Chatham County, GA
Floodplain Management Plan

June 21, 2018

ECOLOGICAL PLANNING GROUP

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EXECUTIVE SUMMARY

The purpose of this Floodplain Management Plan is to reduce or eliminate risk to people and property from flood hazards. Every community faces different hazards and every community has different resources to draw upon in combating problems along with different interests that influence the solutions to those problems. Because there are many ways to deal with flood hazards and many agencies that can help, there is no one solution for managing or mitigating their effects. Planning is one of the best ways to develop a customized program that will mitigate the impacts of flood hazards while taking into account the unique character of a community. The plan provides a framework for all interested parties to work together and reach consensus on how to move forward. A well-prepared Floodplain Management Plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also ensure that activities are coordinated with each other and with other goals and activities, preventing conflicts and reducing the costs of implementing each individual activity.

Chatham County followed the planning process prescribed by the Federal Emergency Management Agency (FEMA), and this plan was developed under the guidance of a Floodplain Management Planning Committee (FMPC) comprised of representatives of County Departments, citizens and other stakeholders. The FMPC conducted a risk assessment that identified and profiled flood hazards that pose a risk to the County, assessed the County's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The flood hazards profiled in this plan include:

- Climate Change and Sea Level Rise
- Dam/Levee Failure
- Flood: 100-/500-year
- Flood: Stormwater/Localized Flooding
- Hurricane and Tropical Storm
- Stream Bank Erosion

This plan identifies activities that can be undertaken to reduce safety hazards, health hazards, and property damage caused by floods. Based on the risk assessment developed for each of the flood hazards identified above, the FMPC identified goals and objectives for reducing the County's vulnerability to the hazards. The goals and objectives are summarized as follows:

Goal 1 – Reduce vulnerability of people, property, critical facilities and infrastructure to flood hazards to protect the health, safety and welfare of residents and visitors.

Objective 1.1: Advise the community of the safety and health precautions to implement before, during, and after a flood.

Objective 1.2: Publish the locations (roads and intersections) which often flood after heavy rain events or major storms.

Objective 1.3: Educate everyone on the benefits of improved water quality and associated habitat.

Objective 1.4: Identify the location of vulnerable populations to aid in emergency evacuations.

Objective 1.5: Conduct site investigations, research exposure and hazard data, and evaluate proposed modifications to repair and mitigate stormwater management problems.

Objective 1.6: Implement flood mitigation measures or strategies, as necessary, to protect critical facilities.

Goal 2 – Reduce damage to development through flood resilient strategies and measures.

Objective 2.1: Prioritize capital improvement projects to address areas where poor drainage causes substantial flooding.

Objective 2.2: Encourage development outside the special flood hazard area (1%-annual-chance flood).

Objective 2.3: Use the most effective approaches to protect buildings from flood damage, including elevation, acquisition, and other retrofitting techniques where appropriate.

Objective 2.4: Encourage property owners to assume an appropriate level of responsibility for their own protection, including the purchase of flood insurance.

Goal 3 – Protect natural resources by employing watershed-based approaches that balance environmental, economic and engineering considerations.

Objective 3.1: Maintain and enforce regulations to protect and restore wetlands and ecological functions for long-term environmental, economic and recreational values.

Objective 3.2: Pursue water management approaches and techniques that improve water quality and protect public health.

Objective 3.3: Preserve and maintain open space in flood prone areas to reduce flood damage to buildings and to provide recreational benefits.

Objective 3.4: Continue to protect wetlands and environmentally sensitive areas from encroachment of development by requiring buffers and other setback mechanisms.

Goal 4 – Encourage property owners, through education and outreach measures, to protect their homes and businesses from flood damage.

Objective 4.1: Educate property owners, including repetitive loss properties, on FEMA grant programs and other methods to mitigate possible flood damage.

Objective 4.2: Provide current flood-proofing and retrofitting information to property owners.

Objective 4.3: Effectively communicate flood risk to residents, businesses, contractors, realtors and prospective buyers.

To meet the identified goals, this plan recommends 21 mitigation actions, which are summarized in the table that follows. Note: Item number does not indicate an order of priority.

Action Item No.	Action	Related to Goal	Address Current Development	Address Future Development	Continued Compliance with NFIP	Mitigation Category
1	Update County website incorporating new technology to create interactive data and mapping system that will provide online technical assistance to homeowners, real estate agents and insurance agents. Include access to elevation certificates, flood zones, general flood history, repetitive loss areas, and mitigated properties, etc.	1, 4	✓		✓	Public Information & Outreach
2	Acquire and demolish high-risk flood-prone buildings and repetitive loss structures and preserve land as open space.	2, 3		✓		Property Protection
3	Update and enforce building codes and Flood Damage Prevention Ordinance and consider higher regulatory standards to better protect existing and future development.	1, 2	✓			Prevention
4	Continue to enforce Flood Damage Prevention requirements through on-site floodplain inspections.	1, 2, 4				Prevention
5	Develop stormwater conveyance systems to alleviate flooding for existing and new development.	1, 2	✓	✓	✓	Structural Projects
6	Improve stormwater management regulations to include higher standards for design storm, size of development regulated, low-impact development, and public maintenance of detention and retention facilities.	1, 2	✓	✓		Prevention
7	Create new drainage maintenance SOP to include natural drainage features within unincorporated Chatham County.	1, 3		✓	✓	Prevention
8	Relocate, elevate, or retrofit substantially damaged and/or pre-FIRM properties.	1, 2	✓			Property Protection
9	Encourage the purchase of flood insurance and educate public on Increased Cost of Compliance (ICC) coverage through outreach materials, face-to-face meetings, and presentations to HOAs.	2, 4	✓		✓	Property Protection, Public Information & Outreach
10	Display signs along roads and canals at entrances to high, moderate, and low flood risk areas.	4	✓	✓	✓	Public Information & Outreach
11	Promote low-impact development projects where applicable to improve water quality and reduce runoff.	2, 3	✓	✓	✓	Natural Resource Protection
12	Enact deed restrictions and other growth management tools to preserve wetland and natural resource areas and conserve their natural and ecological functions.	3	✓	✓	✓	Prevention

Action Item No.	Action	Related to Goal	Address Current Development	Address Future Development	Continued Compliance with NFIP	Mitigation Category
13	Develop a Natural Floodplain Functions Plan to protect and or restore endangered species and habitat.	3	✓			Natural Resource Protection
14	Integrate the FMP into the Emergency Operations Plan, Pre-Disaster Hazard Mitigation Plan, Comprehensive Plan, and Capital Improvement Program.	1	✓	✓		Prevention
15	Implement an outreach campaign to educate residents on flood risks, maps, mitigation activities, stormwater, water quality, environmental protection, and the benefits of natural floodplains.	1, 4	✓	✓	✓	Public Information & Outreach
16	Develop web-based outreach efforts, including social media.	1, 4	✓		✓	Public Information & Outreach
17	Improve recurring local funding for Public Works maintenance and flood management activities implemented through the Capital Improvements Program.	1, 2	✓		✓	Structural Projects
18	Use Flood Protection Questionnaire results to identify target areas for outreach and flood protection.	1	✓	✓	✓	Public Information & Outreach
19	Elevate lift stations and electrical components above the base flood elevation (BFE).	1	✓	✓		Property Protection
20	Partner with Georgia Tech to install additional tidal and riverine flood gauges at various locations throughout the County to help provide real-time flood data on the County website.	1, 4			✓	Emergency Services, Public Information & Outreach
21	Develop a long-range regional plan for sea level rise which evaluates multiple adaptation methods.	2, 3		✓		Prevention

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The following table provides the 10-step CRS planning credit activity checklist and the section/page number within this plan that describes the completion of each planning step in more detail.

