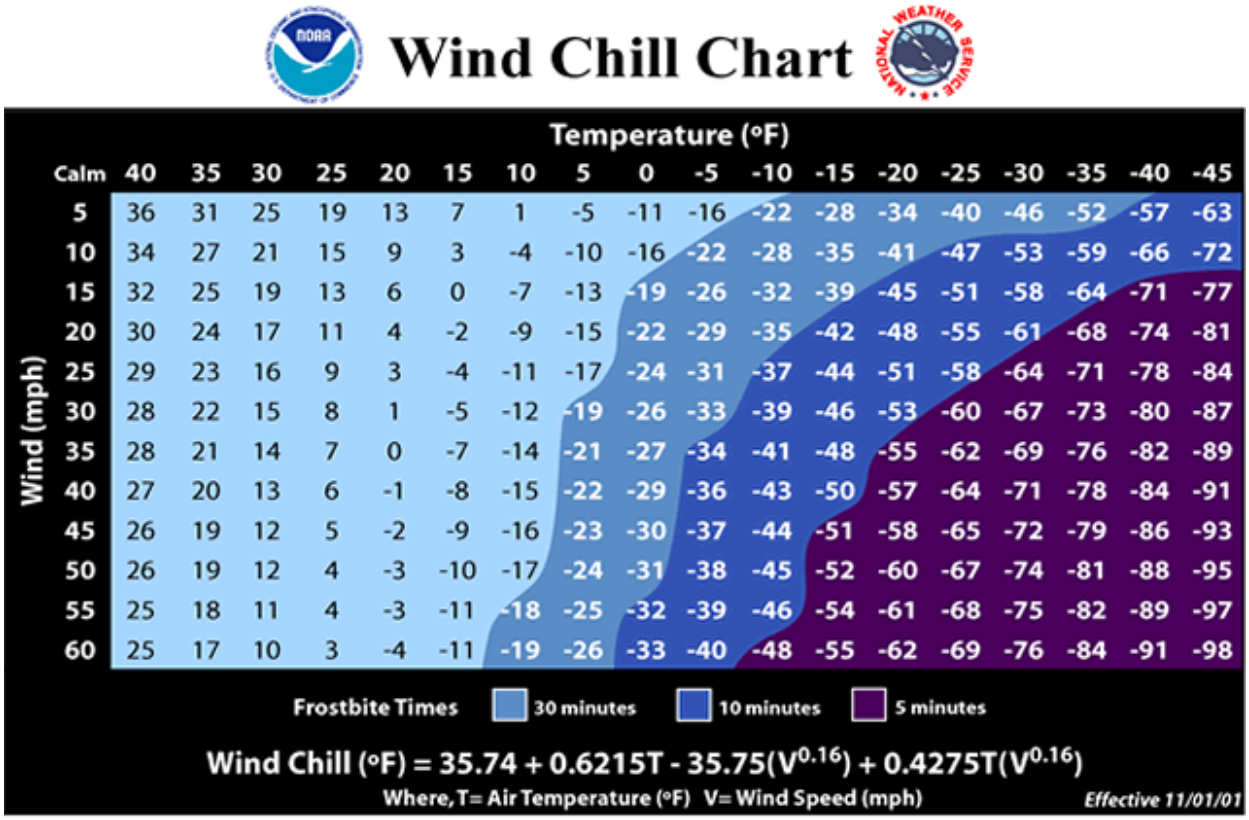
All of Columbus-Muscogee County, could potentially be threatened by extreme temperatures. As such, all extreme temperature mitigation actions should be pursued on a countywide basis. However, areas of higher elevation would be more susceptible to extreme cold events.



Source: 2019-2024 Georgia Hazard Mitigation Strategy and Enhanced Plan

Climate Change Considerations

It is unclear how climate change will impact extreme temperature events in Columbus-Muscogee County. It is possible that extreme heat events could become more severe and longer in duration. However, it is also possible that extreme cold events will be less likely and less severe.



Source: National Weather Service

Hazard Summary

Incidents of extreme temperatures – both hot and cold – pose a significant threat to the citizens of Columbus-Muscogee County. Columbus-Muscogee County's geographical location in the central Georgia increases the likelihood of extreme temperature events with extreme heat events generally considered to be more likely. However, the lack of direct preparation for extreme cold events could lead to greater direct impacts.

Natural Hazard: **Landslide**

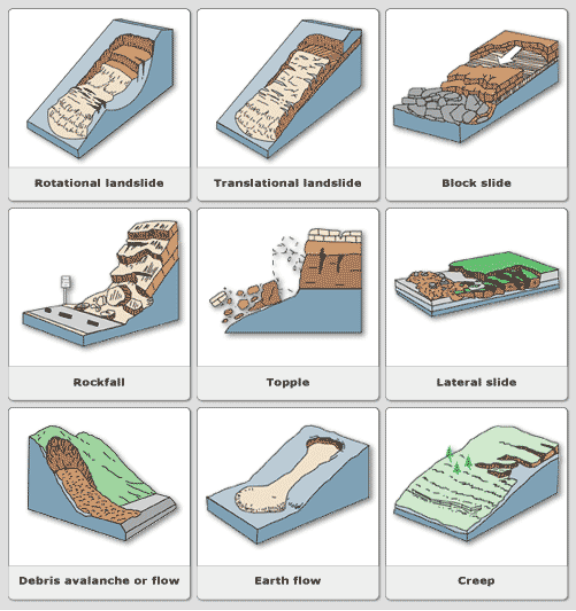
Hazard Description

The term landslide covers a wide range of ground movement. Landslides vary in size and can travel at a rate of a few inches per month to many feet per second depending on slope, type of materials, and moisture content.

Geology, topography, weather and other disasters, such as earthquakes or floods, contribute to landslides. Determining the probability of landslide events is difficult because so many factors can contribute to the cause of a ground failure. Landslides in Columbus-Muscogee County are normally associated with intense or prolonged rain. A combination of precipitation and slopes weakened by heavy rain creating saturated soils is one stimulus.

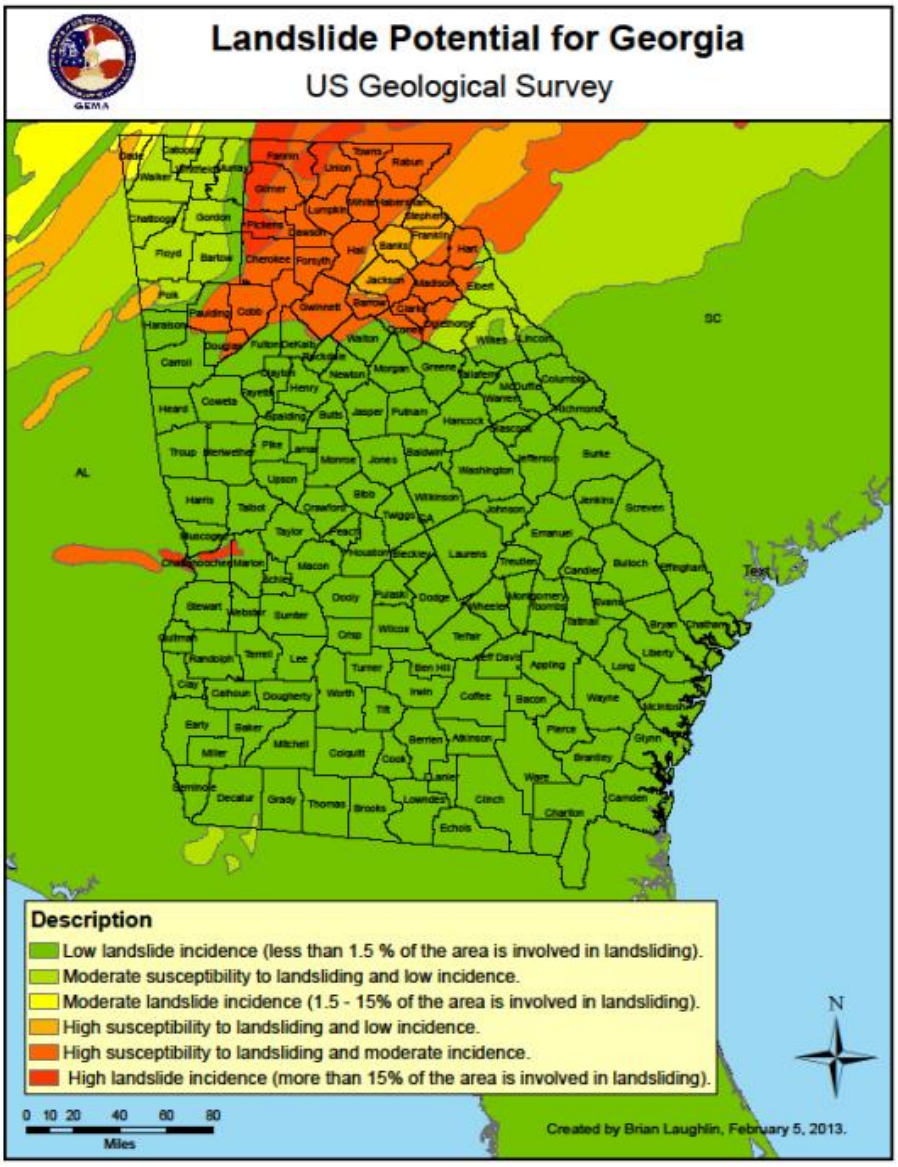
Earthquakes of a magnitude of 4.0 or greater can also induce landslides on susceptible slopes.

The primary types of landslides that occur in Columbus-Muscogee County are debris flows and earth flows. Debris flows are also called mudslides, mudflows, or debris avalanches. They are rivers of a combination of loose soil, rock, organic matter, water, and air that flow downhill. As they continue downhill they tend to grow in volume with the addition of water, soil, boulders and other materials. When the flow reaches flatter ground, it can spread over a large area. Earth flows usually occur in fine-grained materials or clay bearing rocks on moderate slopes. The slope's material liquefies and forms a bowl shape depression at the source area.



Hazard Profile

Normally, landslides in Columbus-Muscogee County have resulted in traffic problems on both state highways and county roads and property damage. There have been ongoing traffic blockages in the unincorporated county due to landslides. Roads along steep slopes are very susceptible to landslides and a slide can happen during milder rainfall conditions then would be expected for a major event. It would also be a threat to public health due to problems of access to medical services.



Source: 2014 State of Georgia Hazard Mitigation Strategy (most up-to-date version)

Expanded development will increase the incidence of landslides, especially on steep slopes. Debris flow on natural slopes is a threat to timber harvest as well. Landslides because of flooding will extend the spread of debris, increase property damages due to weakened structures, and may seriously restrict provision of emergency services.

According to the National Risk Index, there were 2 landslides in Columbus-Muscogee County from 2010-2021. There is no database of landslides from which to pull accurate frequency data. One landslide in 2014 caused damages in the area of Rockdale Drive. A recent flash flood event and development changes in the area were likely culprits for increasing the risk of a landslide. Landslides of a more significant impact are low frequency, but high impact, events.

Natural Hazard: Landslide

Assets Exposed to the Hazard

The Columbus Consolidated Government HMPC determined that all critical facilities and all public and private property within Columbus-Muscogee County are susceptible to the impacts of a landslide due to the unpredictable nature of landslides.

Estimated Potential Losses

Little information is available regarding damages, in terms of dollars, is available for landslide losses in Columbus-Muscogee County. According to the National Risk Index, the expected annual loss for a Landslide event in Columbus-Muscogee County is $136,608.

Land Use and Development Trends

Columbus-Muscogee County currently has no land use trends related to Landslides beyond continued development and population growth, which increases the likelihood of residential and commercial damage as a result of a landslide. Increased development, particularly an increase in impermeable areas, increases the potential for a landslide event.

Multi-Jurisdictional Considerations

All of Columbus-Muscogee County potentially could be threatened by landslides. As such, all landslide mitigation actions should be pursued on a countywide basis.

Climate Change Considerations

It is unclear what impact climate change could have on future landslides in Columbus-Muscogee County. Increased drought conditions or increased heavy rainfall events could have opposing impacts on landslide potential. Additional information is needed in regards to the impact climate change could have on this hazard.

Hazard Summary

Even with the infrequency of landslide impacts in Columbus-Muscogee County, the potential losses and impacts associated with the event would severely damage the infrastructure and economic viability of the County. The mitigation measures identified in this plan should be pursued based on the high impact potential of this hazard and the ability for landslides to inflict widespread devastation anywhere in Columbus-Muscogee County.

Technological Hazard: **Hazardous Materials**

Hazard Description

Hazardous materials, or hazmat, refers to any materials that may pose a real hazard to human health and/or the environment because of its quantity, concentration, and/or physical or chemical characteristics. Hazardous materials include explosives, flammables, combustibles, oxidizers, toxic materials, radioactive substances, and corrosives. Specific federal and state regulations exist regarding the transport and storage of hazardous materials.

A hazardous materials spill or release occurs when a hazardous material gets into the environment in an uncontrolled fashion. Response to a hazmat spill or release depends greatly on the type of material involved and the subsequent physical and chemical characteristics. Major sources of hazardous materials spills include transportation accidents on roadways and railways, pipeline breaches, and spills into rivers and creeks. Jurisdictions with facilities that produce, process, or store hazardous materials are at risk, as are facilities that treat or dispose of hazardous materials.

Hazard Profile

Data from the United States Coast Guard National Response Center was reviewed regarding hazardous materials spill history in Columbus-Muscogee County. Data is available from 1982 to 2023 and all available data was reviewed. There were 392 NRC reported hazardous materials spills or releases in Columbus-Muscogee County over a 41-year period. It is anticipated that many more hazardous materials incidents have occurred over the last 41 years but have not been reported. According to the NRC data, Columbus-Muscogee County averages 9.6 hazardous materials incidents of a reportable amount each year. This equates to a 2.6% chance of a hazardous materials spill of a reportable amount on any given day. The greatest threat for a hazardous materials spill comes from the transportation of materials through Columbus-Muscogee County. This is particularly true for the Interstate 185, US Highway 80, and US Highway 280 corridors. Interstate 185 connects Columbus to Atlanta and US Highway 80 connects Macon to Montgomery.

Hazardous materials releases can also be the result of railway or fixed facility incidents. Fixed facilities continue to be an increasing concern due to Columbus-Muscogee County's growing industrial footprint. Additionally, the proximity of Fort Moore to Columbus-Muscogee County poses an additional threat for a hazardous materials release. This includes both a release on the Fort and the increase of hazardous materials entering the Fort.

Of concern to the Columbus Consolidated Government Hazard Mitigation Committee is the exposure of water sources to potential hazardous materials incidents. A hazardous materials incident at or near drinking water sources could have devastating effects on a large population in Columbus-Muscogee County. There is also concern about the economic impact of a major water contamination on the Chattahoochee River.

Assets Exposed to Hazard

The environment is particularly vulnerable to the threat posed by hazardous materials. Waterways are at a high risk for contamination from hazardous materials. Water contamination is of concern to the Columbus Consolidated Government HMPC. Public and private property located near fixed hazardous materials facilities are also a greater risk than the general population of Columbus-Muscogee County. Water contamination from a hazardous materials release is of particular concern to the Columbus Consolidated Government Hazard Mitigation Planning Committee.

Estimated Potential Losses

Estimation of potential losses is difficult regarding hazardous materials due to the vast array of potential types of hazardous materials that could be involved in the incident and unknown costs regarding environmental damages. No recorded information was found regarding the losses associated with hazardous materials incidents in Columbus-Muscogee County. However, a hazardous materials release, whether in transport or at a fixed facility, would incur significant costs regarding emergency response, potential road closures, evacuations, watershed protection measures, expended man-hours, and cleanup materials, equipment, and personnel.

Land Use and Development Trends

Columbus-Muscogee County currently has no land use trends related to Hazardous Materials beyond continued population growth – particularly in the northern areas of the calendar near the Harris County line.

Multi-Jurisdictional Considerations

All of Columbus-Muscogee County is vulnerable to both fixed facility and transportation-related hazardous materials releases. However, areas along the Interstate 185, US Highway 80, and US Highway 280 corridors are of particular concern.

Hazard Summary

Hazardous materials incidents pose a significant threat to the citizens, infrastructure, and critical facilities of Columbus-Muscogee County. Unknown quantities of hazardous materials are transported daily through Columbus-Muscogee County. These materials are often transported via highways. Water contamination because of a hazardous materials spill is of significant concern to the Columbus Consolidated Government HMPC. As a result of the threat posed by hazardous materials, the Columbus Consolidated Government HMPC has identified mitigation actions directly related to this threat.

Technological Hazard: **Dam Failure**

Hazard Description

Georgia law defines a dam as any artificial barrier, which impounds or diverts water, is 25 feet or more in height from the natural bed of a stream or has an impounding capacity at maximum water storage evaluation of 100 acre-feet or more. Dams are generally constructed to provide a ready supply of water for drinking, irrigation, recreation, and other purposes. Dams can be constructed from earth, rock, masonry, concrete or any combination of these materials.

Dam failure is a term used to describe a significant breach of a dam and the subsequent loss of contained water. Dam failure can cause significant damages downstream to structures, roads, utilities, and crops. Dam failure can also put human and animal lives at risk. National statistics indicate that one-third of all dam failures in the United States are caused by overtopping due to inadequate spillway design, debris blocking spillways, or settlement of the dam crest. Another third of all US dam failures are the result of foundation defects, including settlement and slope instability.

Hazard Profile

There are 12 category I and 15 category II dams located within Columbus-Muscogee County. Category I dams are those that would pose a possible threat to human life if a failure were to occur. All category I dams must be inspected annually according to Georgia's Safe Dams Act.

The threat of a dam failure in Columbus-Muscogee County could potentially lead to downstream flooding. This downstream flooding would have many of the same hazards as a flood event, but with the onset of such an event being much quicker than in a typical flood event.

Eleven of the category 1 dams in Columbus-Muscogee County are owned by the Columbus Consolidated Government. The fourth is owned by the Blue Ridge SWCD. Any of the 4 Category I dams located in Columbus-Muscogee County could have direct, devastating impacts on the local population.

The dam of greatest concern, from an immediate downstream impact, would be Bull Creek Watershed Structure #25. This 59-foot earthen dam is located immediately adjacent to a subdivision that would likely see significant flooding and inundation if a breach were to occur. Additionally, the Lake Oliver Dam on the Chattahoochee River could pose a significant threat to areas along the river, particularly residential areas near Bibb City and commercial areas of downtown Columbus, if a breach were to occur at this location. Lake Oliver Dam is a 70-foot, concrete dam that spans 2,150 across the Chattahoochee River. The dam holds back Lake Oliver, which is a 2,150-acre reservoir. A breach at this dam could have devastating impacts downstream and on the Columbus-Muscogee County economy.

There have not been any dam failures in Columbus in the last 10 years and no probability estimates can be made regarding the likelihood of a future event.

Assets Exposed to Hazard

To evaluate the assets that would potentially be impacted by a dam failure, the Columbus Consolidated Government HMPC attempted to identify known structures within, or close to, the 100-year floodplain. All areas of Columbus-Muscogee could be exposed to the hazards of other dams or face secondary hazards from the dams.

Estimated Potential Losses

Loss estimations are not applicable since it is not known which dam will fail and how significant of failure will occur.

Land Use and Development Trends

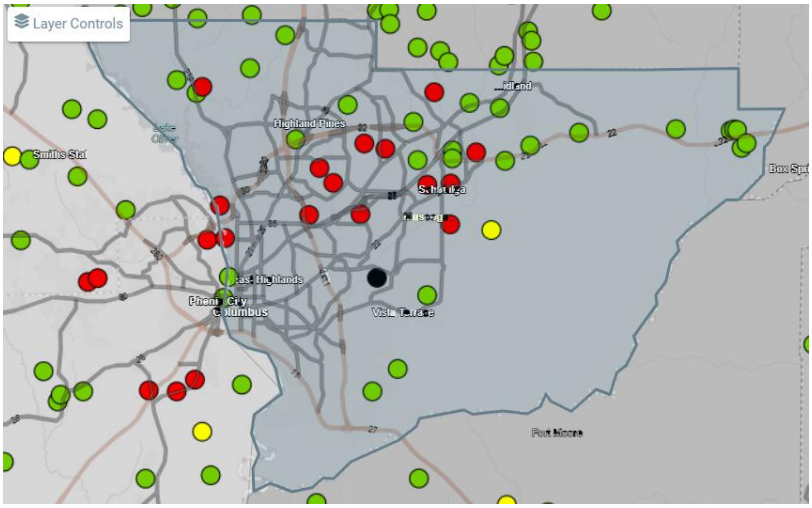
The Columbus Consolidated Government participates in the National Flood Insurance Program (NFIP) and follows the program's guidelines to ensure future development is carried out in the best interests of the public. The Columbus Consolidated Government (CID No. 135158B) first entered the NFIP on October 30, 1970. According to the NFIP guidelines, the County has executed a Flood Damage Prevention Ordinance. This ordinance attempts to minimize the loss of human life and health as well as minimize public and private property losses due to flooding. The ordinance requires any potential flood damage be evaluated at the time of initial construction and that certain uses be restricted or prohibited based on this evaluation. The ordinance also requires that potential homebuyers be notified that a property is located in a flood area. In addition, all construction must adhere to the Georgia State Minimum Standard Codes and the International Building Codes, which is the 2018 International Building Codes.

Multi-Jurisdictional Considerations

During a dam failure event, many portions of Columbus-Muscogee County would potentially be impacted by flooding. However, the area's most prone to flooding have historically been those areas located within the 100-year floodplain and downstream from dams.

Climate Change Considerations

Climate change could, potentially, have an impact on the expected impacts of dam failure in Banks County. However, this would only be the case if the dam failure is directly related to a flooding event, which is the case in less than 20% of all dam failures. Dam failures are generally related to construction and age issues.



Source: National Inventory of Dams – US Army Corps of Engineers

Hazard Summary

Dam failure poses a threat to Columbus-Muscogee County and its citizens, infrastructure, and critical facilities. A dam failure could prove catastrophic for areas downstream of the dam, particularly if the failure were to occur at any of the Category I dams located in Columbus-Muscogee County. As a result, mitigation efforts for dam failure should be focused in this potentially affected area.

Technological Hazard: **Transportation Incident**

Hazard Description

There are many secondary hazards that could be associated with transportation incidents. Injuries or deaths can occur as a result of the impact of a transportation accident, by a hazardous materials release because of a transportation incident, or by other related transportations hazards. Transportation can occur via roadways, highways, interstates, railways, air, or navigable waterways. Each transportation type poses their own unique hazard issues and consequences.

Roadway hazards are most likely to be caused by a motor vehicle accident involving one or more cars, trucks, vans, or transport vehicles. These incidents can have injuries because of the impact of the MVA or a hazardous materials release into the local environment, including waterways. Railway incidents pose many of the same dangers as motor vehicle accidents. However, the threat of a hazardous materials release is greatly increased when railway transportation incidents are considered.

Air accidents can include commercial airplanes, private airplanes, hot air balloons, helicopters, or other forms of air travel. Each of these incidents can cause a significant threat to human life as well as posing a hazardous material threat due to the cargo being transported or the fuel being used. Navigable waterway incidents can create formidable incidents for response organizations. Because of the waterway, technical expertise is needed to carry out rescue operations, especially in swift-moving waterways. Also, any incident in a waterway is likely to have environmental impacts.

Hazard Profile

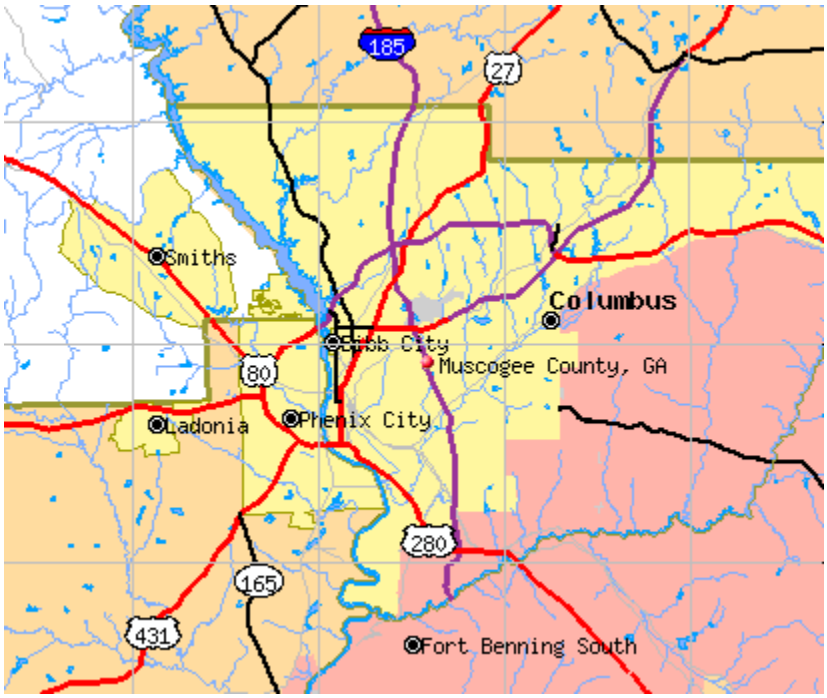
Transportation incidents are of a significant concern in Columbus-Muscogee County. Passing through Columbus-Muscogee County are Interstate 185, US Highways 27, 80, and 280 and Georgia Highways 1, 22, 85, 219, and 540. Interstate 185 and US Highway 80, in particular, are major transportation routes connecting Columbus to Atlanta (185) and Montgomery to Macon and the port of Savannah. Additionally, there is a proposed new interstate, Interstate 14, which may traverse Muscogee County and connect Texas to Central Georgia.