CRS Planning Credit Activity Checklist

CRS Step	Section/Page
1. Organize to prepare the plan.	
a. Involvement of office responsible for community planning	Section 3.1, p. 19-20
b. Planning committee of department staff	Section 3.1, p. 21
c. Process formally created by the community's governing board	--
2. Involve the public.	
a. Planning process conducted through a planning committee	Section 3.1, p. 19-20
b. Public meetings held at the beginning of the planning process	Section 3.2.1, Table 3.5, p. 23 / Appx. A
c. Public meeting held on draft plan	Section 3.2.1, Table 3.5, p. 23 / Appx. A
d. Other public information activities to encourage input	Section 3.2.1, Table 3.6, p. 23-24 / Appx. A
3. Coordinate with other agencies.	
a. Review of existing studies and plans	Section 3.2.1, Table 3.7, p. 26 & associated sections of plan
b. Coordinating with communities and other agencies	Section 3.2.1 / Appendix A
4. Assess the hazard.	
a. Plan includes an assessment of the flood hazard with:	Sections 5.1 – 5.7
(1) A map of known flood hazards	Figures 5.1 – 5.4 / Figures 5.14 – 5.15 / Figures 5.17 – 5.46 / Figures 5.47 – 5.51 / Figures 5.54 – 5.58 / Figures 5.67 – 5.68
(2) A description of known flood hazards	Sections 5.1, 5.3 – 5.6
(3) A discussion of past floods	Sections 5.1 – 5.6
b. Plan includes assessment of less frequent floods	Section 5.2
c. Plan includes assessment of areas likely to flood	Section 5.8
d. The plan describes other natural hazards	Sections 5.5 and 5.6
5. Assess the problem.	
a. Summary of each hazard identified in the hazard assessment and their community impact	Sections 5.1, 5.3 – 5.6
b. Description of the impact of the hazards on:	
(1) Life, safety, health, procedures for warning and evacuation	Sections 5.7.1 – 5.7.3
(2) Public health including health hazards to floodwaters/mold	Section 5.7.2
(3) Critical facilities and infrastructure	Section 4.3.2, Table 4.5, Figure 4.1 / Section 5.3, Table 5.10, Figure 5.16
(4) The community's economy and tax base	Section 2.5
(5) Number and type of affected buildings	Section 5.3, Table 5.7, p. 62-63
c. Review of all damaged buildings/flood insurance claims	Section 5.3, Tables 5.12 – 5.16, p.69-72
d. Areas that provide natural floodplain functions	Section 2.3, p. 8-11
e. Development/Redevelopment/Population Trends	Sections 2.8 – 2.9 / Section 6.3.1, p. 151-152 / Section 7.1.1, p.164-165
f. Impact of future flooding conditions outlined in Step 4, item c	Section 5.8
6. Set goals.	Section 7.1, p. 164-168

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1 INTRODUCTION

Chapter 1 provides a general introduction to hazard mitigation and an introduction to the Chatham County Floodplain Management Plan. This chapter contains the following subsections:

- 1.1 Purpose and Authority
- 1.2 Background
- 1.3 Scope
- 1.4 References
- 1.5 Plan Organization

1.1 PURPOSE AND AUTHORITY

As defined by FEMA, "hazard mitigation" means any sustained action taken to reduce or eliminate the long-term risk to life and property from a hazard event. Hazard mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented. The purpose of this plan is to identify, assess and mitigate flood risk to better protect the people and property of Chatham County from the effects of flood hazards. This plan documents Chatham County's hazard mitigation planning process and identifies relevant flood hazards and vulnerabilities and strategies the County will use to decrease vulnerability and increase resiliency and sustainability.

This Plan was developed in a joint and cooperative venture by members of a Floodplain Management Planning Committee (FMPC) which included representatives of County departments, federal and state agencies, citizens and other stakeholders. This Plan will ensure Chatham County's continued eligibility for federal disaster assistance including the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and the Flood Mitigation Assistance Program (FMA). This Plan has been prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S.C. 5165, enacted under Section 104 of the Disaster Mitigation Act of 2000, (DMA 2000) Public Law 106-390 of October 30, 2000, as implemented at CFR 201.6 and 201.7 dated October 2007.

1.2 BACKGROUND

Chatham County currently participates in the National Flood Insurance Program's (NFIP) Community Rating System (CRS), and qualifies for a Class 6 Rating. The CRS recognizes and encourages community floodplain management activities that exceed the minimum standards. Under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that (1) reduce flood losses, (2) facilitate accurate insurance ratings, and (3) promote the awareness of flood insurance. As part of the qualification for a Class 6 Rating and having 10 or more repetitive loss properties, Chatham County is required to prepare and maintain a Floodplain Management Plan (FMP).

It is the goal of the FMPC to continue to work to make improvements to this plan so as to better serve the citizens of Chatham County, and to strive to improve the Class Rating for the County, so that the highest reduction in flood insurance premium rates can be available for its citizens. Through the County's participation in the NFIP and a Class 5 rating with the CRS, owners of properties in the County's Special Flood Hazard Area (SFHA) are entitled to a 25% discount on their flood insurance premiums. Non-SFHA policies (Standard X Zone policies) receive a 10% discount, and preferred risk policies receive no discount because they already have premiums lower than other policies.

1.3 SCOPE

This document comprises a Floodplain Management Plan for Chatham County, Georgia. This plan includes only the unincorporated areas of the County.

1.4 REFERENCES

The following FEMA guides and reference documents were used to prepare this document:

- FEMA 386-1: Getting Started. September 2002.
- FEMA 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses. August 2001.
- FEMA 386-3: Developing the Mitigation Plan. April 2003.
- FEMA 386-4: Bringing the Plan to Life. August 2003.
- FEMA 386-5: Using Benefit-Cost Review in Mitigation Planning. May 2007.
- FEMA 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning. May 2005.
- FEMA 386-7: Integrating Manmade Hazards into Mitigation Planning. September 2003.
- FEMA 386-8: Multijurisdictional Mitigation Planning. August 2006.
- FEMA 386-9: Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects. August 2008.
- FEMA. Local Mitigation Planning Handbook. March 2013.
- FEMA. Local Mitigation Plan Review Guide. October 1, 2011.
- FEMA National Fire Incident Reporting System 5.0: Complete Reference Guide. January, 2008.
- FEMA Hazard Mitigation Assistance Unified Guidance. June 1, 2010.
- FEMA. Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials. March 1, 2013.
- FEMA. Mitigation Ideas. A Resource for Reducing Risk to Natural Hazards. January 2013.