Columbus-Muscogee County is also home to the Columbus Metropolitan Airport. The airport has two asphalt runways – one 7,000 feet long and one 4,000 feet long. From October 2021 to September 2022, Atlanta was the most popular destination for flights leaving from and arriving to Columbus Metropolitan Airport. Charlotte, NC and Dallas/Ft. Worth, TX were 2nd and 3rd on the popular destinations list. In 2022, Columbus Metropolitan Airport averaged 103 flights per day.

The Columbus-Muscogee County Hazard Mitigation Plan Update committee also expressed particular concern of how a transportation incident both within Columbus and in other areas could lead to supply chain issues that would impact the community. This is a particular concern both because of the higher levels of social vulnerability in the community and the position of Columbus as a regional center of commerce for west central Georgia. Supply chain issues impacting Columbus could have significant impacts on the surrounding jurisdictions, as well.

Assets Exposed to Hazard

All assets and critical facilities located along or near any transportation route could potentially be impacted by a transportation incident. Areas within Columbus-Muscogee County that are not located along or near a transportation route could still face residual impacts.



Estimated Potential Losses

Estimated potential losses cannot be anticipated with this event due to the vast number of differing scenarios regarding transportation incidents.

Land Use and Development Trends

Columbus-Muscogee County currently has no land use trends related to Transportation Incidents beyond an increase in overall population which, in turn, increases the likelihood and potential impact of a transportation incident. The primary areas of growth have been in northern areas near the Harris County line.

Multi-Jurisdictional Considerations

Columbus-Muscogee County could potentially be impacted by a transportation incident. However, areas along the Interstate 185, US Highway 80, and US Highway 280 are the areas of greatest concern.

Hazard Summary

The Columbus Consolidated Government HMPC has determined that transportation incidents pose a high risk to their jurisdictions due to the unpredictable nature and likelihood of the incident. As a result, the Columbus Consolidated Government HMPC has developed mitigation strategies and actions with transportation incidents in mind.

Technological Hazard: **Terrorism**

Hazard Description

The Federal Bureau of Investigation (FBI) defines terrorism as violent acts or acts dangerous to human life that violate federal or state law, appear to be intended to intimidate or coerce a civilian population, affect the conduct of a government by mass destruction, assassination, or kidnapping, and is calculated to influence or affect the conduct of a government by intimidation or retaliate against government conduct. Terrorism is usually referenced as being premeditated and politically motivated.

Terrorist acts are, by their very nature, designed and carried out with the intention of inflicting mass casualties and extensive property damage. When an act of terrorism is carried out in a jurisdiction, it will likely be necessary to implement multiple aspects of the emergency management system and summon additional resources from local, state, and federal partners.

Terrorism is generally divided into two types: domestic terrorism and international terrorism. Domestic terrorism is defined as terroristic acts focused on facilities and populations without foreign direction. International terrorism involves activities that are foreign-based and/or sponsored by organizations outside of the United States.

Terrorists often use threats to create fear among the public, to convince citizens that government is powerless to prevent terrorism and to get immediate publicity for their causes. Weapons of Mass Destruction (WMDs), including incendiary, explosive, chemical, biological, radiological, and nuclear agents, have the capability to cause death or serious bodily injury to a significant number of people, thus posing the threat of a catastrophic incident. Terrorism can also include arson, agro-terrorism, armed attack, intentional hazardous materials release, water or food contamination, and attacks on infrastructure and electronic information systems.

Hazard Profile

Terrorism targets have historically been facilities that make a large economic or social impact on the targeted government or jurisdiction. In Columbus-Muscogee County, all critical facilities could be potential targets. Terrorism includes a multitude of potential approaches, including agro-terrorism, which is terrorism targeted toward agriculture. Additionally, a terrorist contamination of the water sources is of concern.

Within Columbus-Muscogee County, there are many areas that could be viewed as potential targets for terrorism due to their economic impact on the area and overall importance. Fort Moore is considered to be the highest level potential target in Columbus-Muscogee County. Fort Moore, formerly known as Fort Benning, supports more than 120,000 active duty military, family members, reserve components, retirees, and civilian employees. Fort Moore is home to the United States Army Maneuver Center of Excellence, the United States Army Armor School, United States Army Infantry School, and the Western Hemisphere Institute for Security Cooperation (formerly known as the School of the Americas). The Western Hemisphere Institute for Security Cooperation, in particular, has been the subject on protests and public demonstrations in the past. Fort Moore is also home to the 75th Ranger Regiment, known as the Army Rangers. Overall, Fort Moore covers over 284 square miles of land in Muscogee, Chattahoochee, and Russell (AL) Counties. According to the 2017 Columbus Comprehensive Annual Financial Report, Fort Moore supplies nearly 40,000 jobs to the community – 6 times more than the next closest jobs supplier (the Muscogee County School District).

Technological Hazard: **Terrorism**

While active shooter situations are not always classified as terrorism, for this plan, the Columbus Consolidated Government HMPC has chosen to classify them as such. Active shooter situations can occur in any location, including businesses, schools, government buildings, and public spaces. Schools are seen as particularly vulnerable to these types of situations due to the high publicity of recent active shooter events. While active shooter events and other acts of terrorism occur worldwide, they have low probability for Columbus-Muscogee County but would have devastating impacts if they were to occur. To help mitigate some of these impacts, Columbus-Muscogee County has exercised an active shooter response in the past to better prepare for any such event.

The Columbus Consolidated Government Hazard Mitigation Plan Update committee expressed particular concern about the use of an electromagnetic pulse or water contamination as a means of impacting the public. Both of these potentially intentional acts could have devastating impacts on the jurisdiction, particularly for vulnerable populations. Additionally, the committee was also concerned about how a terrorist act in Columbus or anywhere nationwide could have significant impacts on the national financial system. Due to their regional important, impacts to the financial system could have out-weighed impacts on Columbus and the surrounding jurisdictions.

Assets Exposed to the Hazard

Due to the unpredictable nature of terrorism, all public and private structures are threatened by the terrorism hazard. This includes all critical facilities.

Estimated Potential Losses

Losses due to terrorism are difficult to estimate due to the unpredictable nature of terrorism. The type of terrorist act carried out, location of the act, and the impact of the act would all affect the potential losses. Please see the critical facilities information for estimated potential losses for each critical facility.

Land Use and Development Trends

Columbus-Muscogee County currently has no land use trends related to Terrorism.

Multi-Jurisdictional Considerations

All of Columbus-Muscogee County are vulnerable to potential acts of terrorism. However, critical facilities and their surrounding areas are considered to be at the greatest risk.

Hazard Summary

Terrorism, while a low-probability hazard, would have devastating effects on Columbus-Muscogee County. These impacts would be immediate and long-lasting and could be potentially economically crippling to Columbus-Muscogee County and surrounding communities.

Technological Hazard: **Critical Infrastructure Failure**

Hazard Description

Infrastructures are particularly vulnerable to both natural and technological hazards. These include electrical utilities, water utilities, gas pipelines, fuel supplies, and other infrastructures that supply vital supplies and services to the community. While an infrastructure failure would most likely be a secondary hazard of one of the other hazards identified in this plan, an infrastructure failure could be a solo incident itself.

A lack of connection with outside sources could lead to public panic, poor emergency response capabilities, and other domino hazards. These events pose a significant threat to many jurisdictions.

Hazard Profile

In case of any failure of a utility infrastructure, general difficulties would be exacerbated for both emergency responders and for the public. The reliance on wireless communications, particularly for the public safety sector, increases the vulnerability of the Columbus Consolidated Government's emergency response agencies to a communications failure. A failure in the communications sector could have significant impacts to the Columbus Consolidated Government's radio system, telephone systems, and internet infrastructure. Each of these would be devastating to both public safety and the general public.

Additionally, a utility infrastructure failure is also of significant concern to the Columbus Consolidated Government Hazard Mitigation Planning Committee. This includes water, power, and natural gas utility failures. This type of failure would have significant impacts to the citizens of Columbus-Muscogee County. Gas transmission lines and hazardous liquid pipelines traverse the northwestern area of Columbus-Muscogee County. One hazardous liquid pipeline comes to an end at the Plantation Pipeline facility in Columbus-Muscogee County. These pipelines highlight the supply chain issues that may impact Columbus in the case of a critical infrastructure failure.

In addition to traditional critical infrastructure, Columbus-Muscogee County, due to its regional importance, is particularly concerned about a failure of critical infrastructure that would have direct impacts on logistics. Columbus-Muscogee County serves as the primary source of jobs, medical care, and commerce in the West Central Georgia region. In total, the Columbus Metropolitan Statistical area encompasses over 330,000 residents. A critical infrastructure failure could have wide-ranging devastating impacts on the region.

Assets Exposed to Hazard

All assets and critical facilities within Columbus-Muscogee County could potentially be impacted by an infrastructure failure.

Estimated Potential Losses

Estimated potential losses cannot be anticipated with this event due to the vast number of differing scenarios regarding utility failure.

Land Use and Development Trends

Columbus-Muscogee County currently has no land use trends related to infrastructure failures beyond continued population growth and an ever-increasing industrial footprint.

Source: National Pipeline Mapping System

Multi-Jurisdictional Considerations

All areas of Columbus-Muscogee County could potentially be impacted by an infrastructure failure. However, the more remote areas of Columbus-Muscogee County are particularly susceptible to the impacts of a critical infrastructure failure.

Hazard Summary

The Columbus Consolidated Government HMPC has determined that critical infrastructure failures pose a high risk to their jurisdictions due to the unpredictable nature of the incident. As a result, the Columbus Consolidated Government HMPC has developed mitigation strategies and actions with infrastructure failures in mind.

Technological Hazard: **Emergent Infectious Diseases**

Hazard Description

Microorganisms, such as bacteria, viruses, parasites, fungi, or prions, surround us within the environment. They can even be found within our own bodies. Most microorganisms are completely harmless, and many are actually beneficial. However, some of these organisms are pathogenic, meaning they cause or can cause disease. Infectious diseases are caused by these pathogenic organisms and are communicable – meaning they can be spread from person to person either directly or indirectly. Direct transmission of the disease occurs through actual physical contact with an infected person or their bodily fluids. Indirect transmission of a disease occurs when an infected person contaminates a surface by sneezing, coughing, etc., and a non-infected person comes into contact with that infected surface. Another means of indirect transmission includes vectors, such as mosquitos, flies, mites, ticks, fleas, rodents, or dogs, which may carry the pathogenic microorganism and transmit it to people via a bite. Infectious diseases can also impact animal populations, particularly livestock and other farm animals. Even though these diseases may not directly affect humans, the economic impact of these diseases can be just as harmful, if not more so, to the community.

Infectious diseases can occur as primary events or they may occur as a cascading result of another disaster, such as a tornado, flood, or winter weather. Infectious diseases can vary greatly in severity and magnitude. According to the World Health Organization, infectious diseases account for three of the ten leading causes of death worldwide – HIV/AIDS, lower respiratory infections, and diarrheal disease. These three events, combined with tuberculosis and malaria, account for 20% of deaths globally.

In Western countries, the impact of infectious diseases has diminished greatly over the last 75 years due to improved sanitation, personal hygiene, vaccinations, and the use of antibiotics. In the United States, only two infectious diseases – seasonal influenza and pneumonia – rank in the top ten leading causes of death. Annually, there are 1,500 deaths in the United States from seasonal influenza and another 52,000 from pneumonia. Children and older adults are the greatest at risk for both.

Emergent infectious diseases are those that are appearing in a population for the first time. Re-emergent infectious diseases are those that may have previously existed in a population, but levels had dropped to the point where it was no longer considered a public health problem until levels once again began increasing.

During the last 25 years, emergent and re-emergent infectious diseases have been on the rise. The below table outlines some of the contributing factors to this rise:

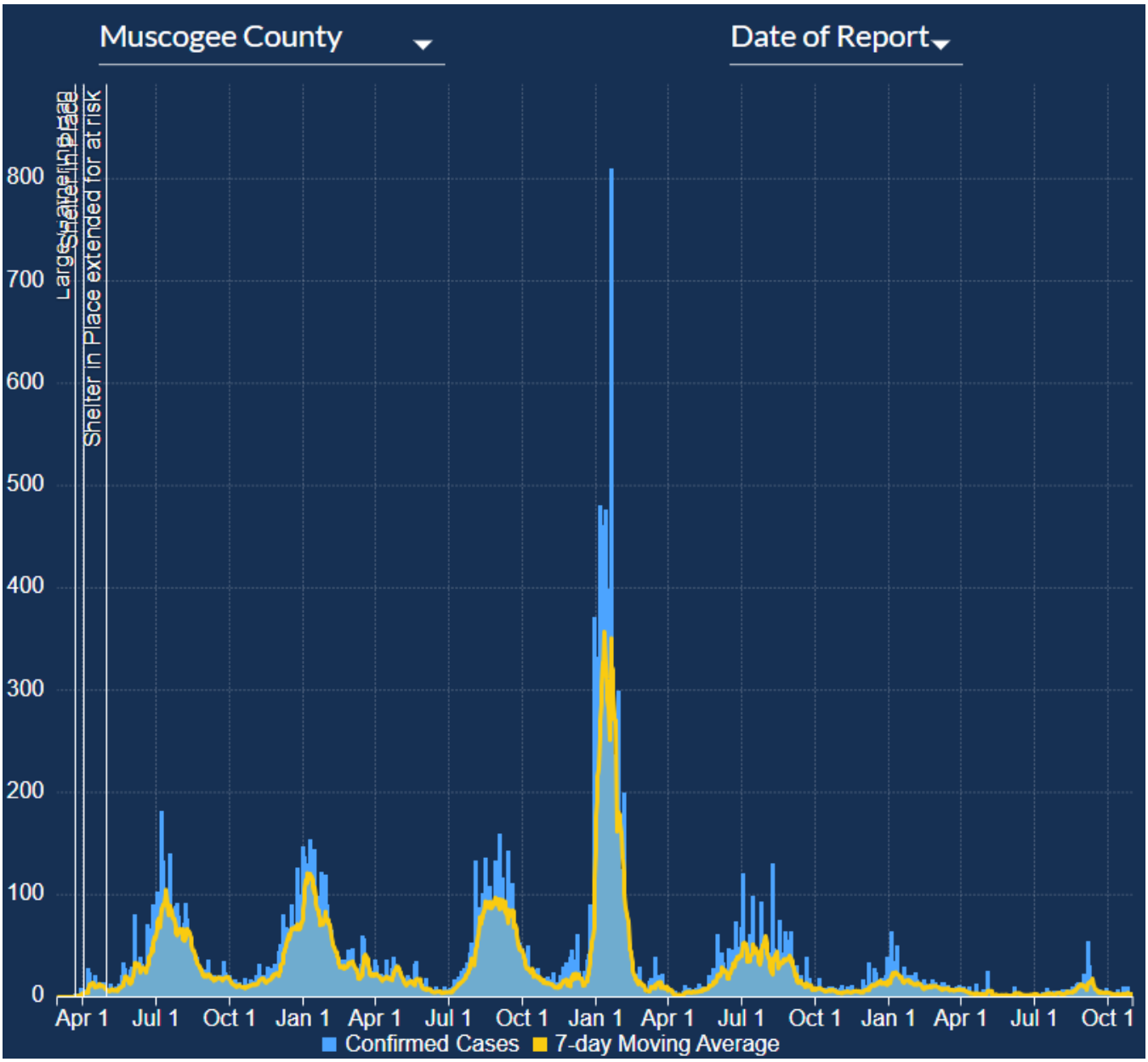
Contributing Factors to Increasing Occurrence of Emergent Diseases
Agent-Related Factors
Evolution of pathogenic infectious agents
Development of resistance to drugs
Resistance of disease carriers to pesticides
Host-Related Factors
Human demographic changes (humans inhabiting new areas)
Human behavior (sexual practices and drug use)
Human susceptibility to infection
Environment-Related Factors
Economic development and land use patterns
International travel and commerce
Deterioration of surveillance systems

Due to a lack of ready-made vaccines for these diseases and a lack of immunity in the population, emergent and re-emergent infectious diseases are much more likely to escalate to pandemic levels rapidly.

CDC-Identified Emergent and Re-Emergent Infectious Diseases	
Drug-resistant Infections	Mad Cow/Variant Creutzfeldt-Jakob Diseases
Campylobacteriosis	Chagas Disease
Cholera	Cryptococcosis
Cryptosporidiosis (Crypto)	Cyclosporiasis
Cysticercosis	Dengue Fever
Diphtheria	Ebola Hemorrhagic Fever
Group B Streptococcal Infection	Hantavirus Pulmonary Syndrome
Hepatitis C	Hendra Virus Infection
Histoplasmosis	HIV/AIDS
Influenza	Lassa Fever
Legionnaires' Disease and Pontiac Fever	Leptospirosis
Listeriosis	Lyme Disease
Malaria	Marburg Hemorrhagic Fever
Measles	Meningitis
Monkeypox	MRSA
Nipah Virus Infection	Norovirus Infection
Pertussis	Plague
Polio	Rabies
Rift Valley Fever	Rotavirus Infection
Salmonellosis	SARS and COVID-19
Shigellosis	Smallpox
Sleeping Sickness (Trypanosomiasis)	Tuberculosis
Tularemia	Valley Fever (Coccidioidomycosis)
VISA/VRSA	Staphylococcus Aureus
West Nile Virus Infection	Yellow Fever

Hazard Profile

Emergent Infectious diseases are of significant concern to the Columbus Consolidated Government HMPC, particularly those that would have an impact on the human population or animal population of Columbus-Muscogee County. Columbus-Muscogee County would likely see significant economic impacts from an outbreak involving animal populations, such as an Avian Flu, due to the large economic base agriculture provides (over $120 million in annual sales). The lack of current vaccines and preparatory activities for these diseases has created a situation where the potential impact to Columbus-Muscogee County of a pandemic or epidemic could be catastrophic. The most recent pandemic scare in the Central Georgia area was the 2009-2010 H1N1 Swine Flu. There were 1286 cases of H1N1 in Georgia in 2009-2010 and 33 deaths. Most registered cases occurred with people between the ages of 5 and 29. This equates to a mortality rate of just over 2.5% - which is slightly lower than the 3% rate of the 1918-1919 Spanish Flu Pandemic. The 2019-2021 COVID-19 Pandemic, which was caused by SARS-CoV2, spready worldwide in a matter of weeks. As of February 21, 2023, there were over 674 million cases reported worldwide with nearly 7 million deaths. In Columbus-Muscogee County, as of October 18, 2023, there had been 38,814 confirmed cases and 829 deaths. The COVID-19 Pandemic was a Federally Declared Disaster.



Source: Georgia Department of Public Health

Over the last 25 years, emergent infectious disease outbreaks have occurred in other parts of the country. These include:

- 1993 Cryptosporidium Outbreak (Milwaukee, Wisconsin – 403,000 people ill and 100 deaths)
- 2010 Whooping Cough Outbreak (California – 9,500 people ill and 10 infant deaths)
- 2015 H5N2 Avian Flu Outbreak (Midwest – over 25 million chickens and turkeys destroyed as a precautionary measure at 83 locations)

Technological Hazard: **Emergent Infectious Diseases**

Assets Exposed to the Hazard

Due to the unpredictable nature of emergent infectious diseases, all public and private structures are threatened by the hazard. This includes all critical facilities.

Estimated Potential Losses

Losses due to emergent infectious diseases are difficult to estimate due to the unpredictable nature of the hazard. The type of emergent infectious disease, location of the outbreak, and the impact of the outbreak would all affect the potential losses. Please see the critical facilities information for estimated potential losses for each critical facility.

Land Use and Development Trends

Columbus-Muscogee County has no land use trends directly related to Emergent Infectious Diseases.

Multi-Jurisdictional Considerations

All of Columbus-Muscogee County are vulnerable to emergent infectious diseases. However, livestock and other farm animals are considered to be the greatest at risk, along with areas that have a large, concentrated human population, such as schools.

Hazard Summary

An emergent infectious disease would have devastating effects on Columbus-Muscogee County. These impacts would be immediate and long-lasting and could be potentially economically crippling. Because of these considerations, the Columbus Consolidated Government HMPC has developed mitigation actions with emergent infectious diseases in mind.

CHAPTER FOUR-HAZARD MITIGATION STRATEGIES

Summary of Updates to Chapter Four

The following table provides a description of each section of this chapter, and a summary of the changes that have been made to the Columbus Consolidated Government Hazard Mitigation Plan 2018.

Chapter 4 Section	Updates
Goals and Objectives	Updated goals to match the needs of the Columbus Consolidated Government
Identification and Analysis of Mitigation Techniques	Content Revised Reviewed mitigation strategies identified in the 2018 plan and made updates Identified mitigation strategies that were completed Identified mitigation strategies to be removed

Goals and Objectives

Requirement §201.6(c)(3)

Requirement §201.6(c)(3)(i)

It is important that State and local government, public-private partnerships, and the average citizen can see the results of these mitigation efforts, therefore, the goals and strategies need to be achievable. The mitigation goals and objectives form the basis for the development of specific mitigation actions. Columbus Consolidated Government officials should consider the listed goals before making community policies, public investment programs, economic development programs, or community development decisions for their communities. The goals of the Columbus Consolidated Government have changed slightly in the last five years (since 2018) due to specific threat events, such as Hurricane Irma in 2018. Because of the recentness of the impacts of these hazards and the devastation that occurred, these types of events have taken a greater priority, particularly in the increased priority of mitigation strategies directly related to these events and the development of new mitigation strategies related to these hazards.

Each jurisdiction covered by the Columbus Consolidated Government Hazard Mitigation plan update – the Columbus Consolidated Government – has limited ability to fully implement the mitigation actions described in this plan. the Columbus Consolidated Government Tack the needed financial strength and staffing to implement all the actions described in this plan. Many of the actions will be pursued through grant programs and by partnering with public and private organizations who can supplement the needed resources to accomplish the goals outlined in this plan. For actions where grant funding or partnerships are not available, the Columbus Consolidated Government revenue streams may be supplemented through Special Purpose Local Option Sales Tax (SPLOST) funds, which are voted on by the electorate.

GOAL 1	Maximize the use of all resources by promoting intergovernmental coordination and partnerships in the public and private sectors
GOAL 2	Harden communities against the impacts of disasters through the development of new mitigation strategies and strict enforcement of current regulations that have proven effective
GOAL 3	Reduce and, where possible, eliminate repetitive damage, loss of life and property from disasters
GOAL 4	Bring greater awareness throughout the community about potential hazards and the need for community preparedness

These objectives state a more specific outcome that the Columbus Consolidated Government strives to accomplish over the next five years. Action steps are the specific steps necessary to achieve these objectives. Objectives are not listed in order of importance.

OBJECTIVE 1	Reduce damage to property and loss of life through the utilization of preventative activities
OBJECTIVE 2	Minimize the damage to property and loss of life through property protection measures
OBJECTIVE 3	Minimize the damage to property and loss of life through natural resource protection activities

OBJECTIVE 4	Reduce damage to property and loss of life through the utilization of structural mitigation projects
OBJECTIVE 5	Increase the ability of the Columbus Consolidated Government and its citizens to respond to natural and manmade hazards through emergency service measures
OBJECTIVE 6	Increase public education and awareness of natural hazards
OBJECTIVE 7	Minimize the impacts on local citizens, industry, and infrastructure of a dam breach
OBJECTIVE 8	Implement additional protective measures and capabilities in response to manmade incidents
OBJECTIVE 9	Increase public awareness of local manmade hazards and proper response to those hazards

Identification and Analysis of Mitigation Techniques

Requirement §201.6(c)(3)(iv)

Requirement §201.6(c)(3)(iii)

In updating the Columbus Consolidated Government's mitigation strategy, a wide range of activities were considered to help achieve the mitigation goals and objectives. This includes the following activities as by the Emergency Management Accreditation Program (EMAP):

1) The use of applicable building construction standards;

2) Hazard avoidance through appropriate land-use practices;

3) Relocation, retrofitting, or removal of structures at risk;

4) Removal or elimination of the hazard;

5) Reduction or limitation of the amount or size of the hazard;

6) Segregation of the hazard from that which is to be protected;

7) Modification of the basic characteristics of the hazard;

8) Control of the rate of release of the hazard;

9) Provision of protective systems or equipment for both cyber and/or physical risks;

10) Establishment of hazard warning and communication procedures; and

11) Redundancy or duplication of essential personnel, critical systems, equipment, and information materials.

Part of the prioritization includes a general assessment according to the STAPLEE criteria, which stands for Social, Technical, Administrative, Political, Legal, Economic and Environmental. This process led to three designated priorities: High, Medium, and Low. Most items that require grant funding must undergo a full Benefit Cost Analysis to determine the action's actual cost effectiveness prior to funding. This process will be completed as part of the grant opportunity application process.

Strategy Priority	Priority Description	Strategies within this priority
LOW	Low priority strategies are those strategies that will have less direct impact on mitigating Columbus-Muscogee County's hazards, are in the early stages of strategy development, or score poorly on a preliminary cost-benefit analysis	**1.i; 2.e; 2.f; 3.a; 3.b; 5.d; 5.e; 5.g; 5.ff; 5.ii; 6.a; 6.f; 6.p; 6.q; 6.r**
MEDIUM	Medium priority strategies are those strategies that will have a direct impact on mitigation Columbus-Muscogee County's hazards but will not have as large of an anticipated impact as High Priority strategies or may be focused on hazards that are not as potentially impactful or prevalent for Columbus-Muscogee County. These strategies may be in the earlier stages of development or score mediocre on a preliminary cost-benefit analysis	**1.e; 1.f; 1.h; 1.j; 1.k; 2.d; 3.c; 4.a; 4.b; 4.c; 5.b; 5.c; 5.h; 5.i; 5.j; 5.k; 5.l; 5.m; 5.n; 5.o; 5.p; 5.s; 5.t; 5.u; 5.v; 5.w; 5.x; 5.z; 5.aa; 5.bb; 5.dd; 5.gg; 5.hh; 5.jj; 5.kk; 5.ll; 6.e; 6.i; 6.j; 6.k; 6.l; 6.m; 8.c; 8.d**
HIGH	High priority strategies are those strategies that would have a direct, large impact on mitigation Columbus-Muscogee County's hazards. These strategies are oftentimes well-established needs of Columbus-Muscogee County and have score high on a preliminary cost-benefit analysis	**1.a; 1.b; 1.c; 1.d; 1.g; 2.a; 2.b; 2.c; 2.g; 2.h; 4.d; 5.a; 5.f; 5.q; 5.r; 5.y; 5.cc; 5.ee; 6.b; 6.c; 6.d; 6.g; 6.h; 6.n; 6.o; 6.s; 7.a; 8.a; 8.b; 9.a; 9.b**

The lead agency listed in the Mitigation Strategy charts will be responsible for the jurisdictional administration and implementation of the mitigation strategy prioritization. Prioritization was determined based on many factors. These include the likelihood of the event, the potential impact of the event, the current readiness posture of the Columbus Consolidated Government for the event, the all-hazard impact of the mitigation strategy, and a cost-benefit analysis for the mitigation action. For example, mitigation actions that address high-likelihood, high-impact events with a low cost would rate higher than low-likelihood, high-impact events with a high cost.

The Columbus Consolidated Government Hazard Mitigation Planning Committee also attempted to identify potential funding sources outside of the Columbus Consolidated Government budgets for the mitigation strategies that were identified. This is particularly helpful for future grant planning and for items with significant costs that are beyond the capabilities of the Columbus Consolidated Government to procure without grant assistance.

Grant Name	Grant Description	Strategies that could be potentially funded
Hazard Mitigation Grant Program	The purpose of the HMGP is to provide funds to State agencies and local governments in the aftermath of a disaster for projects that reduce or eliminate long-term risk to human life and property	1.b; 2.a; 2.g; 2.h; 4.d; 5.b; 5.i; 5.j
Flood Mitigation Assistance Program	The FMA program provides funding to assist States and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP.	1.b; 2.b
Building Resilient Infrastructure and Communities (BRIC) Program	The BRIC program provides funds to states, territories, tribal governments, and communities for hazard mitigation planning and the implementation of mitigation projects before a disaster event occurs to reduce the overall risks to populations and structures while also reducing the reliance on funding from actual disaster declarations.	2.a; 2.d; 2.f; 4.c
Community Development Block Grant	Provides communities with resources to address a wide range of unique community development needs	
Assistance to Firefighters Grant	This program provides funding to meet the firefighting and emergency response needs of fire departments and nonaffiliated emergency medical service organizations	5.c; 5.p; 8.a

The following Mitigation Charts meet:
Requirement §201.6(c)(3)(ii)
Requirement §201.6(d)(3)

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
OBJECTIVE ONE: Reduce damage to property and loss of life through the utilization of preventative activities															
1.a	Maintain NFIP Compliance	Homeland Security and Emergency Management	✓								Local budgets	Staff time	12 months	**In Place; Continue**	**1.a**
1.b	Purchase repetitive loss structures and turn them into green space	Engineering Department	✓								Public and private grants and/or local budgets	$2 million	60+ months	**None; Priority as grant funding allows**	**1.k**
1.c	Continue routine inspections of the storm sewer system	Engineering Department and Public Works	✓		✓		✓				Local budgets	Staff time	12 months	**Performed daily and as needed**	**1.b**
1.d	Continue pre-storm inspection of "hot spots" before heavy rainfall events	Public Works	✓		✓		✓				Local budgets	Small time	12 months	**Inspected, as needed, before an event; cleaned seasonally**	**1.c**
1.e	Continue annual creek walk inspections to looks for blockages, erosion, and damaged infrastructure	Engineering Department and Columbus Water Works	✓		✓		✓			✓	Local budgets	Staff time	12 months	**Performed Annually October – April**	**1.d**
1.f	Continue implementation of the Unified Development Ordinance and update, as needed	Planning	✓		✓		✓		✓		Local budgets	Staff time	12 months	**Ordinance update ongoing**	**1.f**
1.g	Utilize floodplain review checklists during development plan review	Engineering Department	✓		✓		✓				Local budgets	Staff time	12 months	**Reviewed with every plan submission**	**1.g**
1.h	Verify that manufactured homes have sticker stating it is able to withstand windspeeds	Inspections and Codes			✓	✓	✓				Local budgets	Staff time	12 months	**In place; Ongoing**	**2.i**

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
1.i	Implement residential and commercial occupant codes suggesting the installation of lightning rods	Inspections and Codes			✓		✓				Local budgets	Staff time	30 months	**None; Other projects have taken priority**	**7.e**
1.j	During building plan review, ensure compliance with roof load limits and encourage the replacement of flat roofs during renovations	Inspections and Codes		✓							Local budgets	Staff time	24 months	**In Place; Ongoing**	**8.g**
1.k	Ensure compliance with load-bearing wall requirements and encourage retrofitting of older buildings during plan review	Inspections and Coes		✓	✓	✓	✓			✓	Local budgets	Staff time	12 months	**In place; Continue**	**9.a**
OBJECTIVE TWO: Minimize the damage to property and loss of life through property protection measures															
2.a	Provide safe rooms for fire departments, other first responders, and other key emergency personnel	Homeland Security and Emergency Management			✓	✓	✓				Public and private grants and/or local budgets	$250,000	60 months	**None; other projects have taken priority**	**2.f (mod)**
2.b	Mitigate flood-prone properties and buildings	Engineering Department	✓				✓				Public and private grants and/or local budgets	$2 million	60 months	**Strategy implemented dependent on source of flood**	**1.h**
2.c	Ensure Columbus water and wastewater treatment facilities are protected in the event of future flooding	Columbus Water Works	✓				✓				Local budgets	Staff time	12 months	**Last inspected June 2023**	**1.i**
2.d	CIP project to refurbish submarine water resistant door seals	Columbus Water Works and Engineering Department	✓				✓			✓	Public and private grants and/or local budgets	$400,000	60 months	**Reviewed 2022 but did not make funding cut**	**1.l**

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
2.e	Evaluate whether the installation of surge protectors is needed at Columbus Consolidated Government critical facilities	Public Works			✓		✓				Local budgets	Staff time	12 months	**Evaluations ongoing**	**7.h**
2.f	Equip each Columbus Consolidated Government building with lightning rods	Public Works			✓		✓				Public and private grants and/or local budgets	$250,000	60 months	**None; other projects have taken priority**	**7.i**
2.g	Purchase and install generator for the Columbus Airport for runway lights	Columbus Airport and Homeland Security and Emergency Management	✓	✓	✓	✓	✓		✓		Public and private grants and/or local budgets	$200,000	24 months	**NEW**	**NEW**
2.h	Purchase and install generators at all critical infrastructure facilities	Homeland Security and Emergency Management	✓	✓	✓	✓	✓		✓	✓	Public and private grants and/or local budgets	$10 million	60+ months	**NEW**	**NEW**
OBJECTIVE THREE: Minimize the damage to property and loss of life through natural resource protection activities															
3.a	Maintain inventory of open spaces in the jurisdiction	Engineering Department	✓	✓	✓	✓	✓	✓	✓		Local budgets	Staff time	12 months	**NEW**	**NEW**
3.b	Inventory and map all publicly-owned trees utilizing GIS	GIS Department in Public Works		✓	✓	✓	✓		✓		Local budgets	Staff time	12 months	**Performed seasonally for CCG owned trees**	**2.g**
3.c	Maintain maintenance and evaluation program for all publicly-owned trees	Urban Forestry Division		✓	✓	✓	✓		✓		Local budgets	Staff time	12 months	**NEW**	**NEW**
OBJECTIVE FOUR: Reduce damage to property and loss of life through the utilization of structural mitigation projects															

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
4.a	Facilitate discussion and possibly a study to determine the need and feasibility of constructing and/or purchasing safe rooms/ tornado shelters in the city for community use	Homeland Security and Emergency Management				✓	✓				Public and private grants and/or local budgets	$100,000	48 months	**None; other projects have taken priority**	**2.e (mod)**
4.b	Pursue funding to place electrical service lines underground to reduce exposure	Inspections and Codes; Homeland Security and Emergency Management		✓	✓	✓	✓		✓	✓	Local budgets	Staff time	30 months	**Under research**	**8.c**
4.c	Place electrical lines underground with funding from 4.b	Inspections and Codes, Georgia Power, Diverse Power, Flint EMC		✓	✓	✓	✓		✓	✓	Public and private grants and/or local budgets	Unknown	48 months	**Dependent on 4.b**	**8.d**
4.d	Continue to maintain and improve the storm water system	Engineering Department	✓		✓		✓				Public and private grants and/or local budgets	$5 million	36 months	**NEW**	**NEW**
OBJECTIVE FIVE: Increase the ability of the Columbus Consolidated Government and the citizens to respond to natural and manmade hazards through emergency services measures															
5.a	Develop a comprehensive resource guide for heavy equipment and post-disaster resource needs	Fire and EMS		✓	✓	✓	✓		✓	✓	Local budgets	Staff time	24 months	**NEW**	**NEW**
5.b	Replace all fire station generators with whole station generators	Fire and EMS		✓	✓	✓	✓			✓	Public and private grants and/or local budgets	$3.25 million	60 months	**NEW**	**NEW**
5.c	Enhance department training and capability to wildland-urban interface fires	Fire and EMS						✓	✓		Public and private grants and/or local budgets	$250,000	36 months	**NEW**	**NEW**

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
5.d	Identify and acquire resources to facilitate the implementation of a public access automatic external defibrillator (AED) program	Fire and EMS and Risk Management		✓	✓	✓	✓	✓	✓		Public and private grants and/or local budgets	$1.25 million	60 months	**NEW**	**NEW**
5.e	Participate in the GEMA and/or National Weather Service initiated severe weather preparedness events and tornado drills	Homeland Security and Emergency Management			✓	✓	✓				Local budgets	Staff time	12 months	**In place in school system**	**2.a (mod)**
5.f	Maintain current outdoor warning siren operating systems and components, continue to conduct weekly tests, and maintain a contract for service and repair of siren system.	Homeland Security and Emergency Management				✓					Local budgets	Staff time	12 months	**In place; Continue; 47 sirens tested weekly**	**3.a (mod)**
5.g	Monitor for and participate in the weekly test of the NOAA tone alert radio by the NWS	Homeland Security and Emergency Management	✓	✓	✓	✓	✓				Local budgets	Staff time	12 months	**In place; Continue**	**3.b**
5.h	Perform an annual review and, as needed, create a study regarding the need for additional sirens and locations	Homeland Security and Emergency Management				✓					Public and private grants and/or local budgets	$20,000 for study	12 months	**Annual review performed**	**3.c (mod)**
5.i	Follow through with recommendations identified by study referenced in 5.h	Homeland Security and Emergency Management				✓					Public and private grants and/or local budgets	Determined by 5.h	60 months	**None – awaiting study from 5.h**	**3.d**
5.j	Purchase NOAA weather radios to be provided to a portion of the city's local citizens – given out at preparedness events or as requested	Homeland Security and Emergency Management	✓	✓	✓	✓	✓				Public and private grants and/or local budgets	$10,000	30 months	**Purchased 1,500 in 2023 with HMGP funds**	**3.e (mod)**

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
5.k	Provide weather radios for transit and all city buildings	Homeland Security and Emergency Management	✓	✓	✓	✓	✓				Local budgets	$1,000	18 months	**Purchased 1,500 in 2023 with HMGP funds**	**3.f (mod)**
5.l	Provide weather radios for nursing homes and assisted living facilities	Homeland Security and Emergency Management	✓	✓	✓	✓	✓				Local and private budgets	$2,500	24 months	**Purchased 1,500 in 2023 with HMGP funds**	**3.g**
5.m	Provide weather radios for after school programs and non-profits	Homeland Security and Emergency Management	✓	✓	✓	✓	✓				Public and private grants and/or local budgets	$10,000	24 months	**Purchased 1,500 in 2023 with HMGP funds**	**3.h**
5.n	Provide weather radios for schools, hospitals, and places of worship	Homeland Security and Emergency Management	✓	✓	✓	✓	✓				Public and private grants and/or local budgets	$10,000	24 months	**Purchased 1,500 in 2023 with HMGP funds**	**3.i and 3.j (mod)**
5.o	Provide weather radios for daycare centers	Homeland Security and Emergency Management	✓	✓	✓	✓	✓				Public and private grants and/or local budgets	$10,000	24 months	**Purchased 1,500 in 2023 with HMGP funds**	**3.k**
5.p	Purchase two brush trucks for the Columbus Fire and EMS Department	Columbus Fire and EMS	✓	✓	✓	✓	✓				Public and private grants and/or local budgets	$600,000	48 months	**Purchased 1,500 in 2023 with HMGP funds**	**5.a**
5.q	Perform an annual equipment and technology update for the emergency operations center to maintain peak performance	Homeland Security and Emergency Management	✓	✓	✓	✓	✓	✓	✓	✓	Public and private grants and/or local budgets	Determined by annual need	12 months	**NEW**	**NEW**
5.r	Designate an alternate emergency operations center and maintain equipment and technology updates	Homeland Security and Emergency Management	✓	✓	✓	✓	✓	✓	✓	✓	Public and private grants and/or local budgets	$200,000	60 months	**NEW**	**NEW**

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
5.s	Purchase state-of-the-art persistent low-altitude surveillance assets	Homeland Security and Emergency Management	✓	✓	✓	✓	✓		✓	✓	Public and private grants and/or local budgets	$50,000	24 months	**Research ongoing**	**6.l**
5.t	Review and assist, as needed, in the development of evacuation plans and all-hazards emergency plans for assisted living facilities, long-term care facilities, and other vulnerable populations	Homeland Security and Emergency Management	✓	✓	✓	✓	✓		✓	✓	Local budgets	Staff time	18 months	**Plans required to be submitted to EM and reviewed annually**	**6.m (mod)**
5.u	Identify and consider applying for grants that are available before and after a disaster	Homeland Security and Emergency Management	✓	✓	✓	✓	✓	✓	✓	✓	Local budgets	Staff time	12 months	**In place; Continue**	**7.a (mod)**
5.v	Plan for and help ensure there will be an organization providing warming locations for homeless and special needs populations during cold temperature events and communicate information through public information means	Homeland Security and Emergency Management; United Way of the Chattahoochee Valley		✓				✓			Local budgets	Staff time	12 months	**In Place; Continue**	**8.b (mod)**
5.w	Hold an annual meeting to discuss the evacuation of citizens utilizing school transportation, METRA, and EM resources	Homeland Security and Emergency Management	✓				✓		✓	✓	Local budgets	Staff time	12 months	**Identifying attendees**	**9.d (mod)**
5.x	Purchase any equipment identified that would assist with inspection of the storm sewer system	Engineering Department and Public Works	✓		✓		✓				Public and private grants and/or local budgets	Unknown – equipment to be identified	36 months	**NEW**	**NEW**

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
5.y	Perform annual inspection of water and wastewater treatment facility	Columbus Water Works	✓		✓		✓				Local budgets	Staff time	12 months	**Required every 3 years (internal compliance) – last Dec 2022**	**1.j**
5.z	Increase Inspections and Codes staff to enforce and maintain housing/building codes	Inspections and Codes	✓	✓	✓	✓	✓		✓	✓	Local budgets	Staff costs	24 months	**Staff need evaluations are continuous**	**1.m**
5.aa	Property maintenance special enforcement officers to enforce housing/environmental codes to reduce size of storm debris field	Inspections and Codes and Public Works	✓		✓	✓	✓		✓	✓	Local budgets	Staff time	12 months	**Pickups for piles of waste/trash from evictions, as needed**	**2.b**
5.bb	Add additional personnel to public works to completed needed storm sewer assessments	Public Works	✓		✓		✓				Local budgets	Staff costs	24 months	**Staff need evaluations are continuous**	**6.b**
5.cc	Maintain access points for rescuers for ingress to the fiver on the Georgia and Alabama banks	Fire and EMS; Public Works	✓				✓				Local budgets	Staff time	12 months	**Public works maintains; Fire identifies issues**	**6.c**
5.dd	Purchase identified resources for whitewater rescue training and replacement equipment, rafts, and PPE	Fire and EMS	✓				✓				Public and private grants and/or local budgets	$750,000	30 months	**Some training complete**	**6.d and 6.e**
5.ee	Develop a call-in procedure for emergency personnel	Columbus Consolidated Government – all departments with response capabilities	✓	✓	✓	✓	✓		✓	✓	Local budgets	Staff time	18 months	**Fire Dept has one in place**	**6.i**

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
5.ff	Ask legal counsel to investigate options and make recommendation regarding the ability to secure legal authority for first responders (Fire/EMS) to issue "cease and desist" orders and other appropriate directives	Columbus Consolidated Government Council	✓	✓			✓	✓	✓	✓	Local budgets	Staff time	18 months	**None; Other projects have taken priority**	**6.o**
5.gg	Complete inventory and mapping of storm sewer system	Engineering Department and Public Works	✓		✓		✓			✓	Local budgets	Staff time	18 months	**Staff adds new construction and as needed**	**7.c**
5.hh	Develop a Continuity of Operations Plan for Fire and EMS	Fire and EMS	✓	✓	✓	✓	✓		✓	✓	Local budgets	$5,000	30 months	**None; other projects have taken priority**	**7.f**
5.ii	Encourage Columbus Consolidated Government employees to create a "Family Plan" for disasters	Homeland Security and Emergency Management	✓	✓	✓	✓	✓	✓	✓	✓	Local budgets	Staff time	12 months	**None; Other projects have taken priority**	**7.g**
5.jj	Purchase sand and salt spreaders for winter weather	Public Works		✓							Public and private grants and/or local budgets	$5 million	60 months	**3 purchased; need 50**	**8.e**
5.kk	Purchase 4-wheel drive vehicles for use in icy/snowy conditions	Public Works	✓	✓	✓	✓	✓		✓	✓	Public and private grants and/or local budgets	$400,000	60 months	**Most trucks are 4-wheel drive at this time**	**8.f**
5.ll	Purchase and outfit a Mobile Command Vehicle (MCV)	EMA	✓	✓	✓	✓	✓		✓	✓	Public and private grants and/or local budgets	$800,000	60 months	**None; other projects have taken priority**	**6.g**
OBJECTIVE SIX: Increase public education and awareness of natural disasters															

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
6.a	Promote owners to construct or purchase safe rooms for mobile home parks in the city	Homeland Security and Emergency Management			✓	✓	✓				Local budgets	Staff time	36 months	**Modified to put onus on property owners**	**2.d (mod)**
6.b	Purchase and provide emergency preparedness promotional items to the public at different events across the city	Homeland Security and Emergency Management	✓	✓	✓	✓	✓	✓	✓	✓	Public and private grants and/or local budgets	$75,000	48 months	**Promotion events encouraged**	**3.1**
6.c	Increase opt-in participation in the city's mass notification and public safety smart phone apps	Homeland Security and Emergency Management	✓	✓	✓	✓	✓		✓		Local budgets	Staff time	12 months	**NEW**	**NEW**
6.d	Establish new and/or maintain current/effective public information and mass notification methods to disseminate information to the public	Homeland Security and Emergency Management	✓	✓	✓	✓	✓		✓	✓	Local budgets	Staff time	18 months	**Use mass notification system, social media, and CCGTV**	**4.a (mod)**
6.e	Hold annually one or more NWS StormSpotter training courses (in-person or virtually)	Homeland Security and Emergency Management			✓	✓					Local and Federal budgets	Staff time	12 months	**In place; Ongoing**	**4.c**
6.f	Assist with drill participation, as needed, with the Muscogee County School District and private schools in Columbus	Homeland Security and Emergency Management				✓					Local budgets	Staff time	24 months	**As needed**	**4.d (mod)**
6.g	Continue to meet with the Mayor's Committee for Persons with Disabilities and Center for Independent Living to discuss message dissemination	Homeland Security and Emergency Management	✓	✓	✓	✓	✓	✓	✓	✓	Local budgets	Staff time	12 months	**In place; Continue**	**4.e**

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
6.h	Distribute tornado and other severe weather safety information to local citizens (including citizens with special needs) through public events, media outlets, and more	Homeland Security and Emergency Management			✓	✓	✓				Public and private grants and/or local budgets	$10,000	24 months	**In place; Continue**	**4.f (mod)**
6.i	Present tornado awareness programming on city owned and operated television broadcast channel and provide public service announcements to local media	Homeland Security and Emergency Management				✓					Local budgets	Staff time	12 months	**Info provided via CCGTV**	**4.h (mod)**
6.j	Encourage the public to purchase NOAA weather radios and weather apps and assist with radio programming	Homeland Security and Emergency Management	✓	✓	✓	✓	✓		✓		Local budgets	Staff time	12 months	**In place; Ongoing**	**4.i (mod)**
6.k	Promote smart phone apps via social media and during other events	Homeland Security and Emergency Management	✓	✓	✓	✓	✓	✓	✓	✓	Local budgets	Staff time	12 months	**In pace; Ongoing**	**4.j (mod)**
6.l	Promote GEMA Engaged Citizen's Damage Assessment	Homeland Security and Emergency Management	✓	✓	✓	✓	✓	✓	✓	✓	Local budgets	Staff time	12 months	**In place; Ongoing**	**4.l**
6.m	Promote local television apps and other weather smart phone apps on the city owned television station as well as other stations and outlets	Homeland Security and Emergency Management	✓	✓	✓	✓	✓		✓	✓	Local budgets	Staff time	12 months	**In place; Continue**	**4.m (mod)**
6.n	Establish communication with vulnerable populations groups to provide all-hazards awareness info	Homeland Security and Emergency Management; United Way of the Chattahoochee Valley	✓	✓	✓	✓	✓	✓	✓	✓	Local budgets	Staff time	12 months	**In place; Continue**	**8.a (mod)**

Strategy #	Mitigation Action	Lead and Supporting Agency, Department, Organization	Flood	Winter Weather	Thunderstorm	Tornado	Tropical Cyclone	Drought/Ex Temp	Wildfire	Equake/Landslide	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
6.o	Provide information to the public on mitigation and insurance on flooding	Homeland Security and Emergency Management; Engineering Department	✓				✓				Local budgets	Staff time	12 months	**NEW**	**NEW**
6.p	Promote safe room construction in new development and renovation of existing structure	Inspections and Codes; Homeland Security and Emergency Management			✓	✓	✓				Local budgets	Staff time	12 months	**In pace; Continue**	**2.c**
6.q	Encourage citizens to utilize the energy audit system offered by the power companies to see if surge protectors are needed	Inspections and Codes		✓				✓			Local budgets	Staff time	12 months	**In place; Continue**	**6.j**
6.r	Continue to utilize the Columbus Convention and Business Bureau to "promote" available hotels during weather events for evacuees and send info to State Tourism	Columbus Convention and Business Bureau		✓			✓				Local budgets	Staff time	12 months	**In place; Have done for recent hurricanes**	**6.k**
6.s	Continue to participate in continuing education requirements for structural residential codes	Inspections and Codes		✓	✓	✓	✓				Local budgets	Staff time	12 months	**In place; continue**	**9.b**