1.5 PLAN ORGANIZATION

The Chatham County Floodplain Management Plan is organized as follows:

- Chapter 2: Community Profile
- Chapter 3: Planning Process
- Chapter 4: Hazard Identification
- Chapter 5: Hazard Risk and Vulnerability Assessment
- Chapter 6: Capability Assessment
- Chapter 7: Mitigation Strategy
- Chapter 8: Plan Adoption
- Chapter 9: Plan Implementation and Maintenance
- Appendix A: Planning Process
- Appendix B: Mitigation Strategy
- Appendix C: References

2 COMMUNITY PROFILE

2.1 OVERVIEW OF THE COMMUNITY

Chatham County is the northernmost coastal county in Georgia. It is bounded by the Savannah River and Jasper County, South Carolina to the northeast, Effingham County to the northwest, and Bryan County and the Ogeechee River to the south and southwest. The County has a total area of 632 square miles, of which approximately 426 square miles is land area and 206 square miles is water area.

The County Seat is the City of Savannah. The County is served by Interstate 95 and Interstate 16 as well as U.S. Route 17, U.S. Route 80, and State Route 21. According to the U.S. Census Bureau's American Community Survey, the County had a total population of 279,290 in 2015. Therefore, the County's average population density is approximately 656 people per square mile.

Figure 2.1 reflects Chatham County's location within the State. Figure 2.2 provides a base map with the boundaries of all incorporated municipalities as well as the location of federal lands within the County. Figure 2.3 identifies major transportation routes in the County.

2.2 TOPOGRAPHY AND CLIMATE

Chatham County has a moderate climate, with an average annual high temperature of 77.3 degrees Fahrenheit and an average annual low temperature of 56.3 degrees Fahrenheit. Average annual rainfall is approximately 48 inches. The County experiences a rainy season from June through August, with average precipitation around 6 inches per month. The County has a generally flat topography and low elevation, ranging from sea level at the coast to a high point of approximately 49 feet above sea level in Savannah. Much of the County is covered by wetlands and tidal marshes.

Chatham County is located within the Ogeechee and Savannah River Basins. The majority of the County falls in the Ogeechee Coastal Sub-basin, with additional areas in the Lower Savannah River Sub-basin and the Lower Ogeechee Sub-basin. Figure 2.4 illustrates the HUC-8 drainage basins and drainage features in and around Chatham County.