Strategy #	Mitigation Action	Lead and *Supporting* Agency, Department, Organization	Dam Failure	Hazardous Materials	Terrorism	Transportation	Infrastructure Failure	Emer. Disease	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
OBJECTIVE SEVEN: Minimize the impact of a dam breach on local citizens, industry, and infrastructure													
7.a	Ensure adherence to Georgia Safe Dams program rules regarding Category I and II dams	Engineering	✓		✓		✓		Local budgets	Staff time	12 months	**NEW**	**NEW**
OBJECTIVE EIGHT: Implement additional protective measures and capabilities in response to manmade incidents													
8.a	Acquire Hazardous Materials response equipment as identified, including new Decontamination truck	Columbus Fire and EMS		✓	✓	✓	✓	✓	Public and private grants and/or local budgets	$1.5 million	48 months	**Resource needs being identified**	10.b (mod)
8.b	Hold a live annual Hazardous Materials Response Drill and continue joint Hazwoper training with Water Works	Columbus Fire and EMS and Water Works		✓	✓	✓	✓	✓	Local budgets	Staff time	12 months	**In place; Do Annually**	10.c and 1o.i
8.c	Submit competitive grant applications to fund equipment and training needs, as needed	Columbus Fire and EMS	✓	✓	✓	✓	✓	✓	Local budgets	Staff time	12 months	**Done annually as grants are available**	10.h
8.d	Add radio equipment capabilities to HazMat SCBA	Columbus Fire and EMS		✓	✓	✓	✓	✓	Public and private grants and/or local budgets	$150,000	36 months	**None; Other projects have taken priority**	10.j
OBJECTIVE NINE: Increase public awareness of local manmade hazards and proper response to those hazards													
9.a	Institute public awareness campaign for all technological hazards	Homeland Security and Emergency Management	✓	✓	✓	✓	✓	✓	Local budgets	Staff time	12 months	**NEW**	NEW

Strategy #	Mitigation Action	Lead and *Supporting* Agency, Department, Organization	Dam Failure	Hazardous Materials	Terrorism	Transportation	Infrastructure Failure	Emer. Disease	Funding Source	Estimated Cost	Completion Timeframe	Progress/ Status	Previous Strategy #
9.b	Identify communities at risk to man-made hazards, including industrial incidents	Planning Department		✓	✓	✓	✓		Public and private grants and/or local budgets	Staff time - $100,000 if study is necessary	36 months	**NEW**	NEW

Completed Mitigation Strategies

Previous Strategy #	Strategy Description	Status
2.h	Develop a routine maintenance evaluation program for all publicly-owned trees	COMPLETE; Master Tree Plan completed June 2022
6.n	Purchase a mobile rehab trailer	COMPLETE; Completed 2022
7.b	Purchase equipment to connect Midtown Medical Center command center to EOC	COMPLETE; Completed with use of Teams/Zoom in 2021
10.c	Acquire large mobile decontamination showers	COMPLETE; Completed in 2021
10.f	Train all public safety agency personnel to HazMat Awareness level	COMPLETE; Completed in 2020
10.g	Acquire A and B Chlorine kits	COMPLETE; Completed in 2022

Deleted Mitigation Strategies

Previous Strategy #	Strategy Description
1.e	Continue to enforce development of new Conservation subdivisions or redevelopment of current subdivisions to preserve open spaces , to include buffering to 50 feet
4.b	Hold a “weather school” at each elementary and middle school in Columbus to promote weather awareness
4.g	Hold “Talk to the Mayor” forum on a quarterly basis and hand out severe weather information
6.a	Schedule an annual review of emergency procedures and guidelines
6.f	Build a new EOC
6.h	Outfit current EOC as an alternate after completion of 6.f
7.d	Televise sample portions of the basing to rate structural integrity and monitor/update
9.c	Create evacuation plans for buildings taller than 35 feet
10.a	Review current budgets for emergency response training and make adjustments, as needed
10.d	Acquire foam trailer for response to transportation incidents

CHAPTER FIVE – MAINTENANCE AND IMPLEMENTATION

Summary of Updates for Chapter Five

The following table provides a description of each section of this chapter, and a summary of the changes that have been made to the Columbus Consolidated Government Hazard Mitigation Plan 2018.

Chapter 5 Section	Updates
Maintenance	• Content Revised
Plan Distribution	• Content Revised
Implementation	• Content Revised
Evaluation	• Content Revised
Peer Review	• Content Revised
Plan Update	• Content Revised
Conclusion	• Content Revised

Maintenance

Requirement §201.6(c)(4)(iii)

To adhere to best practices, state and federal guidelines, and lessons learned, the Columbus Consolidated Government Hazard Mitigation Plan Update Committee has developed a method to ensure the regular review and update of the Plan occurs. Plan maintenance protocols identified during the 2018 Columbus Consolidated Government Hazard Mitigation Plan was followed, to the best abilities of the Columbus Consolidated Government. This most importantly included an increased attempt for public participation and inclusion in the planning process. The Columbus Consolidated Government Hazard Mitigation Plan Update Committee will reconvene annually in February to monitor and evaluate the progress of the mitigation strategies in the Plan. Columbus-Muscogee County's Homeland Security and Emergency Management Director, Chance Corbett, will be responsible for implementing this meeting. The Committee will discuss the following questions annually:

- Do the goals address current and expected hazards and conditions?
- Are the goals and objectives still relevant to the Columbus Consolidated Government?
- Has the nature or magnitude of risks changed?
- Does the risk assessment portion of the Plan need to be updated or modified?
- Are the goals and objectives meeting changes in state and federal policy?
- Are the current resources appropriate for implementing the Plan?
- Are there local implementation problems, such as technical, political, legal, or coordination issues with other agencies?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?

The responsible parties for various mitigation strategies will provide a report during this annual meeting regarding the following:

- How well did the implementation processes work?
- Were any difficulties encountered during implementation?
- How successful was the coordination of efforts?
- Are there any suggestions for revision of any strategies?

Columbus-Muscogee County's Homeland Security and Emergency Management Director will send the minutes from this annual meeting to the Columbus Consolidated Government Council for review.

If there are any updates or modifications to the Columbus Consolidated Government Hazard Mitigation Plan, the Homeland Security and Emergency Management Director will forward the changes to the Georgia Emergency Management Agency's Hazard Mitigation Officer. All annual reviews of the Columbus Consolidated Government Hazard Mitigation Plan will be open to the public. These meetings will be advertised both in the local newspapers, but also on signage in the publicly used facility hosting the meeting.

Maintenance Log

Revision Date	Revised Section	Reason for Revision	Revised By
2023	**Five Year Hazard Mitigation Plan Update**	**FEMA Requirement**	**Columbus Consolidated Government Hazard Mitigation Planning Committee with assistance from Lux Mitigation and Planning**

Plan Distribution

This Plan will be distributed, but not limited, to the following departments and organizations within the Columbus Consolidated Government:

the Columbus Consolidated Government – City Council
Columbus-Muscogee County Homeland Security and Emergency Management
Columbus Police Department
Muscogee County Sheriff's Office
Columbus Public Works
Columbus Engineering
Columbus Planning
Muscogee County Board of Education
Columbus Fire and Emergency Medical Services

A printed copy of the approved Plan will be available for viewing at the Columbus-Muscogee County Homeland Security and Emergency Management.

Implementation

Requirement §201.6(c)(4)(ii)

Each jurisdiction participating in the Columbus Consolidated Government Hazard Mitigation Plan is responsible for implementing specific mitigation actions as prescribed in this plan. In the Mitigation Strategies section, every proposed strategy is assigned to a specific local department or agency to assign responsibility and accountability and increase the likelihood of subsequent implementation.

In addition to the designation of a local lead department or agency, some strategies have secondary or assisting department or agencies listed as well. This allows for a sharing of responsibility and coordination of effort for some of the identified strategies that cross lines of departmental responsibility. The completion date has been assigned to assess whether identified mitigation strategies are being implemented in a timely fashion.

The Columbus Consolidated Government will seek outside funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, potential funding sources have been identified and targeted for the proposed actions listed in the mitigation strategies. It will be the responsibility of each participating jurisdiction to determine additional implementation procedures beyond those listed within the Columbus Consolidated Government Hazard Mitigation Plan.

This plan, as a joint within the Columbus Consolidated Government and will serve as a comprehensive mitigation plan. The mitigation strategies, hazard identification, and other information identified in this plan will be integrated into all comprehensive Columbus Consolidated Government plans in the future. Incorporation of these strategies will occur, as necessary, throughout this planning cycle covered by this Hazard Mitigation Plan Update. Aspects of this plan will be integrated into the Columbus Consolidated Government Comprehensive Plan during the next planning cycle.

Identified hazards and mitigation strategies of the 2018 Columbus Consolidated Government Hazard Mitigation plan were integrated into the Local Emergency Operations Plan, multiple City SOPs and SOGs, and future planning and zoning plans. The Columbus Consolidated Government will integrate mitigation strategies identified in this plan into the Columbus Consolidated Government Comprehensive Plan, Community Wildfire Protection Plan, Continuity of Operations Plan, and other future plans. Strategies identified in the previous plan were applied to grant applications, building and zoning requirements, and development planning considerations for the Columbus Consolidated Government. Once this plan is approved, it will be used by the consultants and planning committees responsible for the update process for the City Comprehensive Plans, Short-Term Work Programs, and all other plans that could incorporate the requirements of this plan. To facilitate the inclusion of this Plan, the Columbus Consolidated Government will provide a copy to the persons and/or committees responsible for writing and updating plans. Many of these strategies will be applied using previously identified policies and ordinances, including the NFIP compliance ordinances and water-use ordinances, which have now been applied. All jurisdictions have the authority to adopt locally binding ordinances and policies to enhance the mitigation strategies in their jurisdiction.

The Legal and Regulatory Capability survey documents authorities available to the jurisdiction and/or enabling legislation at the state level affecting planning and land management tools that support local hazard mitigation planning efforts. The identified planning and land management tools are typically used by states and local jurisdictions to implement hazard mitigation activities.

Regulatory Tools/Plans	Regulatory Type: Ordinance, Resolution, Codes, Plans, Etc.	Local Authority	State Prohibited	Higher Authority
Building Codes	Columbus Consolidated Government Code	Yes	No	No
Capital Improvements Plan		Yes	No	No
Comprehensive Plan	Columbus Consolidated Government Comprehensive Plan	Yes	No	No
Economic Development Plan	Columbus Consolidated Government Comprehensive Plan	Yes	No	Yes
Emergency Management Accreditation Program		No	No	Yes
Emergency Response Plan	Columbus Consolidated Government Local Emergency Operations Plan (LEOP)	Yes	No	Yes
Flood Management Plan		Yes	No	No
Historic Preservation		Yes	No	No
National Flood Insurance Program Participation		Yes	No	Yes
Continuity of Government/ Operations Plan		No	No	No
Post-Disaster Ordinance		Yes	No	No
Zoning Ordinances	Columbus Consolidated Government Codes	Yes	No	No

Opportunities to integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified. Although it is recognized that there are many possible benefits to integrating components of this Plan into other local planning mechanisms, the development and maintenance of this stand-alone Hazard Mitigation Plan is deemed by the Columbus Consolidated Government Hazard Mitigation Planning Committee to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

Evaluation

Requirement §201.6(c)(4)(i)

Periodic revisions and updates of the Columbus Consolidated Government Hazard Mitigation Plan may be required to ensure that the goals of this plan are kept current with federal, state, and local regulations. These revisions should also consider any potential changes in the hazard vulnerability and mitigation priorities of the Columbus Consolidated Government.

The Columbus Consolidated Government Hazard Mitigation Plan Update Committee will meet annually to review the Columbus Consolidated Government Hazard Mitigation Plan. During this annual review, mitigation strategies will be reviewed to evaluate the progress that has occurred for each identified mitigation strategy. The Columbus Consolidated Government Hazard Mitigation Plan Update Committee will also meet following any disaster event to review the identified mitigation strategies for that hazard and determine if timelines should be adjusted or additional mitigation strategies should be identified and added to the plan. These steps will ensure that the Columbus Consolidated Government Hazard Mitigation Plan is continuously updated to allow for changes in hazard vulnerabilities and identified mitigation strategies.

The Columbus Consolidated Government Hazard Mitigation Plan Update Committee will complete all evaluations of the Columbus Consolidated Government Hazard Mitigation Plan.

Peer Review

State Requirement Element F1

To maintain standards of quality, improve performance, and provide credibility to the Columbus Consolidated Government Hazard Mitigation Plan Update, representatives of local emergency management agencies bordering Columbus Consolidated Government conducted a peer review of the Plan. The peer review of this Plan constitutes a form of self-regulation, accountability, and new insights offered by qualified professionals in neighboring communities, which face many of the same natural and man-made hazards.

Columbus Consolidated Government Hazard Mitigation Plan Update was peer reviewed by:

_____

Monty Davis Date
Director
Harris County Emergency Management Agency

_____

Johnny Floyd Date
Director
Cusseta-Chattahoochee County Emergency Management Agency

_____

LeAnne Erenheim Date
Director
Talbot County Emergency Management Agency

_____

David Martin Date
Director
Russell County (AL) Emergency Management Agency

_____

Rita Smith Date
Director
Lee County (AL) Emergency Management Agency

Plan Update

Requirement §201.6(c)(4)(i)

The Federal Disaster Mitigation Act of 2000 requires that the Hazard Mitigation Plan be updated at least once every five years. The Columbus-Muscogee County Homeland Security and Emergency Management is the department responsible with ensuring this requirement is met. The Columbus Consolidated Government Hazard Mitigation Plan Update Committee will be involved in this future process and will aid the Columbus-Muscogee County Homeland Security and Emergency Management in ensuring that all jurisdictions provide input into the planning process. The public will be invited to participate in the planning process through public hearings to be held whenever major updates to this plan are needed and during annual review meetings. This plan will expire in the third quarter of 2027; therefore, the approval and adoption of the next plan update must be completed before that time.

In the first quarter of 2027, the Columbus Consolidated Government plans to begin the Hazard Mitigation Plan Update process for the fourth time. This planning process will include bi-monthly meetings to accomplish the identified goals of the Columbus Consolidated Government Hazard Mitigation Plan Update. This process will be headed up by the Columbus-Muscogee County Homeland Security and Emergency Management. The Columbus Consolidated Government Hazard Mitigation Planning Committee will follow a similar process as was undertaken during this planning cycle to complete all FEMA and GEMA requirements for the Hazard Mitigation Plan Update. This process will be completed by the first quarter of 2028 to meet all identified planning deadlines.

Conclusion

As a result of the hazard mitigation planning process, the Columbus Consolidated Government, as well as additional participating organizations have gained significant information and knowledge regarding Columbus-Muscogee County's disaster history, natural and technological hazards, vulnerabilities, and potential strategies to lessen the impacts of the identified hazards.

One consistent theme identified by the Columbus Consolidated Government Hazard Mitigation Planning Committee was the inability to consistently identify geographic locations that were more vulnerable to most hazards due to the widespread potential effects and random impact areas of each hazard. This was exceedingly true for most natural hazards. Recognizing this challenge, the Columbus Consolidated Government Hazard Mitigation Plan Update Committee determined it was best to identify many mitigation goals, objectives, and strategies that were both general and specific in nature. These strategies allow the Columbus Consolidated Government Hazard Mitigation Plan Update Committee to adopt strategies that will have the greatest positive effect on the greatest amount of the population.

The Columbus Consolidated Government Hazard Mitigation Planning Committee adopted strategies in all six of the major mitigation categories: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, and Public Education and Awareness. Public Education/Awareness and Emergency Services comprised the greatest number (67%) of the mitigation strategies identified by the Columbus Consolidated Government.

Appendix A – Hazard Mitigation Planning Committee Sign-In Sheets

Columbus-Muscogee County Hazard Mitigation Plan Update
Meeting #1

Sign-In Sheet

Monday, September 25, 2023

Name/Title	Signature	E-mail Address	Agency/Organization
Corey Peer Deputy Director		cpeer@columbusga.org	Columbus Muscogee HSEM
Jennifer St John		jstjohn@uncle.org	Uncle
Suzanne Widenhouse		Widenhouse.Suzanne@columbusga.org	Tax Assessors-CCG
Brian Lackey	Brian Lackey	blackley@columbusga.org	IT/GIS
Tiffany Samples		tiffany.samples@stfrancishealth.org	St. Francis
Roland Sandoval		rsandoval@columbusga.org	Columbus Fire and EMS
Beverley Townsend, MD		beverley.townsend@dph.ga.gov	Public Health
Myron Strange / Major		mstrange@columbusga.org	Muscogee Co. Sheriff's Office
Dorrian Smith / EMS		dorrian.smith@dph.ga.gov	DPH DT / Region II HC
Jessica Harris / Facilities		jessica.harris@piedmont.org	Piedmont Columbus Regional
Tommy Floyd Director		T.floyd@columbusga.org	Chattahoochee Co EMA
Craig Key		ckey@muscogeega.gov	Muscogee County Sheriff's Office

Columbus-Muscogee County Hazard Mitigation Plan Update
Meeting #1

Sign-In Sheet

Monday, September 25, 2023

Name/Title	Signature	E-mail Address	Agency/Organization
Jeremy Cummings / VP of Field Services Columbus water works		JCummings@Cwwga.org	Columbus water works
Caleb Cole Columbus water works		CCole@Cwwga.org	Columbus water works
DAVID MARTIN / Director Russell County EMA		dmartin@rcema.us	Russell County EMA
Samantha Cato / Deputy Director RCEMA		Scato@rcema.us	Russell County EMA
Bill Watt		bill.watt@redcross.org	American Red Cross
Brandon Landis		Christopher.B.Landis4.civ@Army.mil	Fort Moore EM
Michelle Brown-Mang		MBrown-Mang@Columbusga.org	Public Wks. CCG
Cody Meshes / Stormwater Manager		meshes.cody@columbusga.org	CCG / Engineering
Jennifer Kelley	Jennifer Kelley	jkelley@hacga.com	HACSA - Ridgecrest Orchard Villa, and Muscogee Manor Skilled Nursing
Darrell Enfinger		darrell.enfinger@dph.ga.gov	WCHD
PAT FLEY		PFLEY@UNITEDWAY.ORG	UNITED WAY
David Jury / 911 Director		Djury@columbusga.org	Columbus P.D.

Columbus-Muscogee County Hazard Mitigation Plan Update
Meeting #1

Sign-In Sheet

Monday, September 25, 2023

Name/Title	Signature	E-mail Address	Agency/Organization
Everett Fleming / Asst Dir		Fleming.everette@columbusga.org	METRA
Edward "E.J." Bess – Asst Disaster Program Manager		edward.bess@redcross.org	American Red Cross
BEN MOSER		BMOSER@UNITEDWAY.ORG	UNITED WAY
Amber Clark	Amber Clark	aclark@Flycolumbusga.com	Columbus Airport

Columbus-Muscogee County Hazard Mitigation Plan Update
Meeting #1

Sign-In Sheet

Monday, September 25, 2023

Name/Title	Signature	E-mail Address	Agency/Organization
Ryan Pruett, Director	RPruett	rpruett@columbusga.org	CCG - Inspections & Code
Fredrick Jackson	F. Jackson	~~Fred~~ jackson.Fredrick@columbusga.org	Metra Transportation
Chad Klechlw		KLECHLW.CHAD.L@[illegible].MIL	MCSD
Holli Browder	HB	HBrowder@columbusga.org	Cols Parks + Rec

Columbus-Muscogee County Hazard Mitigation Plan Update
Meeting #1

Sign-In Sheet

Monday, September 25, 2023

Name/Title	Signature	E-mail Address	Agency/Organization
SHELBY GUEST (for PETER BOWDEN)	Shelby Guest	SGUEST@VISITCOLUMBUSGA.COM	VISIT COLUMBUS GA
CHANCE D. CORBETT		corbett.chance@columbusga.org	Columbus-Muscogee Co. EM/MS
GARY ALLEN		gallen@columbus.org	

Columbus Consolidated Government Hazard Mitigation Plan Update
Committee Meeting #2

Sign-In Sheet

Monday, October 23, 2023

Name/Title	Signature	E-mail Address	Agency/Organization
GLEN THOMASON, Dep. Ch. TAX ASSESSORS		gthomason@columbusga.org	CCG TAX ASSESSORS Office
David Jury 911 Police Dept Director		Djury@columbusga.org	Police Dept
Quincy Rieer Deputy Director		QRieer2dcolumbusga.org	Homeland Security & EM
Sal Scarpa Fire-EMS Chief		Scarpa.Sal@columbusga.org	Columbus Fire-EMS
Bill Watt		Bill.watt@redcross.org	Red Cross
Samantha Cato Deputy Director RCEMA		scato@rcema.us	Russell County EMA
Cody Meshes Stormwater engineer management		meshes.cody@columbusga.org	CCG / Engineering
Michelle Mang Dep Dir Public Wks		MBrown-Mang@columbusga.org	Public Works-Cols
Jeremy Cummings VP FS CWW Columbus Water Works		JCummings@cwwga.org	Columbus Water Works
Brookie TATE Security Mgr		btate@carlyle.org	Columbus Water Works
Anthony Guignard		guignard.anthony@columbusga.org	CCG I.T.
Donna Newman, Director of Eng		dnewman@columbusga.org	CCG - Engineering

Columbus Consolidated Government Hazard Mitigation Plan Update
Committee Meeting #2

Sign-In Sheet

Monday, October 23, 2023

Name/Title	Signature	E-mail Address	Agency/Organization
DAVID MARTIN/Director RCEMA		dmartin@rcema.us	Russell County EMA
ERIC KLINE / LOGISTICS OFFICER		eric@rcema.us	RUSSELL COUNTY EMA
Jennifer St John		jst john@unitedcv.org	United Way
CHAD KIRKLAND		kirkland.chad.l@muscogee-k12.ga.us	MCSD
Chance Corbett		corbett.chance@columbusga.org	C-MC-EM
Brandon Landis		christopher.b.landis4.civ@Army.mil	Ft Moore/EM
Jennifer Kelley	Jennifer Kelley	jkelley@hacga.com	HACGA - Ridgecrest, Orchard View and Muscogee Manor
Rex Wilkinson / Planning Dept		wilkinson rex@columbusga.net	CCG Planning Dept

Columbus Consolidated Government Hazard Mitigation Plan Update
Committee Meeting #2

Sign-In Sheet

Monday, October 23, 2023

Name/Title	Signature	E-mail Address	Agency/Organization
Johnny Floyd Chatt. Co Emrt Director		JFloyd@columbusga.org	Chatt. Co EMA

Columbus Consolidated Government Hazard Mitigation Plan Update
Committee Meeting #2

Sign-In Sheet

Monday, October 23, 2023

Name/Title	Signature	E-mail Address	Agency/Organization
Derrick Gladen CERT Commander		GladenDerrick@columbusga.org	Muscogee County Prison

Appendix B – Hazard Data Tables

Thunderstorms

Location	County/Zone	St.	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
Totals:							1	11	7.444M	7.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	05/29/1973	03:35	Hail	1.75 in.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	11/21/1973	07:15	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/21/1974	03:36	Thunderstorm Wind	86 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	05/20/1974	12:36	Hail	0.75 in.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	06/14/1974	16:07	Hail	1.75 in.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	01/12/1975	10:30	Hail	1.25 in.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	01/12/1975	10:30	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/16/1976	06:30	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	06/28/1976	12:25	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	08/30/1976	15:52	Thunderstorm Wind	61 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/20/1981	15:25	Hail	1.75 in.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/20/1981	15:25	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/03/1982	06:15	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/03/1982	06:15	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/26/1982	17:38	Thunderstorm Wind	56 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/26/1982	18:34	Thunderstorm Wind	56 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/05/1983	18:30	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	05/16/1983	03:45	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	07/15/1983	16:38	Thunderstorm Wind	55 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	07/15/1983	16:52	Thunderstorm Wind	55 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	07/15/1983	17:08	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	12/03/1983	20:45	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	02/13/1984	16:30	Hail	1.75 in.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/19/1984	20:10	Hail	1.00 in.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	05/03/1984	16:45	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/05/1985	19:38	Thunderstorm Wind	52 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	07/12/1985	14:10	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/13/1986	09:00	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/13/1986	09:45	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	07/27/1986	16:45	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	06/03/1987	12:45	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	07/25/1987	20:08	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	08/18/1987	15:20	Thunderstorm Wind	59 kts.	0	0	0.00K	0.00K

MUSCOGEE CO.	MUSCOGEE CO.	GA	04/25/1988	18:30	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	11/04/1988	16:00	Hail	1.75 in.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	02/28/1989	05:00	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/04/1989	15:00	Hail	1.75 in.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/04/1989	15:35	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	06/11/1989	16:33	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	07/16/1989	12:45	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	08/26/1989	13:48	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	09/03/1989	16:56	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	02/10/1990	04:55	Thunderstorm Wind	0 kts.	0	2	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	02/10/1990	06:02	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	02/16/1990	10:10	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	02/22/1990	08:15	Thunderstorm Wind	0 kts.	0	5	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	02/23/1990	15:40	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/16/1990	16:25	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/28/1990	12:58	Thunderstorm Wind	58 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/28/1990	13:15	Hail	1.75 in.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	05/21/1990	14:15	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	08/14/1990	16:00	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/28/1991	12:20	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/29/1991	07:00	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/29/1991	09:00	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/29/1991	09:20	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/29/1991	12:00	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/29/1991	12:20	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/29/1991	14:10	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/07/1991	13:30	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/09/1991	19:12	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/28/1991	15:50	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	04/29/1991	14:23	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	05/05/1991	15:11	Thunderstorm Wind	71 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	07/09/1991	13:15	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	06/29/1992	16:00	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	07/01/1992	12:45	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	07/12/1992	15:50	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	08/27/1992	15:45	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	08/27/1992	18:47	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	11/04/1992	12:30	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K

MUSCOGEE CO.	MUSCOGEE CO.	GA	11/22/1992	12:39	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
Columbus	MUSCOGEE CO.	GA	02/12/1993	00:00	Thunderstorm Wind	0 kts.	0	0	0.50K	0.00K
Columbus	MUSCOGEE CO.	GA	02/22/1993	04:35	Thunderstorm Wind	0 kts.	0	0	5.00K	0.00K
N Columbus	MUSCOGEE CO.	GA	08/04/1993	17:30	Thunderstorm Wind	0 kts.	0	0	0.50K	0.00K
Columbus	MUSCOGEE CO.	GA	06/15/1994	16:00	Thunderstorm Wind	0 kts.	0	0	0.50K	0.00K
Columbus	MUSCOGEE CO.	GA	06/29/1994	14:10	Hail	1.00 in.	0	0	0.00K	0.00K
Macon	MUSCOGEE CO.	GA	06/29/1994	14:15	Thunderstorm Wind	0 kts.	0	0	5.00K	0.00K
Columbus	MUSCOGEE CO.	GA	06/29/1994	14:36	Thunderstorm Wind	0 kts.	0	0	0.05K	0.00K
Columbus	MUSCOGEE CO.	GA	03/18/1995	14:20	Hail	1.00 in.	0	0	0.00K	0.00K
Columbus	MUSCOGEE CO.	GA	05/15/1995	17:20	Hail	0.75 in.	0	0	0.00K	0.00K
Columbus	MUSCOGEE CO.	GA	06/02/1995	15:00	Thunderstorm Wind	0 kts.	0	0	10.00K	0.00K
Columbus	MUSCOGEE CO.	GA	06/11/1995	15:40	Thunderstorm Wind	0 kts.	0	0	2.00K	0.00K
Southern Bibb	MUSCOGEE CO.	GA	06/30/1995	20:00	Thunderstorm Wind	0 kts.	0	0	1.00K	0.00K
Columbus	MUSCOGEE CO.	GA	07/18/1995	15:40	Thunderstorm Wind	0 kts.	0	0	30.00K	0.00K
Columbus	MUSCOGEE CO.	GA	07/29/1995	17:45	Thunderstorm Wind	0 kts.	0	0	1.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/07/1996	01:00	Thunderstorm Wind	55 kts.	0	0	15.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/18/1996	00:45	Hail	0.88 in.	0	0	10.00K	5.00K
COLUMBUS	MUSCOGEE CO.	GA	06/23/1996	12:00	Thunderstorm Wind	50 kts.	0	0	10.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/24/1996	14:30	Thunderstorm Wind	50 kts.	0	0	15.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/30/1997	18:00	Hail	0.75 in.	0	0	3.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	04/22/1997	16:25	Thunderstorm Wind	50 kts.	0	0	5.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/02/1997	19:00	Thunderstorm Wind	50 kts.	0	0	5.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/09/1997	15:30	Thunderstorm Wind	50 kts.	0	0	5.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/25/1997	20:20	Thunderstorm Wind	50 kts.	0	0	3.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	11/01/1997	15:05	Hail	3.00 in.	0	0	25.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	11/01/1997	15:45	Hail	0.75 in.	0	0	2.00K	0.00K
COLUMBUS METRO ARPT	MUSCOGEE CO.	GA	05/30/1998	13:40	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/30/1998	15:30	Lightning		0	0	40.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/05/1998	17:26	Thunderstorm Wind	60 kts.	0	1	45.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/19/1998	14:05	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/25/1998	16:10	Hail	0.88 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/20/1998	16:05	Hail	1.00 in.	0	0	2.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	10/07/1998	16:15	Hail	1.50 in.	0	0	5.00K	2.00K
COLUMBUS	MUSCOGEE CO.	GA	04/15/1999	06:40	Thunderstorm Wind	50 kts.	0	0	5.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	04/27/1999	12:20	Thunderstorm Wind	50 kts.	0	0	5.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/06/1999	09:30	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/18/1999	18:00	Thunderstorm Wind	50 kts.	0	0	5.00K	0.00K

COLUMBUS	MUSCOGEE CO.	GA	08/12/1999	16:50	Thunderstorm Wind	50 kts.	0	0	10.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/12/1999	17:13	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/12/1999	17:13	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/12/1999	18:05	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/20/1999	14:05	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/20/1999	14:37	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/20/1999	14:45	Hail	1.00 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/10/2000	18:15	Hail	1.00 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/11/2000	10:00	Thunderstorm Wind		0	0	0.70K	0.00K
COUNTYWIDE	MUSCOGEE CO.	GA	07/20/2000	20:35	Thunderstorm Wind	50 kts. EG	0	0	25.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	09/22/2000	22:33	Lightning		0	0	0.50K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/15/2001	04:00	Thunderstorm Wind	53 kts. M	0	1	300.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/22/2001	13:15	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/04/2002	15:35	Hail	0.88 in.	0	0	0.00K	0.00K
FT BENNING JCT	MUSCOGEE CO.	GA	07/02/2002	16:30	Hail	0.88 in.	0	0	0.00K	0.00K
BENNING HILLS	MUSCOGEE CO.	GA	07/07/2002	18:00	Thunderstorm Wind		0	0	5.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	07/21/2002	15:30	Thunderstorm Wind	61 kts. E	0	0	0.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	07/21/2002	15:30	Hail	1.00 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/21/2002	16:20	Thunderstorm Wind		0	0	25.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	07/21/2002	16:20	Hail	1.00 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/23/2002	17:53	Thunderstorm Wind		0	0	1.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	02/22/2003	06:15	Thunderstorm Wind	55 kts. EG	0	0	5.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/13/2003	18:05	Thunderstorm Wind	50 kts. EG	0	0	225.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	04/05/2003	18:45	Hail	0.88 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/01/2003	20:40	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/02/2003	21:00	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/02/2003	21:00	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS METRO ARPT	MUSCOGEE CO.	GA	07/17/2003	02:53	Thunderstorm Wind	51 kts. MG	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/05/2003	08:05	Lightning		0	0	5.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	04/12/2004	18:00	Hail	1.00 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	04/12/2004	18:00	Thunderstorm Wind	52 kts. EG	0	0	10.00K	0.00K

PIERCE CHAPEL	MUSCOGEE CO.	GA	04/12/2004	22:07	Hail	1.00 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/27/2004	17:12	Thunderstorm Wind	52 kts. EG	0	0	25.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/24/2004	22:00	Thunderstorm Wind	50 kts. EG	0	0	25.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/26/2004	12:45	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	01/13/2005	16:55	Thunderstorm Wind	50 kts. EG	0	0	7.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/22/2005	11:40	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/22/2005	13:42	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	04/22/2005	15:55	Hail	0.88 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/20/2005	15:20	Thunderstorm Wind	50 kts. EG	0	0	0.25K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/02/2005	15:04	Thunderstorm Wind	50 kts. EG	0	0	250.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/02/2005	15:04	Hail	0.88 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/02/2005	15:25	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/06/2005	12:45	Hail	0.88 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/22/2005	16:30	Thunderstorm Wind	31 kts. EG	0	0	0.25K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/20/2006	21:17	Thunderstorm Wind	50 kts. EG	0	0	25.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/20/2006	21:27	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	04/22/2006	02:29	Hail	0.75 in.	0	0	0.00K	0.00K
COUNTYWIDE	MUSCOGEE CO.	GA	05/10/2006	16:30	Thunderstorm Wind	59 kts. MG	0	0	15.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/10/2006	16:40	Hail	1.00 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/13/2006	21:35	Hail	0.75 in.	0	0	0.00K	0.00K
MIDLAND	MUSCOGEE CO.	GA	06/21/2006	16:06	Thunderstorm Wind	50 kts. EG	0	0	1.50K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/25/2006	16:30	Thunderstorm Wind	50 kts. EG	0	0	25.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/20/2006	17:41	Thunderstorm Wind	45 kts. EG	0	0	1.50K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	04/11/2007	18:53	Hail	0.75 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/11/2007	21:50	Hail	1.00 in.	0	0	0.00K	0.00K
MIDLAND	MUSCOGEE CO.	GA	06/11/2007	22:00	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
MIDLAND	MUSCOGEE CO.	GA	08/12/2007	16:50	Thunderstorm Wind	50 kts. EG	0	0	4.00K	0.00K

MIDLAND	MUSCOGEE CO.	GA	08/17/2007	17:59	Thunderstorm Wind	39 kts. EG	0	0	1.50K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	01/31/2008	22:29	Thunderstorm Wind	50 kts. EG	0	0	20.00K	0.00K
GREEN IS HILLS	MUSCOGEE CO.	GA	02/06/2008	10:30	Thunderstorm Wind	43 kts. EG	0	0	2.00K	0.00K
SCHATULGA	MUSCOGEE CO.	GA	02/17/2008	17:24	Lightning		0	0	15.00K	0.00K
(CSG)COLUMBUS METRO	MUSCOGEE CO.	GA	02/26/2008	08:55	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/15/2008	17:20	Hail	0.88 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/22/2008	14:00	Thunderstorm Wind	52 kts. EG	0	0	30.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/03/2009	16:55	Thunderstorm Wind	47 kts. MG	0	0	1.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/29/2010	14:11	Lightning		0	0	10.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/27/2010	12:48	Hail	1.00 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/27/2010	12:53	Thunderstorm Wind	39 kts. EG	0	0	1.50K	0.00K
AVONDALE	MUSCOGEE CO.	GA	03/26/2011	16:22	Hail	1.25 in.	0	0	0.00K	0.00K
GREEN IS HILLS	MUSCOGEE CO.	GA	04/04/2011	23:08	Thunderstorm Wind	50 kts. EG	0	0	25.00K	0.00K
FLAT ROCK	MUSCOGEE CO.	GA	04/25/2011	18:28	Thunderstorm Wind	56 kts. EG	0	2	350.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/13/2011	17:40	Thunderstorm Wind	50 kts. EG	0	0	7.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/15/2011	23:42	Thunderstorm Wind	36 kts. EG	0	0	1.00K	0.00K
MIDLAND	MUSCOGEE CO.	GA	07/03/2011	16:28	Hail	1.50 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/13/2011	14:43	Thunderstorm Wind	50 kts. EG	0	0	4.00K	0.00K
SAND HILL	MUSCOGEE CO.	GA	09/05/2011	15:01	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
GREEN IS HILLS	MUSCOGEE CO.	GA	01/21/2012	14:19	Hail	1.75 in.	0	0	2.440M	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	01/21/2012	14:20	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
MIDLAND	MUSCOGEE CO.	GA	05/06/2012	11:30	Hail	1.00 in.	0	0	0.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	07/03/2012	13:53	Thunderstorm Wind	50 kts. MG	0	0	2.00K	0.00K
ALTA VISTA	MUSCOGEE CO.	GA	07/05/2012	16:30	Thunderstorm Wind	60 kts. EG	0	0	75.00K	0.00K
MUSCOGEE	MUSCOGEE CO.	GA	07/10/2012	18:07	Thunderstorm Wind	40 kts. EG	0	0	2.00K	0.00K

DOUBLE CHURCHES	MUSCOGEE CO.	GA	07/10/2012	18:25	Thunderstorm Wind	40 kts. EG	0	0	0.75K	0.00K
GREEN IS HILLS	MUSCOGEE CO.	GA	07/27/2012	18:20	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	03/05/2013	16:55	Thunderstorm Wind	60 kts. EG	0	0	10.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	03/18/2013	18:14	Hail	2.00 in.	0	0	2.790M	0.00K
ALTA VISTA	MUSCOGEE CO.	GA	04/19/2013	10:30	Thunderstorm Wind	78 kts. EG	0	0	60.00K	0.00K
WYNNTON	MUSCOGEE CO.	GA	06/28/2013	14:57	Thunderstorm Wind	45 kts. EG	0	0	1.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/24/2013	14:30	Thunderstorm Wind	60 kts. EG	1	0	5.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	04/29/2014	04:10	Thunderstorm Wind	65 kts. EG	0	0	7.00K	0.00K
LINDEN	MUSCOGEE CO.	GA	06/30/2014	16:45	Thunderstorm Wind	55 kts. EG	0	0	1.50K	0.00K
AVONDALE	MUSCOGEE CO.	GA	07/09/2014	18:30	Thunderstorm Wind	55 kts. EG	0	0	2.00K	0.00K
BAKER VILLAGE	MUSCOGEE CO.	GA	08/18/2014	18:17	Thunderstorm Wind	50 kts. EG	0	0	4.00K	0.00K
ALTA VISTA	MUSCOGEE CO.	GA	11/23/2014	15:30	Thunderstorm Wind	55 kts. EG	0	0	1.50K	0.00K
ALTA VISTA	MUSCOGEE CO.	GA	11/23/2014	15:48	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
BROOKHAVEN	MUSCOGEE CO.	GA	04/25/2015	17:08	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	05/26/2015	14:30	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	06/09/2015	14:54	Hail	1.00 in.	0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/24/2015	18:45	Thunderstorm Wind	50 kts. EG	0	0	16.00K	0.00K
GLENNS	MUSCOGEE CO.	GA	07/03/2015	21:45	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
(CSG)COLUMBUS METRO	MUSCOGEE CO.	GA	08/06/2015	19:12	Thunderstorm Wind	60 kts. EG	0	0	1.00K	0.00K
BAKER VILLAGE	MUSCOGEE CO.	GA	06/11/2016	15:15	Lightning		0	0	0.50K	0.00K
BAKER VILLAGE	MUSCOGEE CO.	GA	06/11/2016	15:15	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
NANKIPOOH	MUSCOGEE CO.	GA	06/16/2016	19:30	Thunderstorm Wind	55 kts. EG	0	0	25.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	06/17/2016	17:50	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K

COLUMBUS	MUSCOGEE CO.	GA	07/18/2016	18:45	Thunderstorm Wind	61 kts. EG	0	0	100.00K	0.00K
BAKER VILLAGE	MUSCOGEE CO.	GA	01/02/2017	18:30	Thunderstorm Wind	45 kts. EG	0	0	1.00K	0.00K
GREEN IS HILLS	MUSCOGEE CO.	GA	01/21/2017	10:20	Thunderstorm Wind	50 kts. EG	0	0	6.00K	0.00K
NANKIPOOH	MUSCOGEE CO.	GA	02/07/2017	16:23	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
MIDLAND	MUSCOGEE CO.	GA	04/03/2017	10:54	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	04/05/2017	04:00	Hail	1.00 in.	0	0	0.00K	0.00K
GLENNS	MUSCOGEE CO.	GA	04/05/2017	04:00	Hail	0.75 in.	0	0	0.00K	0.00K
ALTA VISTA	MUSCOGEE CO.	GA	04/05/2017	04:00	Hail	0.88 in.	0	0	0.00K	0.00K
MIDLAND	MUSCOGEE CO.	GA	12/20/2017	13:47	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
FLAT ROCK	MUSCOGEE CO.	GA	06/21/2018	17:00	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
WYNNTON	MUSCOGEE CO.	GA	06/22/2018	19:10	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	02/12/2019	13:26	Thunderstorm Wind	50 kts. EG	0	0	6.00K	0.00K
BIBB CITY	MUSCOGEE CO.	GA	06/07/2019	14:36	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	07/05/2019	14:10	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	01/11/2020	17:13	Thunderstorm Wind	45 kts. EG	0	0	1.00K	0.00K
BAKER VILLAGE	MUSCOGEE CO.	GA	06/10/2020	16:20	Thunderstorm Wind	45 kts. EG	0	0	1.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	07/12/2020	16:38	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
SCHATULGA	MUSCOGEE CO.	GA	07/25/2020	17:05	Hail	1.00 in.	0	0	0.00K	0.00K
ALLENDALE	MUSCOGEE CO.	GA	07/25/2020	17:11	Thunderstorm Wind	50 kts. EG	0	0	4.00K	0.00K
ALLENDALE	MUSCOGEE CO.	GA	07/25/2020	17:20	Thunderstorm Wind	52 kts. MG	0	0	0.00K	0.00K
ALLENDALE	MUSCOGEE CO.	GA	08/03/2020	15:05	Thunderstorm Wind	50 kts. EG	0	0	12.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/12/2020	16:54	Thunderstorm Wind	45 kts. EG	0	0	1.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	06/11/2021	15:33	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/27/2021	15:30	Thunderstorm Wind	45 kts. EG	0	0	1.00K	0.00K

FORTSON	MUSCOGEE CO.	GA	08/10/2021	13:55	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
WYNNTON	MUSCOGEE CO.	GA	12/11/2021	16:23	Thunderstorm Wind	39 kts. EG	0	0	1.00K	0.00K
GREEN IS HILLS	MUSCOGEE CO.	GA	12/30/2021	15:58	Hail	1.00 in.	0	0	0.00K	0.00K
NANKIPOOH	MUSCOGEE CO.	GA	12/30/2021	16:00	Hail	1.00 in.	0	0	0.00K	0.00K
FLAT ROCK	MUSCOGEE CO.	GA	12/30/2021	16:03	Hail	1.00 in.	0	0	0.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	12/30/2021	16:14	Hail	1.00 in.	0	0	0.00K	0.00K
ALTA VISTA	MUSCOGEE CO.	GA	12/30/2021	16:15	Hail	1.75 in.	0	0	0.00K	0.00K
FOXRUN	MUSCOGEE CO.	GA	04/06/2022	16:00	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	06/15/2022	17:35	Hail	1.00 in.	0	0	0.00K	0.00K
GLENNS	MUSCOGEE CO.	GA	08/07/2022	16:53	Thunderstorm Wind	57 kts. MG	0	0	0.00K	0.00K
WYNNTON	MUSCOGEE CO.	GA	08/10/2022	15:10	Thunderstorm Wind	43 kts. EG	0	0	1.00K	0.00K
BAKER VILLAGE	MUSCOGEE CO.	GA	03/26/2023	15:54	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
BROOKHAVEN	MUSCOGEE CO.	GA	03/26/2023	15:55	Hail	1.00 in.	0	0	0.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	03/26/2023	16:16	Hail	1.25 in.	0	0	0.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	03/26/2023	16:21	Hail	1.50 in.	0	0	0.00K	0.00K
BEAVER RUN	MUSCOGEE CO.	GA	06/14/2023	12:20	Thunderstorm Wind	43 kts. EG	0	0	1.00K	0.00K
GLENNS	MUSCOGEE CO.	GA	06/25/2023	19:48	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	06/30/2023	15:15	Thunderstorm Wind	39 kts. EG	0	0	1.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	07/21/2023	18:54	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
(CSG)COLUMBUS METRO	MUSCOGEE CO.	GA	07/30/2023	13:57	Thunderstorm Wind	43 kts. EG	0	0	1.00K	0.00K

Severe Winter Weather

Location	County/Zone	St.	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
Totals:							0	0	153.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	01/02/2002	06:00	Heavy Snow		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	01/28/2005	20:00	Winter Storm		0	0	150.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	03/01/2009	13:00	Heavy Snow		0	0	3.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	02/12/2010	11:30	Heavy Snow		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	12/25/2010	19:00	Winter Weather		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	01/09/2011	16:00	Winter Weather		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	01/28/2014	17:00	Winter Storm		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	12/09/2017	00:00	Winter Weather		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	01/17/2018	01:00	Winter Storm		0	0	0.00K	0.00K

Tornadoes

Location	County/Zone	St.	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
Totals:							0	7	35.778M	25.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	05/01/1978	07:30	Tornado	F2	0	3	2.500M	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	11/20/1983	13:50	Tornado	F1	0	2	250.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	03/29/1991	10:05	Tornado	F0	0	0	2.50K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	05/05/1991	15:10	Tornado	F1	0	0	250.00K	0.00K
MUSCOGEE CO.	MUSCOGEE CO.	GA	11/22/1992	13:35	Tornado	F1	0	0	250.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	03/13/1997	17:12	Tornado	F1	0	1	750.00K	25.00K
COLUMBUS	MUSCOGEE CO.	GA	11/15/2006	15:03	Tornado	F0	0	0	0.50K	0.00K
GREEN IS HILLS	MUSCOGEE CO.	GA	03/01/2007	18:31	Tornado	EF2	0	1	28.000M	0.00K
COLUMBUS	MUSCOGEE CO.	GA	04/19/2009	22:35	Tornado	EF1	0	0	3.000M	0.00K
MUSCOGEE	MUSCOGEE CO.	GA	04/03/2017	10:42	Tornado	EF1	0	0	100.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	03/03/2019	15:29	Tornado	EF3	0	0	500.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	04/14/2019	09:16	Tornado	EF0	0	0	150.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	04/14/2019	09:46	Tornado	EF0	0	0	25.00K	0.00K

Flooding

Location	County/Zone	St.	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
Totals:							0	0	377.50K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	03/08/1998	09:45	Flood		0	0	30.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	03/03/2001	21:00	Flood		0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	06/25/2002	16:25	Flood		0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	05/08/2003	04:00	Flash Flood		0	0	50.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	05/08/2003	08:00	Flood		0	0	25.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	07/13/2003	17:07	Flash Flood		0	0	50.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	08/10/2004	11:15	Flash Flood		0	0	50.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	09/17/2004	12:00	Flood		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	03/27/2005	06:30	Flood		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	07/11/2005	00:00	Flood		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	07/29/2005	15:00	Flood		0	0	50.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	04/08/2006	10:30	Flood		0	0	0.50K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	11/15/2006	13:30	Flood		0	0	0.00K	0.00K
PIERCE CHAPEL	MUSCOGEE CO.	GA	05/13/2012	19:05	Flash Flood		0	0	2.00K	0.00K
ALLENDALE	MUSCOGEE CO.	GA	08/14/2013	15:25	Flash Flood		0	0	30.00K	0.00K
GREEN IS HILLS	MUSCOGEE CO.	GA	09/07/2014	19:00	Flash Flood		0	0	2.00K	0.00K
GREEN IS HILLS	MUSCOGEE CO.	GA	08/06/2015	19:40	Flash Flood		0	0	3.00K	0.00K
GLENNS	MUSCOGEE CO.	GA	01/02/2017	20:35	Flash Flood		0	0	35.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	01/02/2017	20:35	Flash Flood		0	0	50.00K	0.00K
UPATOI	MUSCOGEE CO.	GA	05/23/2018	10:30	Flash Flood		0	0	0.00K	0.00K
BIBB CITY	MUSCOGEE CO.	GA	04/19/2020	21:06	Flash Flood		0	0	0.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	04/19/2020	21:06	Flash Flood		0	0	0.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	09/16/2020	21:53	Flash Flood		0	0	0.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	10/04/2021	11:15	Flash Flood		0	0	0.00K	0.00K
DOUBLE CHURCHES	MUSCOGEE CO.	GA	10/04/2021	11:20	Flash Flood		0	0	0.00K	0.00K
AVONDALE	MUSCOGEE CO.	GA	10/04/2021	12:30	Flash Flood		0	0	0.00K	0.00K
COLUMBUS	MUSCOGEE CO.	GA	10/04/2021	12:30	Flash Flood		0	0	0.00K	0.00K
MUSCOGEE	MUSCOGEE CO.	GA	10/04/2021	13:25	Flash Flood		0	0	0.00K	0.00K

Drought

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	105.44K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	11/01/1998	00:00	EST	Drought		0	0	0.00K	25.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	12/01/1998	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	02/01/1999	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	07/01/1999	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	02/01/2000	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	04/01/2000	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	05/01/2000	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	06/01/2000	00:00	EST	Drought		0	0	0.00K	80.44K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	07/01/2000	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	10/01/2000	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	10/01/2001	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	12/01/2001	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	04/01/2002	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	08/01/2002	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	01/01/2003	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	03/01/2004	00:00	EST	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	05/01/2007	00:00	EST-5	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	09/01/2007	00:00	EST-5	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	10/01/2007	00:00	EST-5	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	11/01/2007	00:00	EST-5	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	12/01/2007	00:00	EST-5	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	09/01/2011	00:00	EST-5	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	10/01/2016	00:00	EST-5	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	11/01/2016	00:00	EST-5	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	12/01/2016	00:00	EST-5	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	01/01/2017	00:00	EST-5	Drought		0	0	0.00K	0.00K
MUSCOGEE (ZONE)	MUSCOGEE (ZONE)	GA	10/15/2019	00:00	EST-5	Drought		0	0	0.00K	0.00K

Appendix C – Columbus-Muscogee County Worksheet 3As

GEMA Worksheet #3a **Inventory of Assets**
Jurisdiction: Columbus-Muscogee County
Hazard: Non-Spatially Defined Hazard

Task A. Determine the proportion of buildings, the value of buildings, and the population in your community or state that are located in hazard areas.