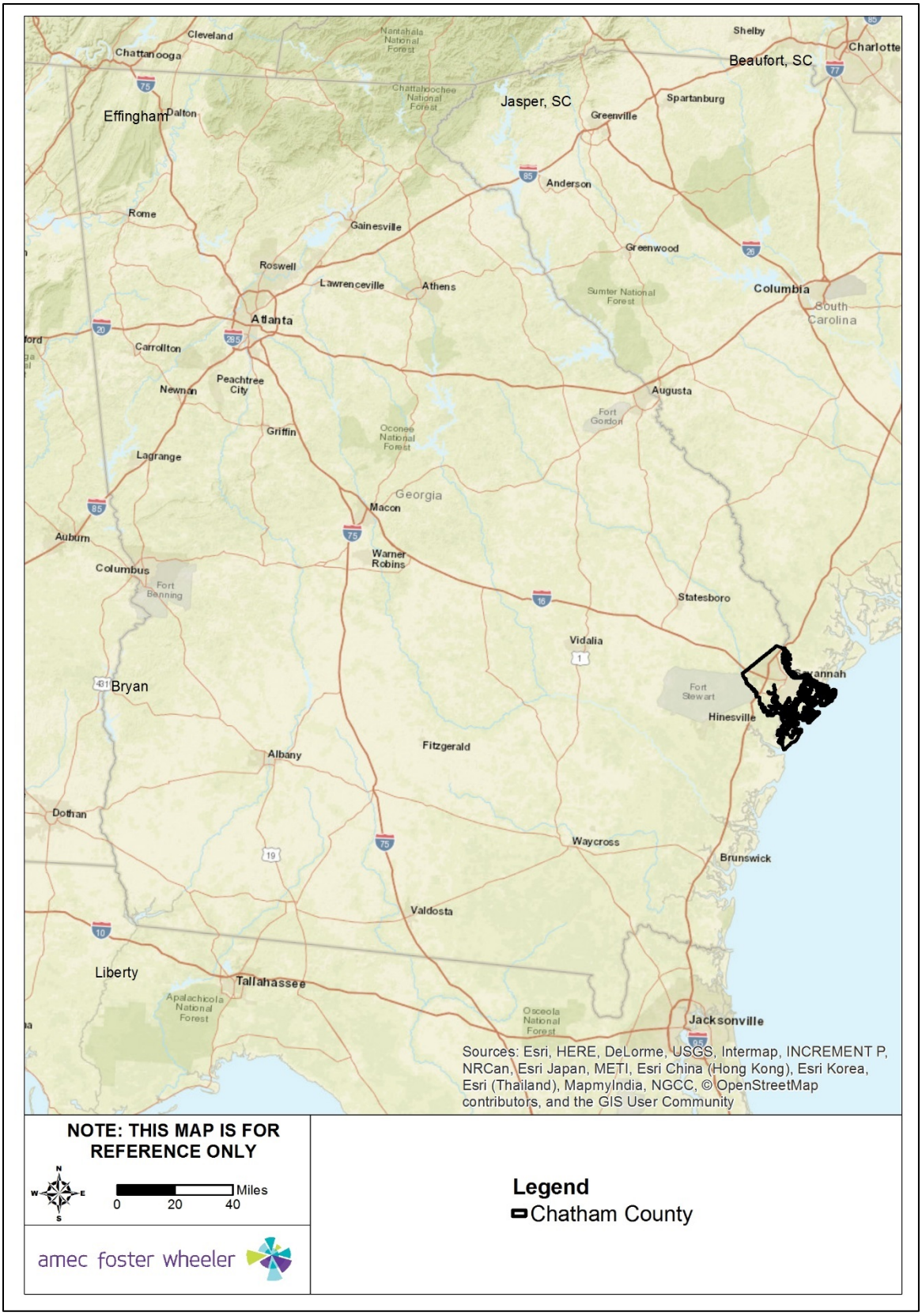


Figure 2.1 – Location Map

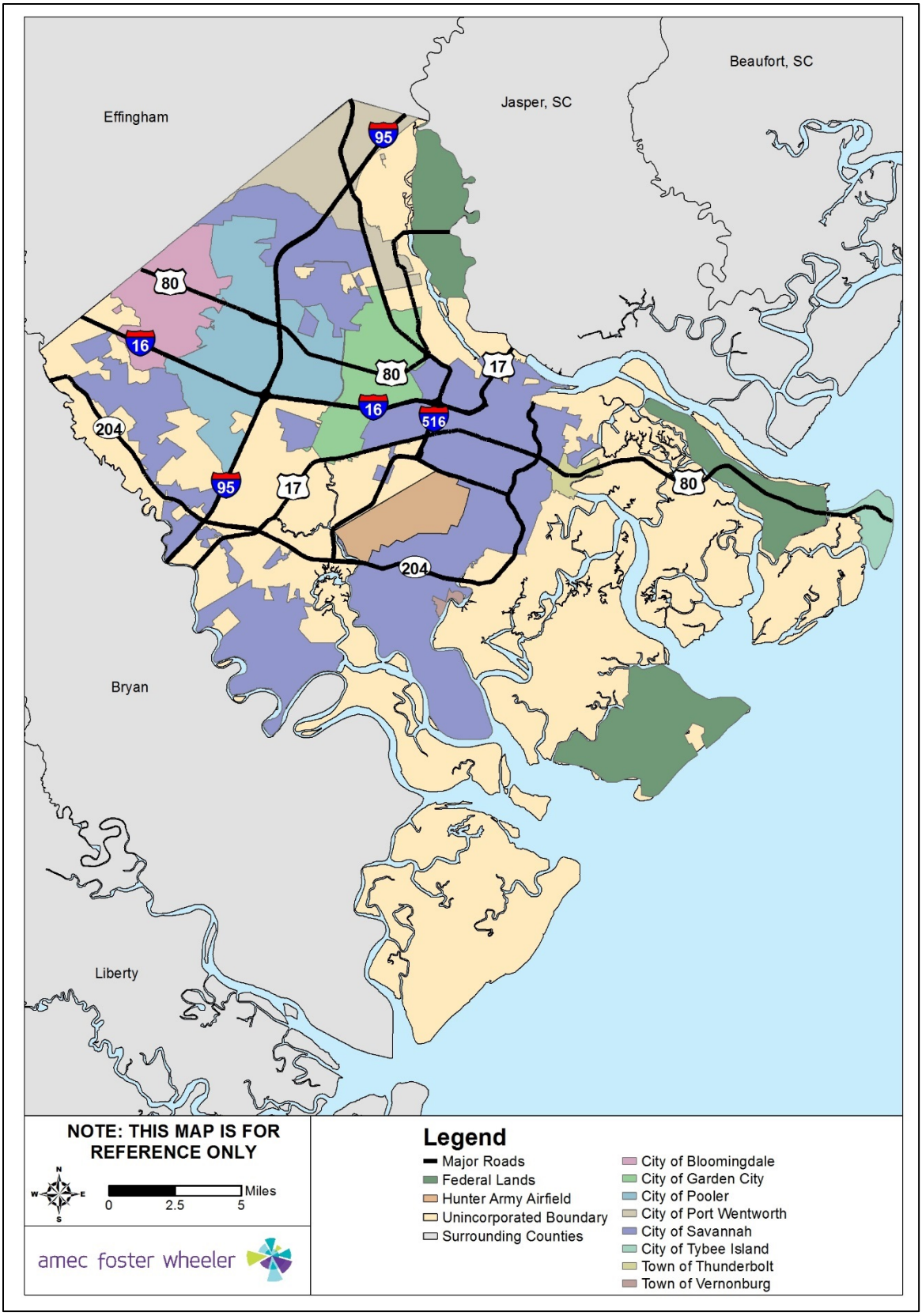


Figure 2.2 – Base Map

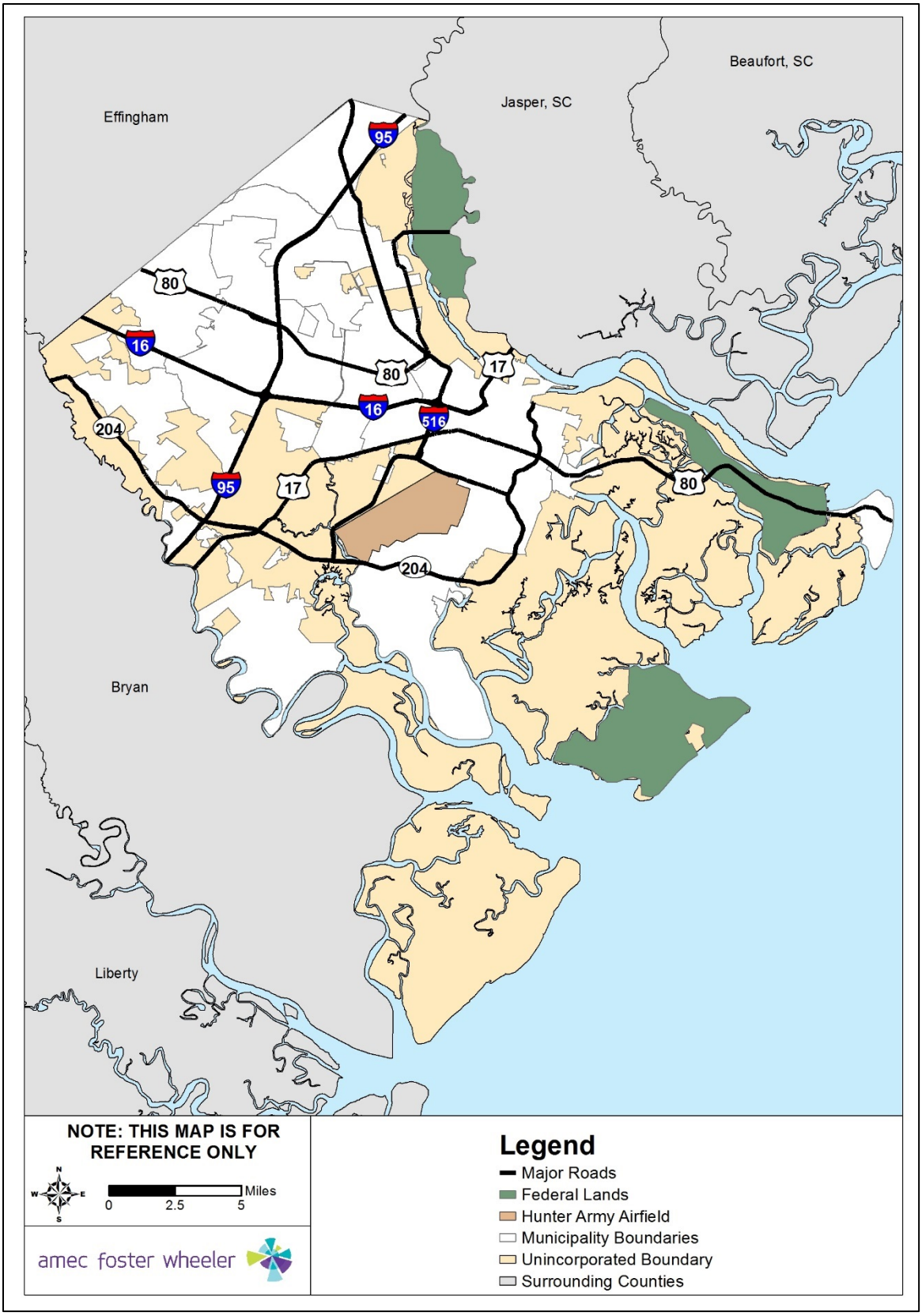
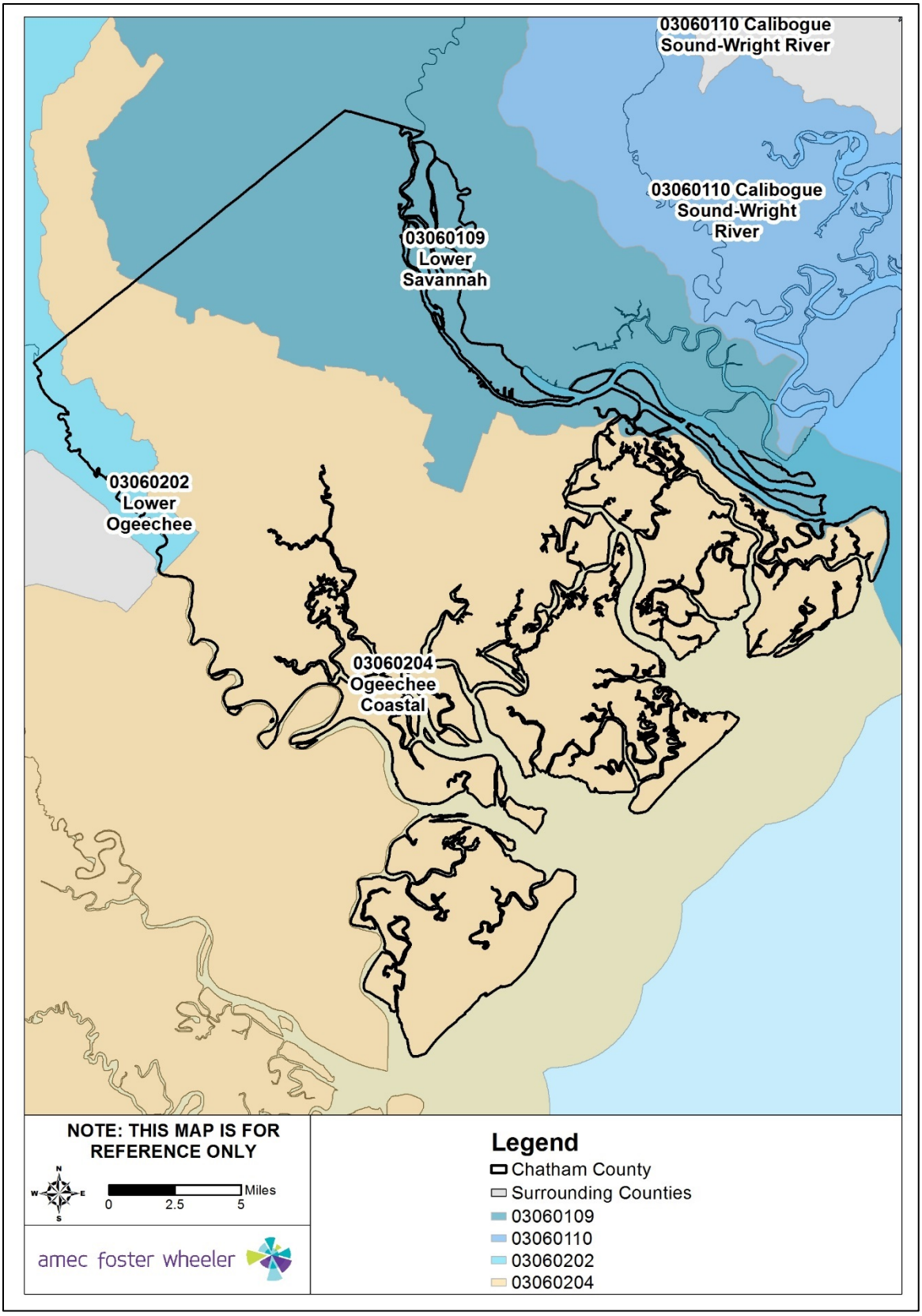


Figure 2.3 – Transportation Map



Data Source: USGS, 2015

Figure 2.4 – HUC-8 Drainage Basins

2.3 CULTURAL, HISTORIC AND NATURAL RESOURCES

Historic Resources

Chatham County has 66 listings on the National Register of Historic Places including 21 Historic Districts, 6 Historic Landmarks, and 3 Historic Landmark Districts. Listing on the National Register signifies that these structures and districts have been determined to be worthy of preservation for their historical values.

Cultural Resources

Chatham County is home to many institutions of higher education, including Savannah College of Art and Design, Savannah State University, Savannah Technical College, Armstrong University, Georgia Tech - Savannah and Georgia Southern University.

The County is also a popular tourist destination, for both the City of Savannah and the Tybee Island beaches. Savannah is famous for its history, art, architecture, parks, and culture. Tybee Island is the popular beach for locals and visitors and is home to the Tybee Island Light Station, the Fort Screven Historic District, and the Tybee Island Marine Science Center, and neighbors the Fort Pulaski National Monument.

Natural Features and Resources

Parks, Preserve and Conservation

Chatham County Parks and Recreation manages 6 community parks, 10 neighborhood parks, 4 community centers, 7 sports fields, 3 multipurpose trails, 4 nature preserves, the Al Henderson Golf Club, the Chatham County Aquatic Center, and the Anderson-Cohen Weightlifting Center.

Chatham County is home to Skidaway Island State Park, a 588-acre park bordering Skidaway narrows. The park contains camping and picnicking facilities; hiking, birding, and biking trails, playgrounds, trolley tours, and volleyball facilities.

Chatham County also contains three national protected areas:

- **Fort Pulaski National Monument** is a site famous for its importance as turning point in the Civil War but also relevant for its natural features. The 6,307-acre monument preserves approximately 4,800 acres of salt marsh wetlands.
- **Wassaw National Wildlife Refuge** was established in 1969 and contains 10,726 acres of marsh, mudflats, tidal creeks, and beaches. It is part of the Savannah Coastal Refuges Complex, which extends from Pinkney Island in South Carolina to Wolf Island in Georgia. The refuge sits on the coast, southeast of Skidaway Island.
- **Savannah National Wildlife Refuge** was established in 1927 and contains 29,452 acres of freshwater marshes, tidal rivers and creeks, and bottomland hardwoods. The refuge covers 6,464 acres of northeastern Chatham County and also spans Effingham County and parts of South Carolina.

The locations of these federal lands within Chatham County are shown in Figure 2.5.