Type of Structure (Occupancy Class)	# in Community of State	# in Hazard Area	% in Hazard Area	$ in Community or State	$ in Hazard Area	% in Hazard Area	# in Community or State	# in Hazard Area	% in Hazard Area
Residential	58,764	58,764	100.000%	6,581,247,770	6,581,247,770	100.000%	202,616	202,616	100%
Commercial	4,813	4,813	100.000%	2,785,478,635	2,785,478,635	100.000%	0	0	#DIV/0!
Industrial	171	171	100.000%	268,552,910	268,552,910	100.000%	0	0	#DIV/0!
Agricultural	85	85	100.000%	22,380,605	22,380,605	100.000%	0	0	#DIV/0!
Religious/ Non-profit	804	804	100.000%	504,453,278	504,453,278	100.000%	0	0	#DIV/0!
Government	1,260	1,260	100.000%	6,514,006,355	6,514,006,355	100.000%	0	0	#DIV/0!
Education	199	199	100.000%	582,658,615	582,658,615	100.000%	0	0	#DIV/0!
Utilities	45	45	100.000%	403,535,498	403,535,498	100.000%	0	0	#DIV/0!
Total	66,141	66,141	100.000%	17,662,313,666	17,662,313,666	100.000%	202,616	202,616	100%

Task B. Determine whether (and where) you want to collect additional inventory data.

	Y	N
1. Do you know where the greatest damages may occur in your area?		N
2. Do you know whether your critical facilities will be operational after a hazard event?		N
3. Is there enough data to determine which assets are subject to the greatest potential damages?		N
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?		N
5. Is there enough data to determine whether certain areas of historic, environmental, political, or cultural significance are vulnerable to potential hazards?		N
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?		N
7. Is additional data needed to justify the expenditure of community or state funds for mitigation initiatives?		N

GEMA Worksheet #3a **Inventory of Assets**
Jurisdiction: Columbus-Muscogee County
Hazard: Wildfire Hazard

Task A. Determine the proportion of buildings, the value of buildings, and the population in your community or state that are located in hazard areas.

Type of Structure (Occupancy Class)	# in Community of State	# in Hazard Area	% in Hazard Area	$ in Community or State	$ in Hazard Area	% in Hazard Area	# in Community or State	# in Hazard Area	% in Hazard Area
Residential	58,764	48,857	83.141%	6,581,247,770	5,471,717,757	83.141%	202,616	168,457	83%
Commercial	4,813	3,185	66.175%	2,785,478,635	1,843,288,895	66.175%	0	0	#DIV/0!
Industrial	171	97	56.725%	268,552,910	152,337,031	56.725%	0	0	#DIV/0!
Agricultural	85	74	87.059%	22,380,605	19,484,291	87.059%	0	0	#DIV/0!
Religious/ Non-profit	804	696	86.567%	504,453,278	436,690,897	86.567%	0	0	#DIV/0!
Government	1,260	741	58.810%	6,514,006,355	3,830,856,118	58.810%	0	0	#DIV/0!
Education	199	171	85.930%	582,658,615	500,676,498	85.930%	0	0	#DIV/0!
Utilities	45	34	75.556%	403,535,498	304,893,487	75.556%	0	0	#DIV/0!
Total	66,141	53,855	81.425%	17,662,313,666	12,559,944,976	71.112%	202,616	168,457	83%

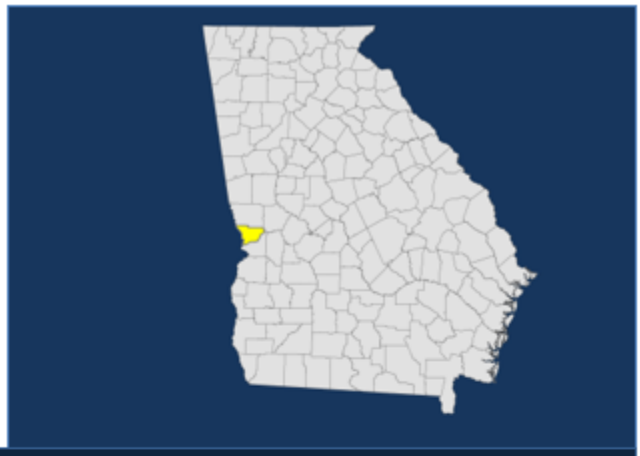
Task B. Determine whether (and where) you want to collect additional inventory data.

	Y	N
1. Do you know where the greatest damages may occur in your area?		N
2. Do you know whether your critical facilities will be operational after a hazard event?		N
3. Is there enough data to determine which assets are subject to the greatest potential damages?	Y	
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards?	Y	
5. Is there enough data to determine whether certain areas of historic, environmental, political, or cultural significance are vulnerable to potential hazards?	Y	
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence?		N
7. Is additional data needed to justify the expenditure of community or state funds for mitigation initiatives?		N

Appendix D – Documentation of Peer Review

Chattahoochee County

Appendix E – Columbus-Muscogee County HAZUS Report



Hazard Risk Analyses
Supplement to the Muscogee County Joint Hazard Mitigation Plan

Carl Vinson Institute of Government
UNIVERSITY OF GEORGIA

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Introduction

The Federal Disaster Mitigation Act of 2000 (DMA2K) requires state, local, and tribal governments to develop and maintain a mitigation plan to be eligible for certain federal disaster assistance and hazard mitigation funding programs.

Mitigation seeks to reduce a hazard's impacts, which may include loss of life, property damage, disruption to local and regional economies, and the expenditure of public and private funds for recovery. Sound mitigation must be based on a sound risk assessment that quantifies the potential losses of a disaster by assessing the vulnerability of buildings, infrastructure, and people.

In recognition of the importance of planning in mitigation activities, FEMA Hazus-MH, a powerful disaster risk assessment tool based on geographic information systems (GIS). This tool enables communities of all sizes to predict estimated losses from floods, hurricanes, earthquakes, and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses.

In 2024, the Georgia Department of Emergency Management partnered with the Carl Vinson Institute of Government at the University of Georgia to develop a detailed risk assessment focused on defining hurricane, riverine flood, and tornado risks in Muscogee County, Georgia. This assessment identifies the characteristics and potential consequences of the disaster, how much of the community could be affected by the disaster, and the impact on community assets.

Risk Assessment Process Overview

Hazus-MH Version 2.2 SP1 was used to perform the analyses for Muscogee County. The Hazus-MH application includes default data for every county in the US. This Hazus-MH data was derived from a variety of national sources and in some cases the data are also several years old. Whenever possible, using local provided data is preferred. Muscogee County provided building inventory information from the county's property tax assessment system. This section describes the changes made to the default Hazus-MH inventory and the modeling parameters used for each scenario.

County Inventory Changes

The default Hazus-MH site-specific point inventory was updated using data compiled from the Georgia Emergency Management Agency (GEMA). The default Hazus-MH aggregate inventory (General Building Stock) was also updated prior to running the scenarios. Reported losses reflect the updated data sets.

General Building Stock Updates

General Building Stock (GBS) is an inventory category that consists of aggregated data (grouped by census geography — tract or block). Hazus-MH generates a combination of site-specific and aggregated loss estimates based on the given analysis and user input.

The GBS records for Muscogee County were replaced with data derived from parcel and property assessment data obtained from Muscogee County. The county provided property assessment data was current as of February 2024 and the parcel data current as of February 2024. Records without improvements were deleted. The parcel boundaries were converted to parcel points located in the centroids of each parcel boundary; then, each parcel point was linked to an assessor record based upon matching parcel numbers. The parcel assessor match-rate for Muscogee County is 97.6%. The generated building inventory represents the approximate locations (within a parcel) of structures. The building inventory was aggregated by census block. Both the tract and block tables were updated. Table 1 shows the results of the changes to the GBS tables by occupancy class.

Table 1: GBS Building Exposure Updates by Occupancy Class*

General Occupancy	Default Hazus-MH Count	Updated Count	Default Hazus-MH Exposure	Updated Exposure
Agricultural	4	0	$277,000	$0
Commercial	3,261	829	$1,342,155,000	$1,213,380,000
Education	45	13	$249,561,000	$50,670,000
Government	7	0	$131,930,000	$0
Industrial	655	232	$145,854,000	$298,075,000
Religious	353	24	$166,891,000	$26,945,000
Residential	57,282	58,238	$6,447,963,000	$7,387,934,000
Total	**61,607**	**59,336**	**$8,484,631,000**	**$8,977,004,000**

*The exposure values represent the total number and replacement cost for all Muscogee County Buildings

For Muscogee County, the updated GBS was used to calculate hurricane wind losses. The flood losses and tornado losses were calculated from building inventory modeled in Hazus-MH as User-Defined Facility

5

(UDF)[1], or site-specific points. Figure 1 shows the distribution of buildings as points based on the county provided data.

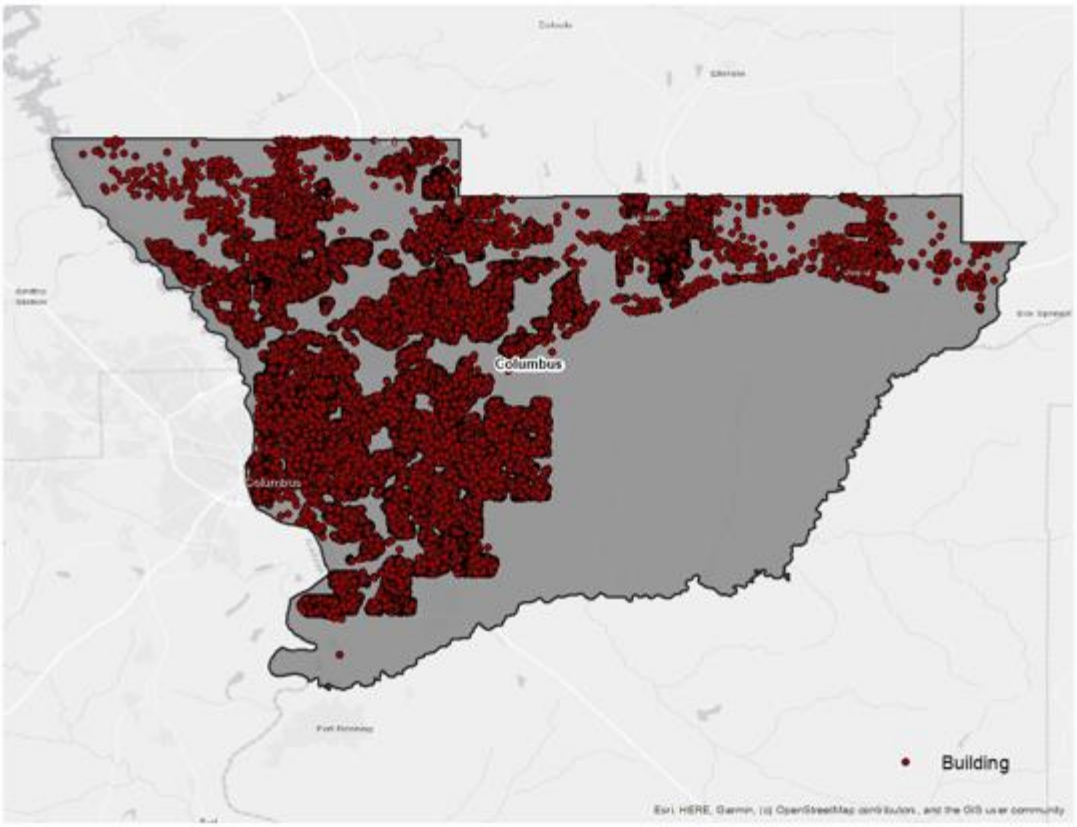

Figure 1: Muscogee County Overview

Essential Facility Updates

The default Hazus-MH essential facility data was updated to reflect improved information available in the Georgia Mitigation Information System (GMIS) as of February 2024. For these risk analyses, only GMIS data for buildings that Hazus-MH classified as Essential Facilities was integrated into Hazus-MH because the application provides specialized reports for these five facilities. Essential Facility inventory was updated for the analysis conducted for this report. The following table summarizes the counts and exposures, where available, by Essential Facility classification of the updated data.

Essential facilities include:

- Care facilities
- EOCs
- Fire stations
- Police stations
- Schools

[1] The UDF inventory category in Hazus-MH allows the user to enter site-specific data in place of GBS data.

Table 2: Updated Essential Facilities

Classification	Updated Count	Updated Exposure
Columbus/Muscogee County		
EOC	1	$3,342,000
Care	11	$197,024,000
Fire	16	$21,510,000
Police	4	$10,866,000
School	100	$736,378,000
Total	**132**	**$969,120,000**

Assumptions and Exceptions

Hazus-MH loss estimates may be impacted by certain assumptions and process variances made in this risk assessment.

- The Muscogee County analysis used Hazus-MH Version 2.2 SP1, which was released by FEMA in May 2015.
- County provided parcel and property assessment data may not fully reflect all buildings in the county. For example, some counties do not report not-for-profit buildings such as government buildings, schools and churches in their property assessment data. This data was used to update the General Building Stock as well as the User Defined Facilities applied in this risk assessment.
- Georgia statute requires that the Assessor's Office assign a code to all of the buildings on a parcel based on the buildings primary use. If there is a residential or a commercial structure on a parcel and there are also agricultural buildings on the same parcel Hazus-MH looks at the residential and commercial "primary" structures first and then combines the value of all secondary structures on that parcel with the value of the primary structure. The values and building counts are still accurate but secondary structures are accounted for under the same classification as the primary structure. Because of this workflow, the only time that a parcel would show a value for an agricultural building is when there are no residential or commercial structures on the parcel thus making the agricultural building the primary structure. This is the reason that agricultural building counts and total values seem low or are nonexistent.
- GBS updates from assessor data will skew loss calculations. The following attributes were defaulted or calculated:
  - Foundation Type was set from Occupancy Class
  - First Floor Height was set from Foundation Type
  - Content Cost was calculated from Replacement Cost
- It is assumed that the buildings are located at the centroid of the parcel.
- The essential facilities extracted from the GMIS were only used in the portion of the analysis designated as essential facility damage. They were not used in the update of the General Building Stock or the User Defined Facility inventory.

The hazard models included in this risk assessment included:

- Hurricane assessment which was comprised of a wind only damage assessment.
- Flood assessment based on the 1% annual chance event that includes riverine assessments.
- Tornado assessment based on GIS modeling.

Hurricane Risk Assessment

Hazard Definition

The National Hurricane Center describes a hurricane as a tropical cyclone in which the maximum sustained wind is, at minimum, 74 miles per hour (mph)[2]. The term hurricane is used for Northern Hemisphere tropical cyclones east of the International Dateline to the Greenwich Meridian. The term typhoon is used for Pacific tropical cyclones north of the Equator west of the International Dateline. Hurricanes in the Atlantic Ocean, Gulf of Mexico, and Caribbean form between June and November with the peak of hurricane season occurring in the middle of September. Hurricane intensities are measured using the Saffir-Simpson Hurricane Wind Scale (Table 3). This scale is a 1 to 5 categorization based on the hurricane's intensity at the indicated time.

Hurricanes bring a complex set of impacts. The winds from a hurricane produce a rise in the water level at landfall called storm surge. Storm surges produce coastal flooding effects that can be as damaging as the hurricane's winds. Hurricanes bring very intense inland riverine flooding. Hurricanes can also produce tornadoes that can add to the wind damages inland. In this risk assessment, only hurricane winds, and coastal storm surge are considered.

Table 3: Saffir-Simpson Hurricane Wind Scale

Category	Wind Speed (mph)	Damage
1	74 - 95	Very dangerous winds will produce some damage
2	96 - 110	Extremely dangerous winds will cause extensive damage
3	111 - 130	Devastating damage will occur
4	131 -155	Catastrophic damage will occur
5	> 155	Catastrophic damage will occur

The National Oceanic and Atmospheric Administration's National Hurricane Center created the HURDAT database, which contains all of the tracks of tropical systems since the mid-1800s. This database was used to document the number of tropical systems that have affected Muscogee County by creating a 20-mile buffer around the county to include storms that didn't make direct landfall in Muscogee County but impacted the county. Note that the storms listed contain the peak sustained winds, maximum pressure and maximum attained storm strength for the entire storm duration. Since 1852, Muscogee County has had 25 tropical systems within 20 miles of its county borders (Table 4).

Table 4: Tropical Systems affecting Muscogee County[3]

YEAR	DATE RANGE	NAME	MAX WIND(Knots)	MAX PRESSURE	MAX CAT
1852	August 19 - 30	UNNAMED	115	961	H3

[2] National Hurricane Center (2011). "Glossary of NHC Terms." National Oceanic and Atmospheric Administration. http://www.nhc.noaa.gov/aboutgloss.shtml#h. Retrieved 2012-23-02.

[3] Atlantic Oceanic and Meteorological Laboratory (2012). "Data Center." National Oceanic and Atmospheric Administration. http://www.aoml.noaa.gov/hrd/data_sub/re_anal.html. Retrieved 7-20-2015.

YEAR	DATE RANGE	NAME	MAX WIND(Knots)	MAX PRESSURE	MAX CAT
1859	September 15 - 18	UNNAMED	81	0	H1
1881	August 21 - 29	UNNAMED	104	1002	H2
1882	September 02 - 13	UNNAMED	127	1000	H3
1887	July 20 - 28	UNNAMED	98	0	H2
1889	September 12 - 26	UNNAMED	109	0	H2
1893	September 27 - October 05	UNNAMED	132	948	H4
1896	July 04 - 12	UNNAMED	98	0	H2
1898	August 30 - September 01	UNNAMED	86	0	H1
1901	June 11 - 15	UNNAMED	40	0	TS
1915	August 31 - September 06	UNNAMED	98	1003	H2
1926	July 22 - August 02	UNNAMED	138	967	H4
1950	September 01 - 09	EASY	121	996	H3
1957	September 07 - 09	DEBBIE	40	1003	TS
1959	May 28 - June 02	ARLENE	63	1002	TS
1994	June 30 - July 07	ALBERTO	63	1014	TS
1994	August 14 - 19	BERYL	58	1013	TS
2001	June 05 - 19	ALLISON	58	1012	TS
2002	September 12 - 15	HANNA	58	1014	TS
2004	August 25 - September 10	FRANCES	144	1009	H4
2010	August 10 - 18	FIVE	35	1013	TD
2017	August 30 - September 13	IRMA	178	1008	H5
2020	September 11 - 18	SALLY	109	1007	H2
2021	August 09 - 20	FRED	63	1013	TS
2022	November 06 - 11	NICOLE	75	1005	H1

Category Definitions:

TS – Tropical storm

TD – Tropical depression

H1 – Category 1 (same format for H2, H3, and H4)

E – Extra-tropical cyclone

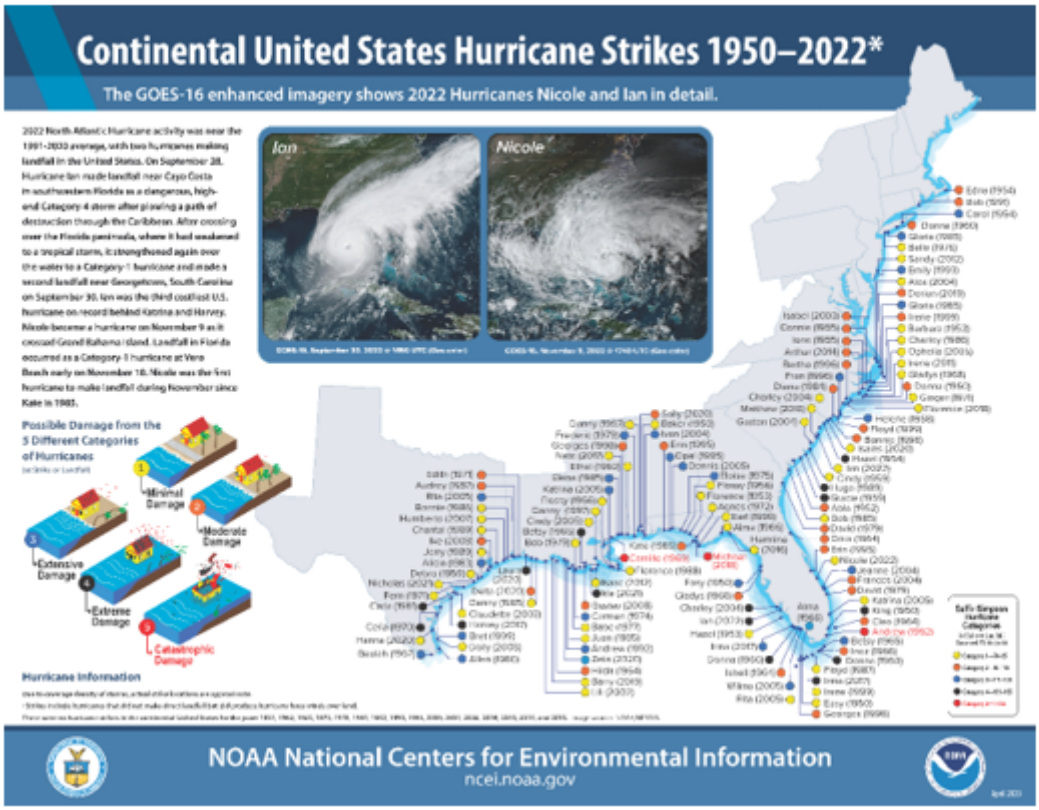

Figure 2: Continental United States Hurricane Strikes: 1950 to 2022[4]

Probabilistic Hurricane Scenario

The following probabilistic wind damage risk assessment modeled a Category One storm with maximum winds of 78 mph.

Wind Damage Assessment

Separate analyses were performed to determine wind and hurricane storm surge related flood losses. This section describes the wind-based losses to Muscogee County. Wind losses were determined from probabilistic models run for the Category One storm which equates to the 1% chance storm event. Figure 3 shows wind speeds for the modeled Category One storm.

[4] Source: NOAA National Centers for Environmental Information

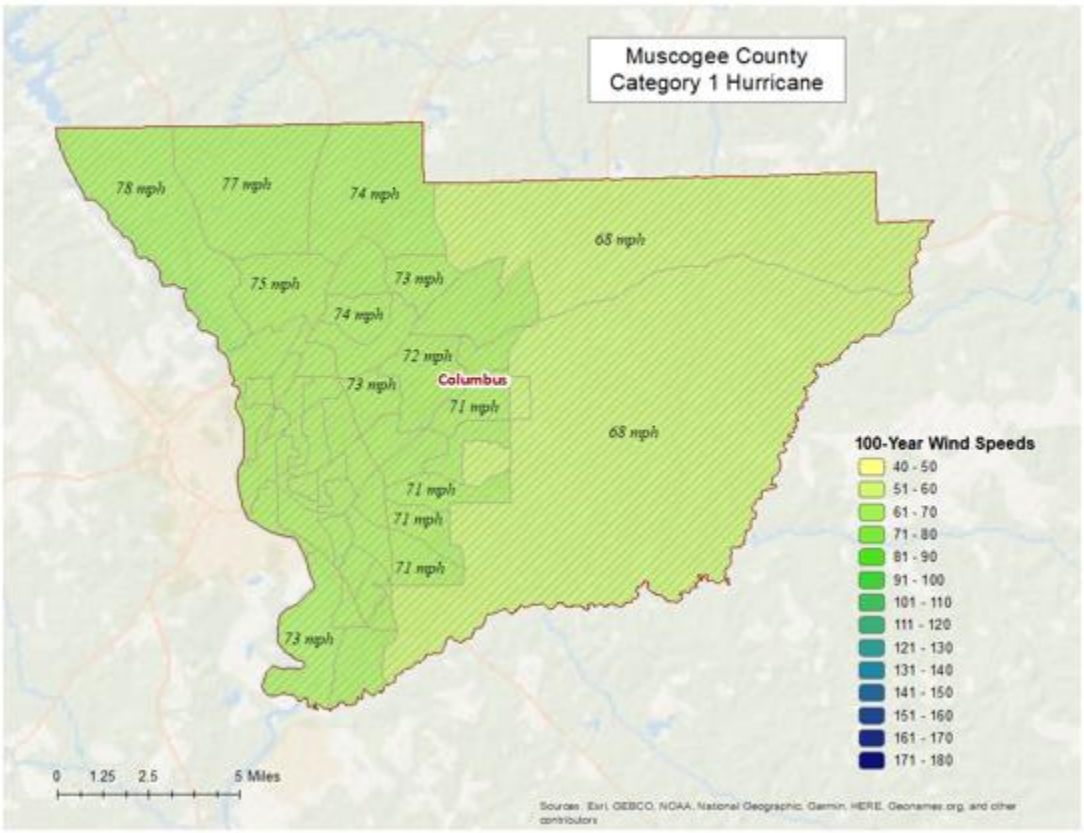

Figure 3: Wind Speeds by Storm Category

Wind-Related Building Damages

Buildings in Muscogee County are vulnerable to storm events, and the cost to rebuild may have significant consequences to the community. The following table shows a summary of the results of wind-related building damage in Muscogee County for the Category One (100 Year Event) storm. The loss ratio expresses building losses as a percentage of total building replacement cost in the county. Figure 4 illustrates the building loss ratios of the modeled Category One storm.