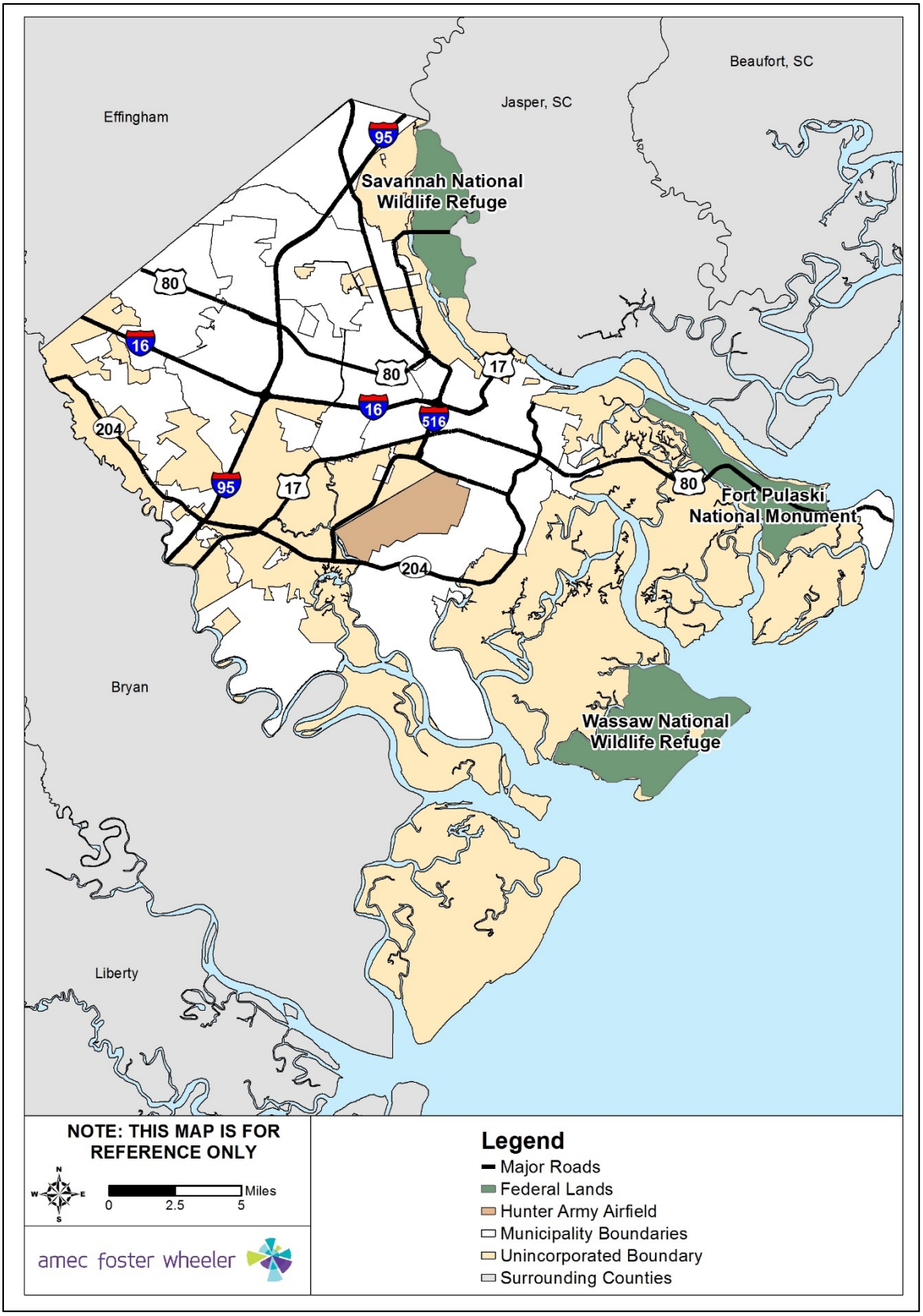


Figure 2.5 – Federal Lands in Chatham County

Water Bodies and Floodplains

Approximately 15.4% of the County's unincorporated areas are open water, and another 27.8% are tidal marshes. These lands are primarily found in the southern and eastern portions of the County's planning jurisdiction and along the County's waterways. Traditional land uses are not desirable in these areas, but current protections are not sufficient to prevent development in many areas, particularly given that much of the County's land outside the SFHA is already built out.

According to the Effective FIRMs, over 142,000 acres of the land within the County is located within a 100-year floodplain and an additional 9,040 acres are located within the 500-year floodplain. With over 76% of the County at high risk to flooding in the SFHA and an additional 5% at moderate risk to flooding, Chatham County must seek ways to balance its continued development with strategies to preserve sensitive lands and natural drainage features.

Natural and Beneficial Floodplain Functions: Under natural conditions, a flood causes little or no damage in floodplains. Nature ensures that floodplain flora and fauna can survive the more frequent inundations, and the vegetation stabilizes soils during flooding. Natural floodplains include marsh areas and low lying areas along canals. Open parks such as Henderson and Wilmington Island Golf Courses also have natural floodplains. Natural floodplains reduce damage by allowing flood waters to spread out over large areas, aiding absorption into the ground, reducing flow rates and acting as a flood storage area to reduce downstream peaks. We must all do our part to keep floodplain and floodplain waters free of contaminants such as oil, paint, anti-freeze and pesticides. These chemicals pollute the marsh waters, decreasing the water quality that local wildlife depend upon.

Wetlands

Wetlands in Chatham County generally follow the major hydrology and many are found within areas that are deemed flood hazard areas which provide additional regulations that make these areas difficult to develop. However, the Chatham County – Savannah Comprehensive Plan notes that wetlands interspersed in upland areas lack protection and are frequently filled for development. Tidal marsh makes up 85,666 acres of the County's unincorporated areas, or approximately 27.8 percent.

Natural and Beneficial Wetland Functions: The benefits of wetlands are hard to overestimate. They provide critical habitat for many plant and animal species that could not survive in other habitats. They are also critical for water management as they absorb and store vast quantities of storm water, helping reduce floods and recharge aquifers. Not only do wetlands store water like sponges, they also filter and clean water as well, absorbing toxins and other pollutants.

Threatened and Endangered Species

The U.S. Fish and Wildlife Service maintains a regular listing of threatened species, endangered species, species of concern, and candidate species for counties across the United States. Chatham County has 12 species that are listed with the U.S. Fish and Wildlife Services. Table 2.1 below shows the species identified as threatened, endangered, or other classification in Chatham County.

Table 2.1 – Threatened and Endangered Species

Common Name	Scientific Name	Federal Status
Frosted Flatwoods salamander	*Ambystoma cingulatum*	Threatened
Red-cockaded woodpecker	*Picoides borealis*	Endangered
Wood stork	*Mycteria americana*	Threatened
Piping Plover	*Charadrius melodus*	Threatened
Red knot	*Calidris canutus rufa*	Threatened
Pondberry	*Lindera melissifolia*	Endangered
West Indian Manatee	*Trichechus manatus*	Threatened

Common Name	Scientific Name	Federal Status
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
Loggerhead sea turtle	*Caretta caretta*	Threatened
Gopher tortoise	*Gopherus polyphemus*	Candidate

Source: U.S. Fish & Wildlife Service (https://ecos.fws.gov/ecp0/reports/species-by-current-range-county?fips=13051)

2.4 HISTORY

Originally inhabited by the Native American Creek tribe, Chatham County was settled by the British in 1733. James Oglethorpe founded Savannah as the colony seat along the Savannah River. The City was unique for its planned development based on a system of wards, each part of a larger regional land system. This plan resulted in a dense grid of town lots and squares, garden lots, and farm lots, surrounded by agricultural villages.

Chatham County grew more significant during the Revolutionary War and Civil War due to the port in Savannah. After the Civil War, the streetcar induced expansion and suburban development into the County. This trend gained strength after World War II with the increase of automobile use. Though once entirely rural outside the limits of the City of Savannah, much of Chatham County is now developed.

2.5 ECONOMY

Wages and Employment

Per the 2011-2015 American Community Survey 5-Year Estimates, the median household income for Chatham County is $47,218 and mean household income is $64,795. 19.1% of the population is considered to be living below the poverty level. Table 2.2 shows employment and unemployment rates along with industry employment by major classification for the County. Major employers for Chatham County according to the Savannah Area Chamber of Commerce are listed in Table 2.3 along with an estimate of the number of employees.

Table 2.2 – Employment and Occupation Statistics for Chatham County, GA

Employment Status	Percentage
In labor force	63.4
Employed	55.8
Unemployed	6.0
Armed Forces	1.6
Not in labor force	36.6
Occupation	
Management, business, science and arts	35.1
Service	21.2
Sales and office	23.5
Natural resources, construction and maintenance	8.8
Production, transportation and material moving	11.4

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Table 2.3 – Major Employers in Chatham County, 2015

Corporation/Organization	Service/Product by SIC Code	# of Employees
Major Employers (Non-Manufacturing)		
Memorial University Medical Center	Hospital	5,000 – 9,999
St. Joseph's / Candler	Hospital	3,617

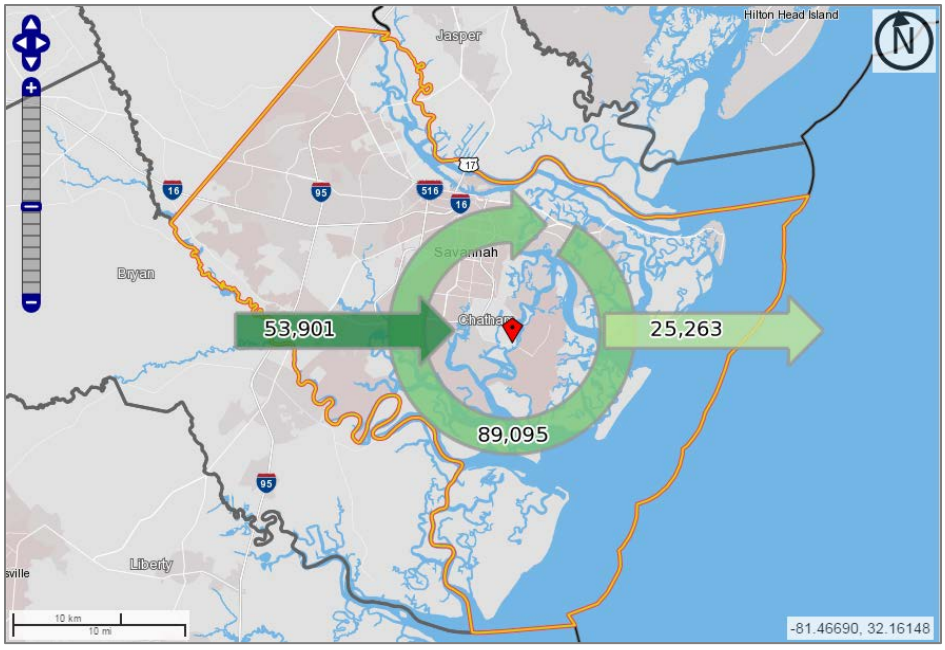
Corporation/Organization	Service/Product by SIC Code	# of Employees
Major Employers (Non-Manufacturing)		
Kroger	Retail Food	1,000 – 4,999
Marine Terminals Corp	Marine Cargo Handling	1,000 – 4,999
SSA Cooper	Marine Cargo Handling	1,000 – 4,999
Major Education, Government, and Public Service Employers		
Savannah-Chatham County Board of Education	Public Schools	4,808
Ft. Stewart / Hunter Army Airfield	Civilian personnel on bases	3,891
City of Savannah	Government	2,795

Source: Savannah Area Chamber of Commerce

Employer statistics provided by the Savannah Chamber of Commerce do not include manufacturing; however, manufacturing is an extremely important piece of the local economy, as noted in the Chatham County – Savannah Comprehensive Plan. Also important to the local economy, as indicated by the marine cargo handling industry employers, is the Port of Savannah, which is the largest single terminal container facility in North America and the busiest container port in the U.S. Southeast. Per the Comprehensive Plan, the Port contributes $20.4 billion in income, $84.1 billion in sales, and $1.3 billion in state and local taxes annually.

Another important component of the Chatham County economy not captured by employer statistics is tourism, which has been steadily growing since the 1990s, due in part to Savannah's historic assets, architecture, and monuments, and the County's coastal setting.

Also of note is Chatham County's role as an employment hub for the surrounding area. As of 2015, nearly 80% of Chatham County residents also worked within the County, yet over 37% of people working in the County lived outside the County according to the U.S. Census Bureau's Center For Economic Studies, as showing in Figure 2. Residents of Effingham, Bryan, Liberty, and Bulloch Counties account for most of Chatham Counties commuters.



Source: U.S. Census Bureau, Center for Economic Studies

Figure 2.6 - Chatham County Job Worker Inflow/Outflow

2.6 HOUSING

According to the 2011-2015 American Community Survey 5-Year Estimates, there are 121,877 housing units in Chatham County, 86.1% of which are occupied. Approximately 45.4% of occupied units are renter-occupied. This indicates a high level of pre- and post-disaster vulnerability because, according to Cutter, et al. (2003), renters often do not have the financial resources of homeowners, are more transient, are less likely to have information about or access to recovery aid following a disaster, and are more likely to require temporary shelter following a disaster.

Median home value in Chatham County is $171,500. Of the County' owner-occupied housing units, 66.2% have a mortgage. Most householders (75%) moved into their current homes in the last 17 years; 35.0% moved in between 2000 and 2009, and 37.7% moved in between 2010 and 2014. Householders of over 8% of occupied housing units have no vehicle available to them, which suggests these residents may have difficulty in the event of an evacuation.

2.7 POPULATION

Chatham County had 265,128 residents at the time of the 2010 U.S. Census with 87,072 residents in the unincorporated county. Unincorporated Chatham County had an estimated population of 91,327 in 2016. As of 2015, the Chatham County population density was 656 persons per square mile. Table 2.4 provides demographic profile data from the 2016 American Community Survey 5-Year Estimates.

Table 2.4 – Unincorporated Chatham County Demographic Profile Data, 2016

Demographic	Chatham County
Gender/Age	
Male	49.3%
Female	50.7%
Median Age (years)[1]	34.3
Under 5 Years	6.0%
65 Years and Over	15.9%
Race/Ethnicity (One Race)	
White	69.9%
Black or African American	22.5%
Asian	3.5%
American Indian/Alaska Native	0.2%
Other Race	1.5%
Hispanic or Latino[2]	6.3%
Education	
High School Graduate or Higher[1]	89.0%
Bachelor's Degree or Higher[1]	32.6%

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates
[1]This figure is for all of Chatham County, including incorporated areas
[2]Hispanics may be of any race, so also are included in applicable race categories.

2.8 LAND USE

A land use plan is intended to provide a framework that will guide local government officials and private citizens as they make day-to-day and long-term decisions affecting development. The August 2016 Update to the Chatham County-Savannah Comprehensive Plan serves as an overall "blueprint" for the development of the County that, when implemented, results in the most suitable and appropriate use of the land based on the vision, goals, and objectives created during the planning process. The Comprehensive Plan will serve as a guide to the overall development of Chatham County including as a reference for rezoning decisions and capital investment decisions. The Comprehensive Plan is intended

to guide development over a 20-year period, through 2036. However, the plan is a considered a living document that should be updated regularly.