Table 5: Hurricane Wind Building Damage

Classification	Number of Buildings Damaged	Total Building Damage	Total Economic Loss[5]	Loss Ratio
Category One	228	$13,141,580	$17,063,120	0.15%

[5] Includes property damage (infrastructure, contents, and inventory) as well as business interruption losses.

Note that wind damaged buildings are not reported by jurisdiction. This is due to the fact that census tract boundaries – upon which hurricane building losses are based – do not closely coincide with jurisdiction boundaries.

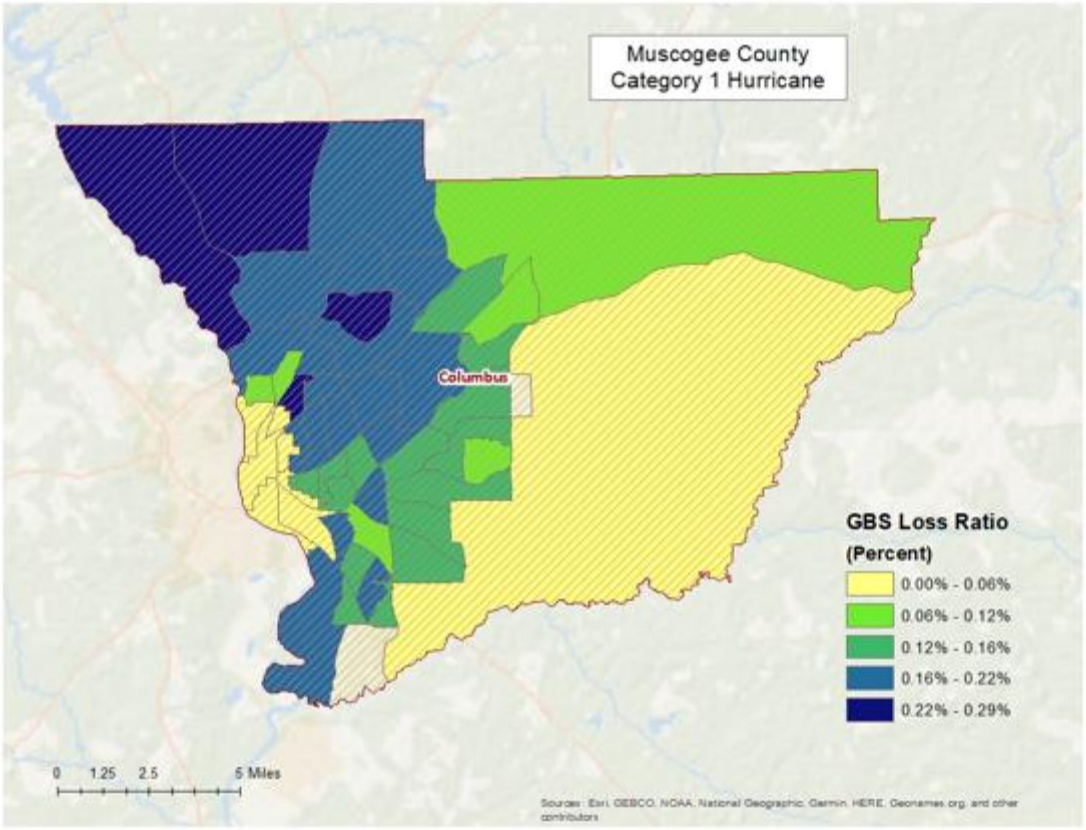

Figure 4: Hurricane Wind Building Loss Ratios

Essential Facility Losses

Essential facilities are also vulnerable to storm events, and the potential loss of functionality may have significant consequences to the community. Hazus-MH identified the essential facilities that may be moderately or severely damaged by winds. The results are compiled in Table 6.

There are 132 essential facilities in Muscogee County.

Classification	Number
EOCs	1
Fire Stations	16
Care Facilities	11
Police Stations	4
Schools	100

Table 6: Wind-Damaged Essential Facility Losses

Classification	Facilities At Least Moderately Damaged > 50%	Facilities Completely Damaged > 50%	Facilities with Expected Loss of Use (< 1 day)
Category One	4	0	132

Shelter Requirements

Hazus-MH estimates the number of households evacuated from buildings with severe damage from high velocity winds as well as the number of people who will require short-term sheltering. Since the 1% chance storm event for Muscogee County is a Category One storm, the resulting damage is not enough to displace Households or require temporary shelters as shown in the results listed in Table 7.

Table 7: Displaced Households and People

Classification	# of Displaced Households	# of People Needing Short-Term Shelter
Category One	0	0

Debris Generated from Hurricane Wind

Hazus-MH estimates the amount of debris that will be generated by high velocity hurricane winds and quantifies it into three broad categories to determine the material handling equipment needed:

- Reinforced Concrete and Steel Debris
- Brick and Wood and Other Building Debris
- Tree Debris

Different material handling equipment is required for each category of debris. The estimates of debris for this scenario are listed in Table 8. The amount of hurricane wind related tree debris that is estimated to require pick up at the public's expense is listed in the eligible tree debris column.

Table 8: Wind-Related Debris Weight (Tons)

Classification	Brick, Wood, and Other	Reinforced Concrete and Steel	Eligible Tree Debris	Other Tree Debris	Total
Category One	1,161	0	5,034	10,607	16,802

Figure 5 shows the distribution of all wind related debris resulting from a Category One storm. Each dot represents 20 tons of debris within the census tract in which it is located. The dots are randomly distributed within each census tract and therefore do not represent the specific location of debris sites.

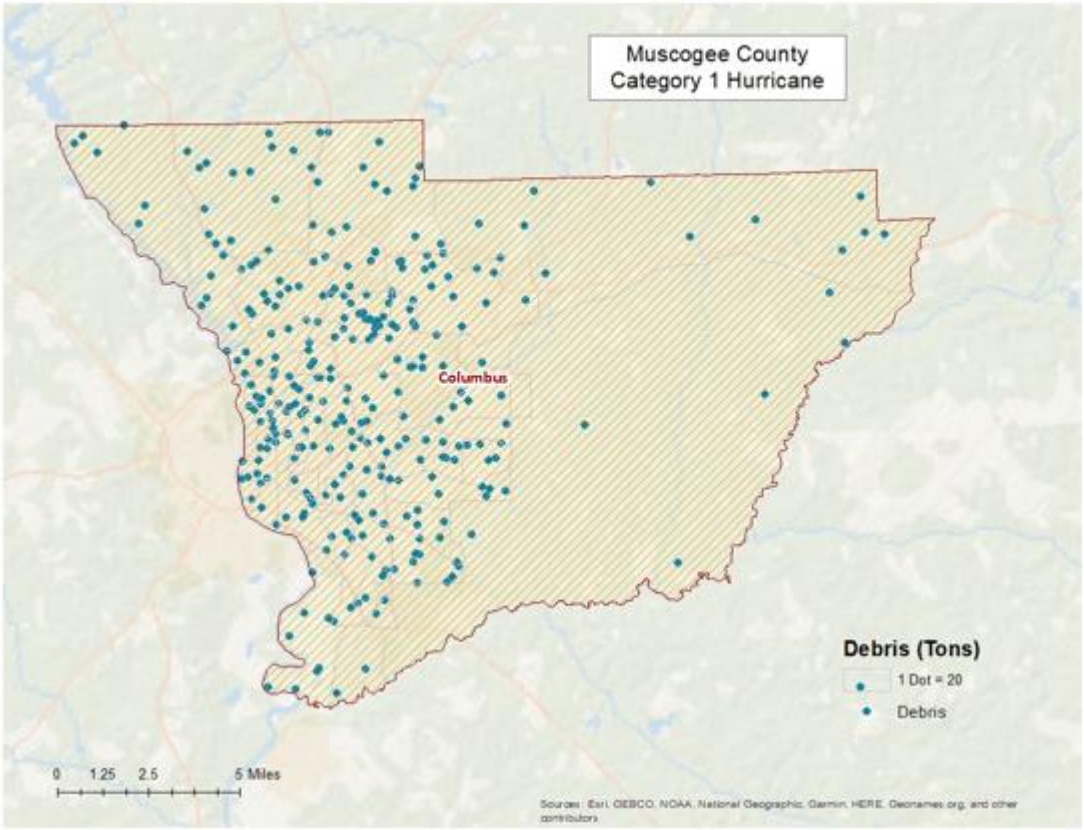

Figure 5: Wind-Related Debris Weight (Tons)

Flood Risk Assessment

Hazard Definition

Flooding is a significant natural hazard throughout the United States. The type, magnitude, and severity of flooding are functions of the amount and distribution of precipitation over a given area, the rate at which precipitation infiltrates the ground, the geometry and hydrology of the catchment, and flow dynamics and conditions in and along the river channel. Floods can be classified as one of three types: upstream floods, downstream floods, or coastal floods.

Upstream floods, also called flash floods, occur in the upper parts of drainage basins and are generally characterized by periods of intense rainfall over a short duration. These floods arise with very little warning and often result in locally intense damage, and sometimes loss of life, due to the high energy of the flowing water. Flood waters can snap trees, topple buildings, and easily move large boulders or other structures. Six inches of rushing water can upend a person; another 18 inches might carry off a car. Generally, upstream floods cause damage over relatively localized areas, but they can be quite severe in the local areas in which they occur. Urban flooding is a type of upstream flood. Urban flooding involves the overflow of storm drain systems and can be the result of inadequate drainage combined with heavy rainfall or rapid snowmelt. Upstream or flash floods can occur at any time of the year in Georgia, but they are most common in the spring and summer months.

Downstream floods, also called riverine floods, refer to floods on large rivers at locations with large upstream catchments. Downstream floods are typically associated with precipitation events that are of relatively long duration and occur over large areas. Flooding on small tributary streams may be limited, but the contribution of increased runoff may result in a large flood downstream. The lag time between precipitation and time of the flood peak is much longer for downstream floods than for upstream floods, generally providing ample warning for people to move to safe locations and, to some extent, secure some property against damage.

Coastal floods occurring on the Atlantic and Gulf coasts may be related to hurricanes or other combined offshore, nearshore, and shoreline processes. The effects of these complex interrelationships vary significantly across coastal settings, leading to challenges in the determination of the base (1-percent-annual-chance) flood for hazard mapping purposes. Land area covered by floodwaters of the base flood is identified as a Special Flood Hazard Area (SFHA). The Muscogee County flood risk assessment analyzed at risk structures in the SFHA.

> The SFHA is the area where the National Flood Insurance Program's (NFIP) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies. The owner of a structure in a high-risk area must carry flood insurance, if the owner carries a mortgage from a federally regulated or insured lender or servicer.

The following probabilistic risk assessment involves an analysis of a 1% annual chance riverine flood event (100-Year Flood) and a 1% annual chance coastal flood.

Riverine 1% Flood Scenario

Riverine losses were determined from the 1% flood boundaries downloaded from the FEMA Flood Map Service Center in March 2024. The flood boundaries were overlaid with the USGS 10 meter DEM using

the Hazus-MH Enhanced Quick Look tool to generate riverine depth grids. The riverine flood depth grid was then imported into Hazus-MH to calculate the riverine flood loss estimates. Figure 6 illustrates the riverine inundation boundary associated with the 1% annual chance.

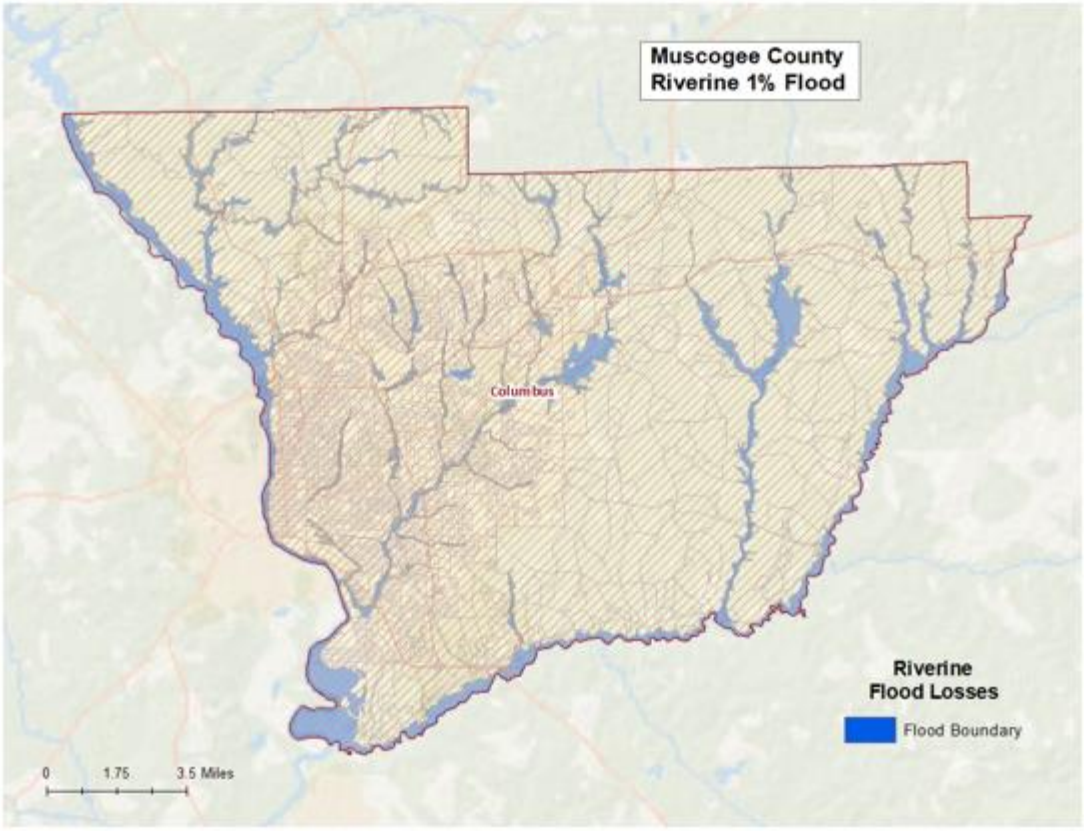

Figure 6: Riverine 1% Flood Inundation

Riverine 1% Flood Building Damages

Buildings in Muscogee County are vulnerable to flooding from events equivalent to the 1% riverine flood. The economic and social impacts from a flood of this magnitude can be significant. Table 9 provides a summary of the potential flood-related building damage in Muscogee County by jurisdiction that might be experienced from the 1% flood. Figure 7 maps the potential loss ratios of total building exposure to losses sustained to buildings from the 1% flood by 2010 census block and Figure 8 illustrates the relationship of building locations to the 1% flood inundation boundary.

Table 9: Muscogee County Riverine 1% Building Losses

Occupancy	Total Buildings in the Jurisdiction	Total Buildings Damaged in the Jurisdiction	Total Building Exposure in the Jurisdiction	Total Losses to Buildings in the Jurisdiction	Loss Ratio of Exposed Buildings to Damaged Buildings in the Jurisdiction
Columbus					
Residential	58,238	921	$7,387,967,224	$34,446,514	0.47%
Commercial	829	13	$1,213,412,103	$3,234,786	0.27%
Industrial	232	1	$298,079,250	$386,645	0.13%
County Total					
	59,299	**935**	**$8,899,458,577**	**$38,067,945**	

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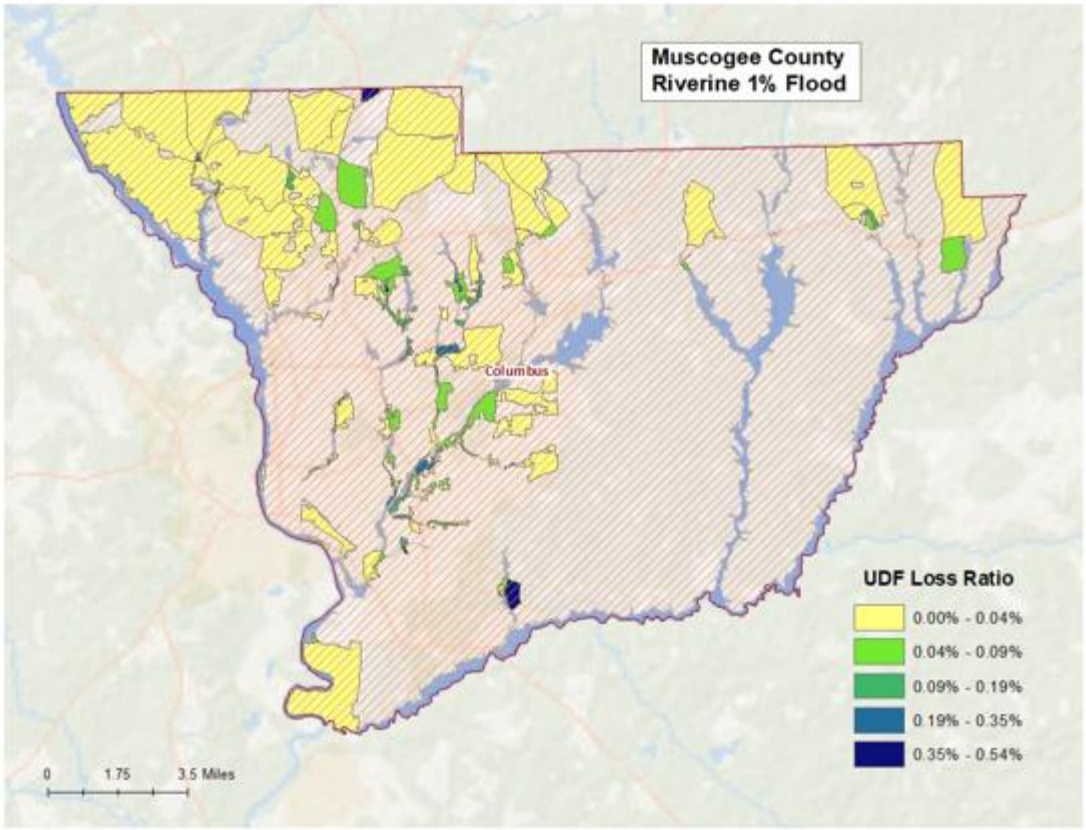

Figure 7: Muscogee County Potential Loss Ratios of Total Building Exposure to Losses Sustained to Buildings from the 1% Riverine Flood by 2010 Census Block

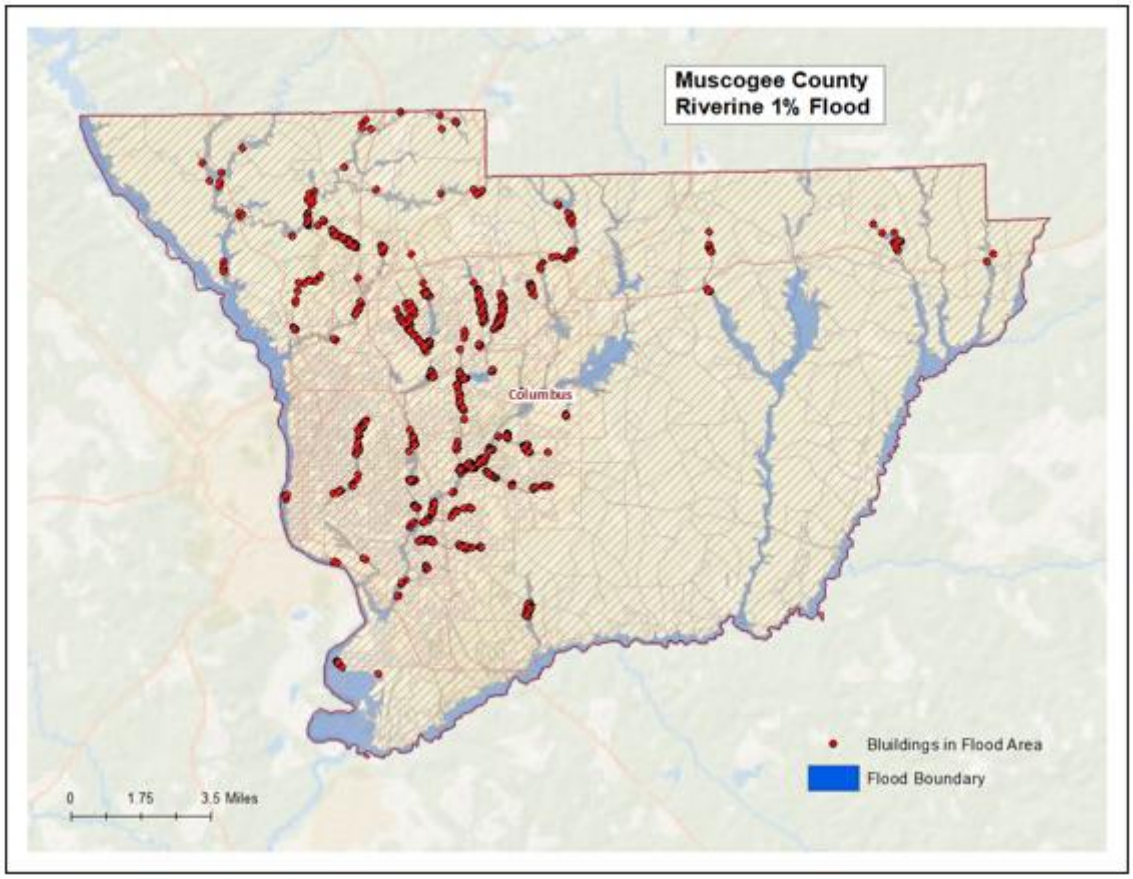

Figure 8: Muscogee County Damaged Buildings in Riverine Floodplain (1% Flood)

Riverine 1% Flood Essential Facility Losses

An essential facility may encounter many of the same impacts as other buildings within the flood boundary. These impacts can include structural failure, extensive water damage to the facility and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community). The analysis identified no essential facility that were subject to damage in the Muscogee County riverine 1% probability floodplain.

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Riverine 1% Flood Shelter Requirements

Hazus-MH estimates that the number of households that are expected to be displaced from their homes due to riverine flooding and the associated potential evacuation. The model estimates 2,189 households might be displaced due to the flood. Displacement includes households evacuated within or very near to the inundated area. Displaced households represent 6,567 individuals, of which 4,880 may require short term publicly provided shelter. The results are mapped in Figure 9.

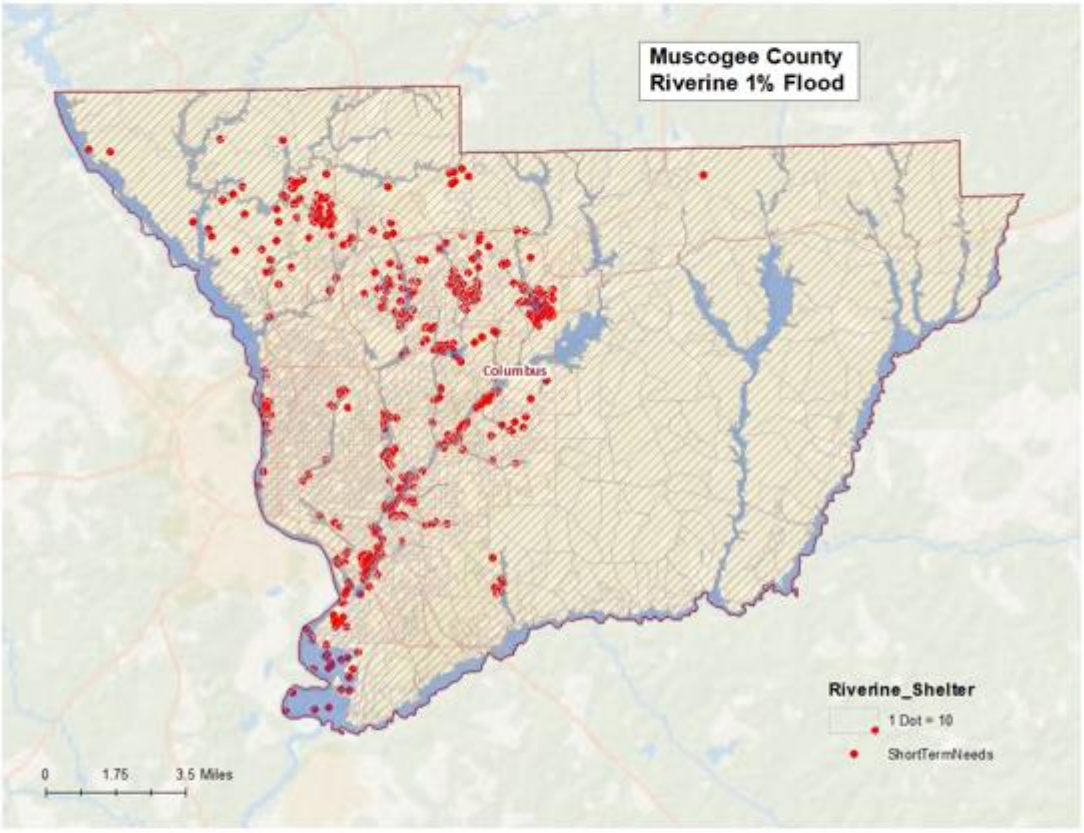

Figure 9: Riverine 1% Estimated Flood Shelter Requirements

Riverine 1% Flood Debris

Hazus-MH estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories:

- Finishes (dry wall, insulation, etc.)
- Structural (wood, brick, etc.)
- Foundations (concrete slab, concrete block, rebar, etc.)

Different types of material handling equipment will be required for each category. Debris definitions applied in Hazus-MH are unique to the Hazus-MH model and so do not necessarily conform to other definitions that may be employed in other models or guidelines.

The analysis estimates that an approximate total of 20,396 tons of debris might be generated: 1) Finishes- 6,769 tons; 2) Structural – 6,898 tons; and 3) Foundations- 6,729 tons. The results are mapped in Figure 10.

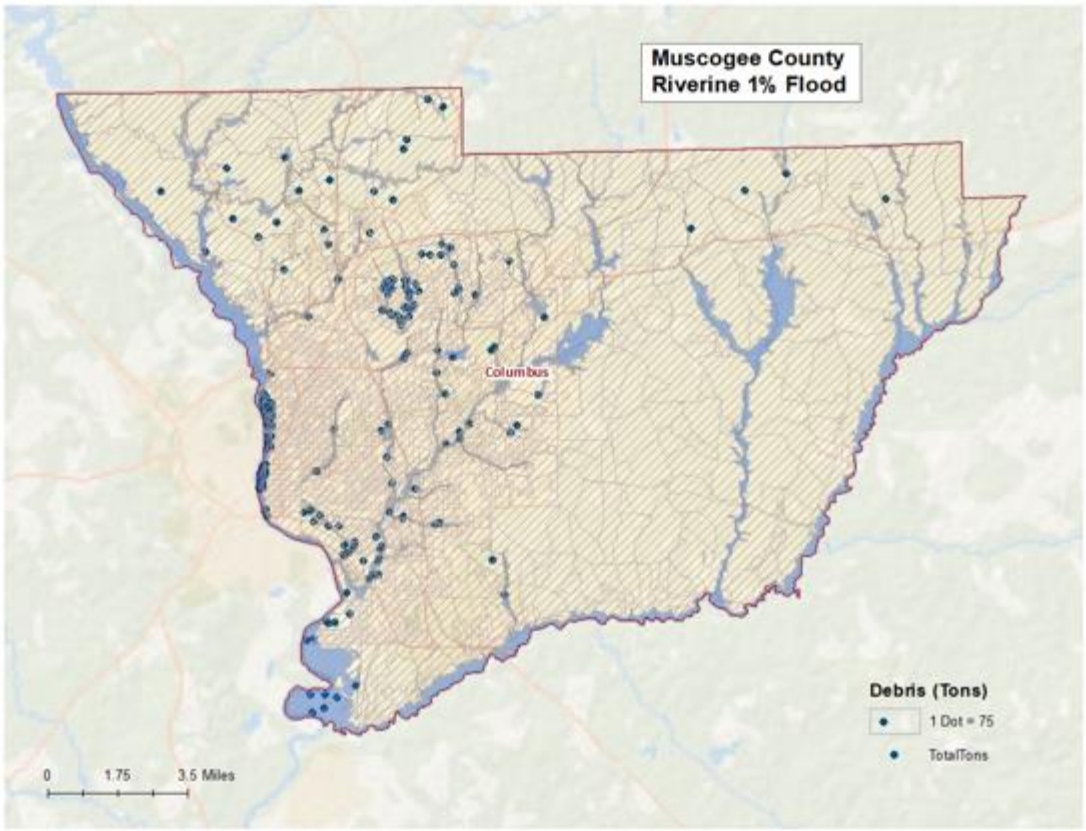

Figure 10: Riverine 1% Flood Debris Weight (Tons)

Tornado Risk Assessment

Hazard Definition

Tornadoes pose a great risk to the state of Georgia and its citizens. Tornadoes can occur at any time during the day or night. They can also happen during any month of the year. The unpredictability of tornadoes makes them one of Georgia's most dangerous hazards. Their extreme winds are violently destructive when they touch down in the region's developed and populated areas. Current estimates place the maximum velocity at about 300 miles per hour, but higher and lower values can occur. A wind velocity of 200 miles per hour will result in a wind pressure of 102.4 pounds per square foot of surface area—a load that exceeds the tolerance limits of most buildings. Considering these factors, it is easy to understand why tornadoes can be so devastating for the communities they hit.

Tornadoes are defined as violently-rotating columns of air extending from thunderstorms and cyclonic events. Funnel clouds are rotating columns of air not in contact with the ground; however, the violently-rotating column of air can reach the ground very quickly and become a tornado. If the funnel cloud picks up and blows debris, it has reached the ground and is a tornado.

Tornadoes are classified according to the Fujita tornado intensity scale. Originally introduced in 1971, the scale was modified in 2006 to better define the damage and estimated wind scale. The Enhanced Fujita Scale ranges from low intensity EF0 with effective wind speeds of 65 to 85 miles per hour, to EF5 tornadoes with effective wind speeds of over 200 miles per hour. The Enhanced Fujita intensity scale is included in Table 10.

Table 10: Enhanced Fujita Tornado Rating

Fujita Number	Estimated Wind Speed	Path Width	Path Length	Description of Destruction
EF0 *Gale*	65-85 mph	6-17 yards	0.3-0.9 miles	Light damage, some damage to chimneys, branches broken, sign boards damaged, shallow-rooted trees blown over.
EF1 Moderate	86-110 mph	18-55 yards	1.0-3.1 miles	Moderate damage, roof surfaces peeled off, mobile homes pushed off foundations, attached garages damaged.
EF2 Significant	111-135 mph	56-175 yards	3.2-9.9 miles	Considerable damage, entire roofs torn from frame houses, mobile homes demolished, boxcars pushed over, large trees snapped or uprooted.
EF3 Severe	136-165 mph	176-566 yards	10-31 miles	Severe damage, walls torn from well-constructed houses, trains overturned, most trees in forests uprooted, heavy cars thrown about.
EF4 Devastating	166-200 mph	0.3-0.9 miles	32-99 miles	Complete damage, well-constructed houses leveled, structures with weak foundations blown off for some distance, large missiles generated.
EF5 Incredible	> 200 mph	1.0-3.1 miles	100-315 miles	Foundations swept clean, automobiles become missiles and thrown for 100 yards or more, steel-reinforced concrete structures badly damaged.

Source: http://www.srh.noaa.gov

Hypothetical Tornado Scenario

For this report, an EF3 tornado was modeled to illustrate the potential impacts of tornadoes of this magnitude in the county. The analysis used a hypothetical path based upon an EF3 tornado event running along the predominant direction of historical tornados (southeast to northwest). The tornado path was placed to travel through Columbus. The selected widths were modeled after a re-creation of the Fujita-Scale guidelines based on conceptual wind speeds, path widths, and path lengths. There is no guarantee that every tornado will fit exactly into one of these categories. Table 11 depicts tornado path widths and expected damage.

Table 11: Tornado Path Widths and Damage Curves

Fujita Scale	Path Width (feet)	Maximum Expected Damage
EF-5	2,400	100%
EF-4	1,800	100%
EF-3	1,200	80%
EF-2	600	50%
EF-1	300	10%
EF-0	300	0%

Within any given tornado path there are degrees of damage. The most intense damage occurs within the center of the damage path, with decreasing amounts of damage away from the center. After the hypothetical path is digitized on a map, the process is modeled in GIS by adding buffers (damage zones) around the tornado path. Figure 11 describes the zone analysis.

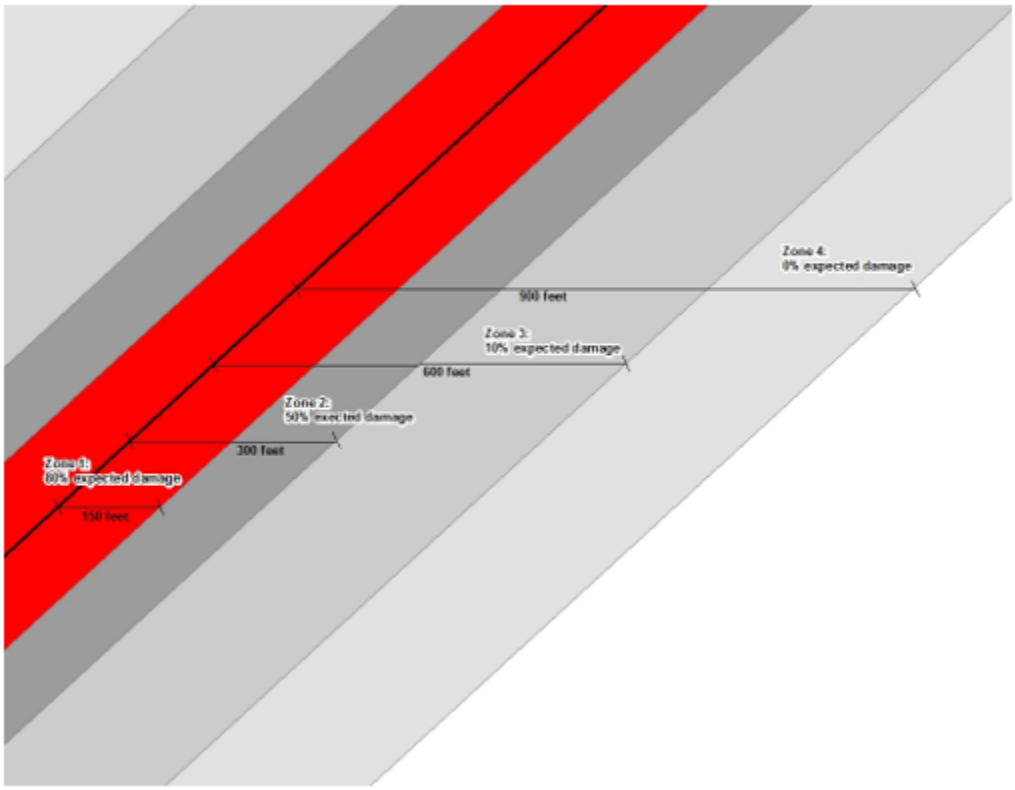

Figure 11: EF Scale Tornado Zones

An EF3 tornado has four damage zones, depicted in Table 12. Major damage is estimated within 150 feet of the tornado path. The outer buffer is 900 feet from the tornado path, within which buildings will not experience any damage. The selected hypothetical tornado path is depicted in Figure 12 and the damage curve buffer zones are shown in Figure 13.

Table 12: EF3 Tornado Zones and Damage Curves

Zone	Buffer (feet)	Damage Curve
1	0-150	80%
2	150-300	50%
3	300-600	10%
4	600-900	0%

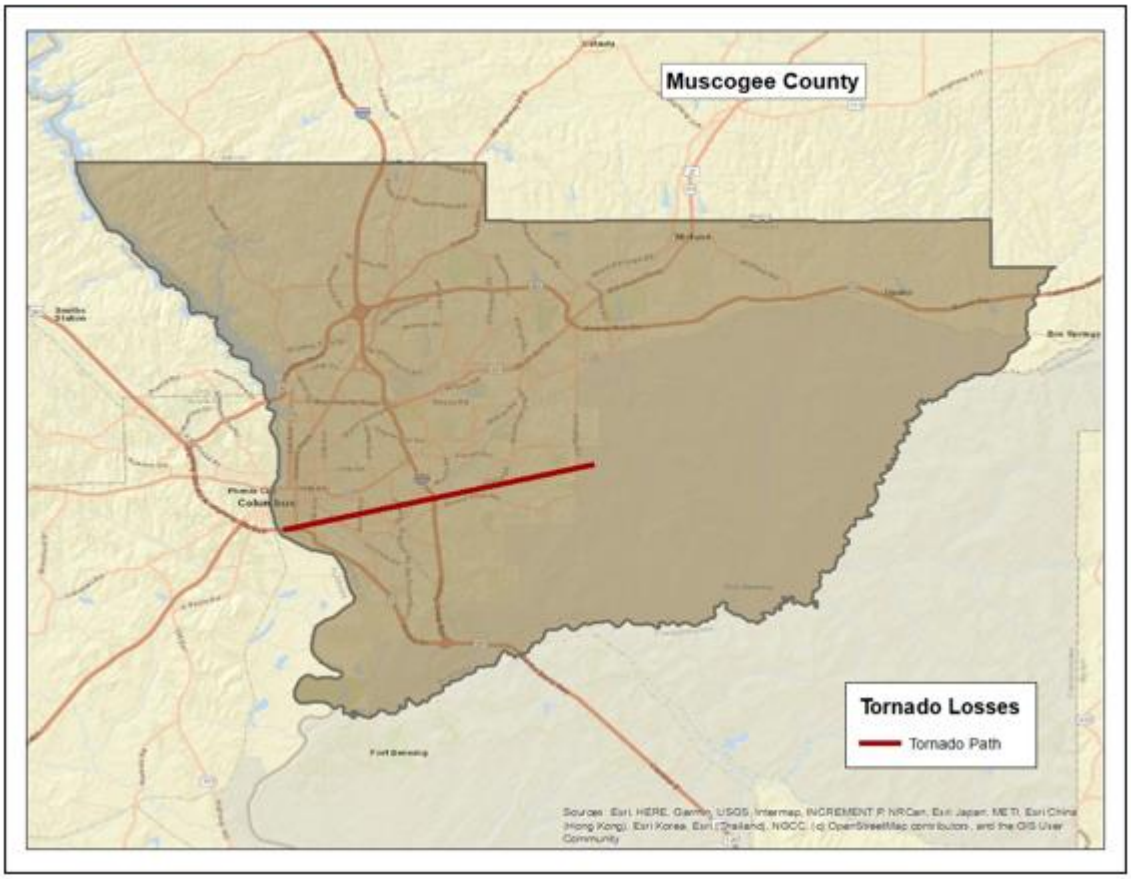

Figure 12: Hypothetical EF3 Tornado Path in Muscogee County

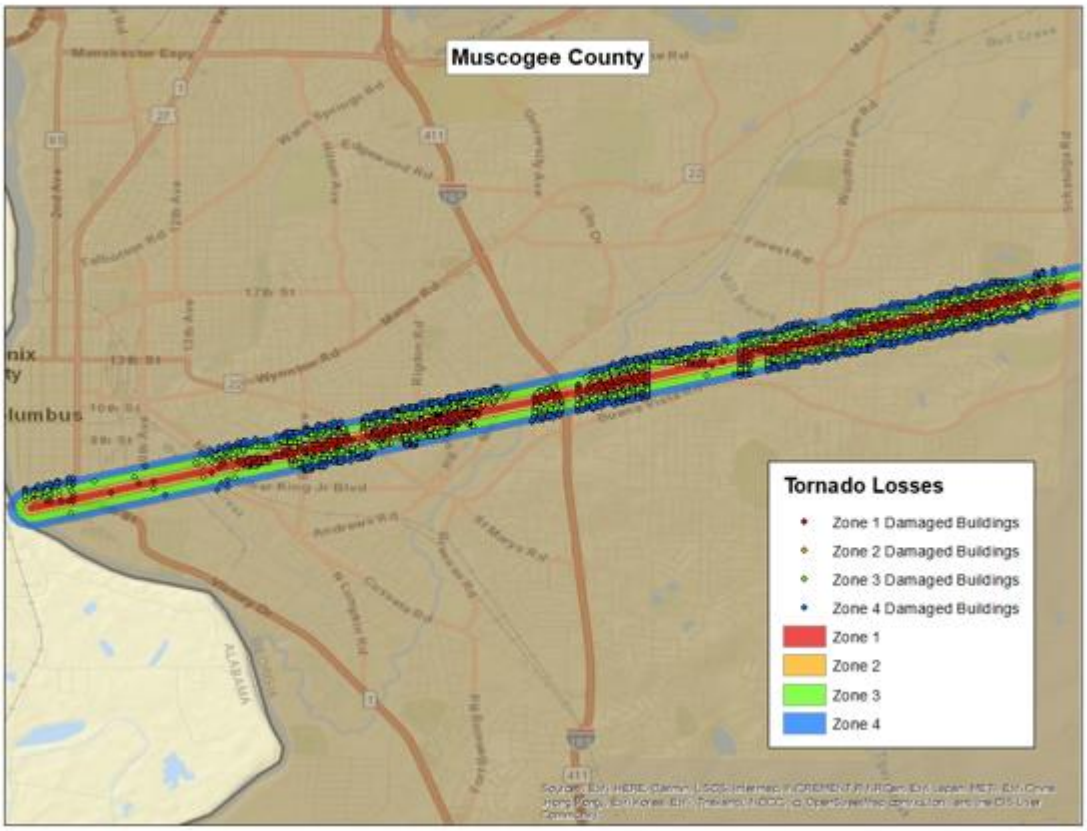

Figure 13: Modeled EF3 Tornado Damage Buffers in Muscogee County

EF3 Tornado Building Damages

The analysis estimated that approximately 3,028 buildings could be damaged, with estimated building losses of $76 million. The building losses are an estimate of building replacement costs multiplied by the percentages of damage. The overlay was performed against parcels provided by Muscogee County that were joined with Assessor records showing estimated property replacement costs. The Assessor records often do not distinguish parcels by occupancy class if the parcels are not taxable and thus the number of buildings and replacement costs may be underestimated. The results of the analysis are depicted in Table 13.

Table 13: Estimated Building Losses by Occupancy Type

Occupancy	Buildings Damaged	Building Losses
Residential	2,985	$51,363,770
Commercial	24	$5,165,853
Industrial	17	$19,494,640
Religious	2	$297,055
Total	**3,028**	**$76,321,318**

EF3 Tornado Essential Facility Damage

There were four essential facilities located in the tornado path – four schools. Table 14 outlines the specific facility and the amount of damage under the scenario.

Table 14: Estimated Essential Facilities Damaged

Facility	Amount of Damage
Davis Elementary School	Minor Damage
Lonnie Jackson Elementary School	Minor Damage
Marshall Success Center	Minor Damage
Rothschild Leadership Academy	Minor Damage

According to the Georgia Department of Education, Davis Elementary School's enrollment was approximately 292 students, Lonnie Jackson Elementary School's enrollment was approximately 425 students, Marshall Success Center's enrollment was approximately 192 students, and Rothschild Leadership Academy's enrollment was approximately 540 students as of October 2023. Depending on the time of day, a tornado strike as depicted in this scenario could result in significant injury and loss of life. In addition, arrangements would have to be made for the continued education of the students in another location.

The location of the damaged Essential Facility is mapped in Figure 14.

Figure 14: Modeled Essential Facility Damage in Muscogee County

Exceptions Report

Hazus Version 2.2 SP1 was used to perform the loss estimates for Muscogee County, Georgia. Changes made to the default Hazus-MH inventory and the modeling parameters used to setup the hazard scenarios are described within this document.

Reported losses reflect the updated data sets. Steps, algorithms and assumptions used during the data update process are documented in the project workflow named PDM_GA_Workflow.doc.

Statewide Inventory Changes

The default Hazus-MH Essential Facility inventory was updated for the entire state prior to running the hazard scenarios for Muscogee County.

Updates to the Critical Facility data used in GMIS were provided by Muscogee County in February 2024. These updates were applied by The Carl Vinson Institute of Government at the University of Georgia. Table 15 summarizes the difference between the original Hazus-MH default data and the updated data for Muscogee County.

Table 15: Essential Facility Updates

Site Class	Feature Class	Default Replacement Cost	Default Count	Updated Replacement Cost	Updated Count
EF	Care	$476,515,000	6	$197,024,000	11
EF	EOC	$880,000	1	$3,342,000	1
EF	Fire	$16,999,000	18	$21,510,000	16
EF	Police	$105,566,000	6	$10,866,000	4
EF	School	$818,311,000	113	$736,378,000	100

County Inventory Changes

The GBS records for Muscogee County were replaced with data derived from parcel and property assessment data obtained from Muscogee County. The county provided property assessment data was current as of February 2024 and the parcel data current as of February 2024.

General Building Stock Updates

The parcel boundaries and assessor records were obtained from Muscogee County. Records without improvements were deleted. The parcel boundaries were converted to parcel points located in the centroids of each parcel boundary. Each parcel point was linked to an assessor record based upon matching parcel numbers. The generated Building Inventory represents the approximate locations (within a parcel) of building exposure. The Building Inventory was aggregated by Census Block and imported into Hazus-MH using the Hazus-MH Comprehensive Data Management System (CDMS). Both the 2010 Census Tract and Census Block tables were updated.

The match between parcel records and assessor records was based upon a common Parcel ID. For this type of project, unless the hit rate is better than 85%, the records are not used to update the default aggregate inventory in Hazus-MH. The Parcel-Assessor hit rate for Muscogee County was 97.6%.

Adjustments were made to records when primary fields did not have a value. In these cases, default values were applied to the fields. Table 16 outlines the adjustments made to Muscogee County records.

Table 16: Building Inventory Default Adjustment Rates

Type of Adjustment	Building Count	Percentage
Area Unknown	12	0%
Construction Unknown	16	0%
Condition Unknown	4,372	7%
Foundation Unknown	26	0%
Year Built Unknown	43	0%

Approximately 4% of the CAMA values were either missing (<Null> or '0'), did not match CAMA domains or were unusable ('Unknown', 'Other', 'Pending'). These were replaced with 'best available' values. Missing YearBuilt values were populated from average values per Census Block. Missing Condition, Construction and Foundation values were populated with the highest-frequency CAMA values per Occupancy Class. Missing Area values were populated with the average CAMA values per Occupancy Class.

The X and Y coordinates for the center point of each parcel and assessor records were provided to The University of Georgia's Carl Vinson Institute of Government from Muscogee County. The X and Y coordinates were converted to parcel points located in the centroids of each parcel. Each parcel point was linked to an assessor record based upon matching parcel numbers. Since these points were created from the tabular assessment records, there is naturally a 100% match between the data and the geography. If there are any records that were not contained in the assessment records, they also did not create a centroid and likewise, do not generate a tax bill. The generated Building Inventory represents the approximate locations (within a parcel) of building exposure. The Building Inventory was aggregated by Census Block and imported into Hazus-MH using the Hazus-MH Comprehensive Data Management System (CDMS). Both the 2010 Census Tract and Census Block tables were updated.

Less than one percent of the CAMA values were either missing (<Null> or '0'), did not match CAMA domains or were unusable ('Unknown', 'Other', 'Pending'). These were replaced with 'best available' values. Missing YearBuilt values were populated from average values per Census Block. Missing Condition, Construction and Foundation values were populated with the highest-frequency CAMA values per Occupancy Class. Missing Area values were populated with the average CAMA values per Occupancy Class.

The resulting Building Inventory was used to populate the Hazus-MH General Building Stock and User Defined Facility tables. The updated General Building Stock was used to calculate flood and tornado losses. Changes to the building counts and exposure that were modeled in Muscogee County are sorted by General Occupancy in Table 1 at the beginning of this report. If replacements cost or building value were not present for a given record in the Assessor data, replacement costs were calculated from the Building Area (sqft) multiplied by the Hazus-MH RS Means ($/sqft) values for each Occupancy Class.

Differences between the default and updated data are due to various factors. The Assessor records often do not distinguish parcels by occupancy class when the parcels are not taxable; therefore, the total number of buildings and the building replacement costs for government, religious/non-profit, and education may be underestimated.

User Defined Facilities

Building Inventory was used to create Hazus-MH User Defined Facility (UDF) inventory for flood modeling. Hazus-MH flood loss estimates are based upon the UDF point data. Buildings within the flood boundary were imported into Hazus-MH as User Defined Facilities and modeled as points.

Table 17: User Defined Facility Exposure

Class	Hazus-MH Feature	Counts	Exposure
BI	Building Exposure	59,336	$8,977,080,633
Riverine UDF	Structures Inside 1% Annual Chance Riverine Flood Area	1,023	$128,740,624

Assumptions

- Flood analysis was performed on Building Inventory. Building Inventory within the flood boundary was imported as User Defined Facilities. The point locations are parcel centroid accuracy.
- The analysis is restricted to the county boundary. Events that occur near the county boundary do not contain loss estimates from adjacent counties.
- The following attributes were defaulted or calculated:
  First Floor Height was set from Foundation Type
  Content Cost was calculated from Building Cost