Existing Land Use

Unincorporated Chatham County comprises 308,520 acres, 15.4% of which is open water. Of the remaining 260,997 acres, 32.8% is tidal marsh land and 43.1% is vacant, undeveloped land. Therefore, over 75% of the total land area in Chatham County is undeveloped according to the 2016 Comprehensive Plan. Approximately 36.1% of the developed area (8.7% of the total unincorporated County land area) is in residential use. Commercial uses accounts for approximately 7.5% of the developed area (1.8% of the total), industrial uses comprise approximately 12.0% of the developed area (2.9% of the total), and agricultural uses represent 33.8% of the developed area (8.1% of the total). On the following page, Figure 6.2 shows the existing land use as mapped in the Comprehensive Plan. The map shows that the abundant conservation and tidal marsh lands are clustered along the coast and riverfronts, while agricultural land is clustered in the west of the County, residential land is scattered throughout, and a large portion of industrial land lines the Savannah River.

Future Land Use

The purpose of the Future Land Use Map is to graphically depict Chatham County's policies for growth and land development and the projected patterns of future land use. The Future Land Use Map has been prepared with consideration given to land development objectives and policies, natural constraints and limitations, overall land suitability, and the ability to provide the infrastructure to support growth and development.

The Comprehensive Plan recommends mixed use development, town centers, cluster and conservation design, and New Urban development options and it encourages open space preservation. Additionally, the plan recognizes that past development forms pose a challenge to smart development and growth management.

The County's Future Land Use Map classifications include the following categories and subcategories:

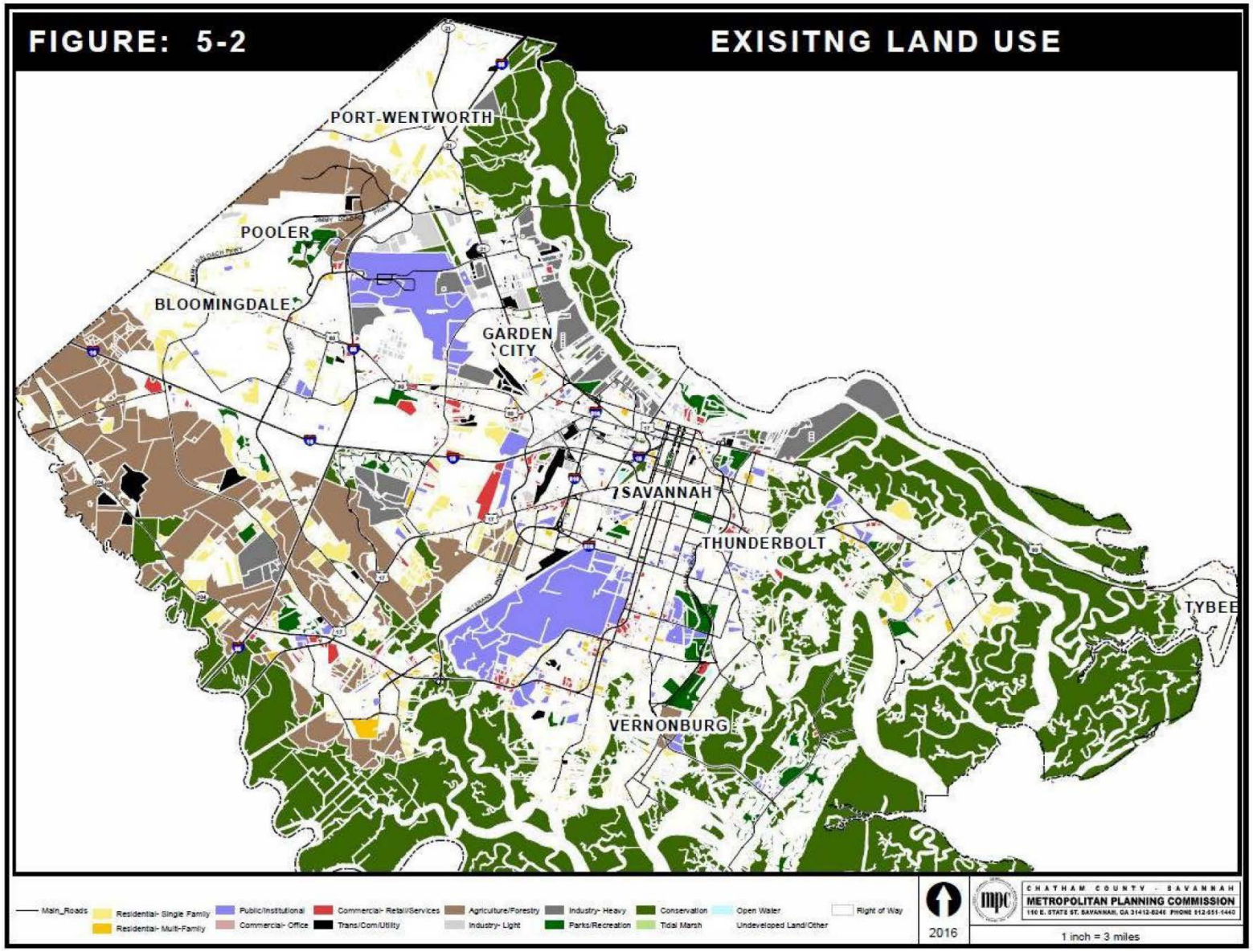
- Downtown
- Downtown Expansion
- Traditional Commercial
- Traditional Neighborhood
- Commercial (Neighborhood, Suburban, Regional, and Marine)
- Residential (Suburban Single Family, Single Family, General)
- Planned Development
- Planned Campus
- Agriculture/Forestry
- Industry (Light, Heavy)
- Civic/Institutional
- Transportation/Communication/Utility
- Parks/Recreation
- Conservation
- Conservation- Residential
- Tidal Marsh
- Transition

Generally, some growth and land development is anticipated to occur in all future land use categories except for the Parks/Recreation and Conservation classifications. The type and intensity of projected development varies within each future land use map classification. A simplified version of the Future Land

Use Map, which also include the Downtown Savannah area, is shown in Figure 3.7. In this map, Parks/Recreation, Conservation, and Conservation-Residential are shown as Parks and Open Space; Planned Campus is combined with Civic/Institutional; Residential is grouped into medium and low density; and Commercial incorporates Transition and Traditional Commercial areas.

The most prominent change from existing to future land use is that much of western Chatham County, which is currently agricultural and forestry land, is planned for low density and medium density residential development. Some of these lands fall within the 100-year and 500-year floodplains, therefore the County must consider the need for protection of new development as well as the impact on the floodplain and downstream flooding that may result from developing these areas.

The County is not experiencing high levels of redevelopment, however because much of the County is built out, redevelopment is likely to occur in the future as the housing stock ages. The Chatham County-Savannah Comprehensive Plan notes that "urban neighborhoods that have declined in population and former industrial lands represent an opportunity for internal growth in the form of infill development." Urban neighborhoods that are considered blighted are being targeted with CDBG funds for revitalization, and brownfields and grayfields are also recognized as opportunities for redevelopment. As land for new development becomes scarcer and infrastructure limitations are met, redevelopment of low density first-ring suburbs in higher densities will likely be encouraged.



Source: Chatham County-Savannah Comprehensive Plan, 2016

Figure 2.7 – Chatham County Existing Land Use Map

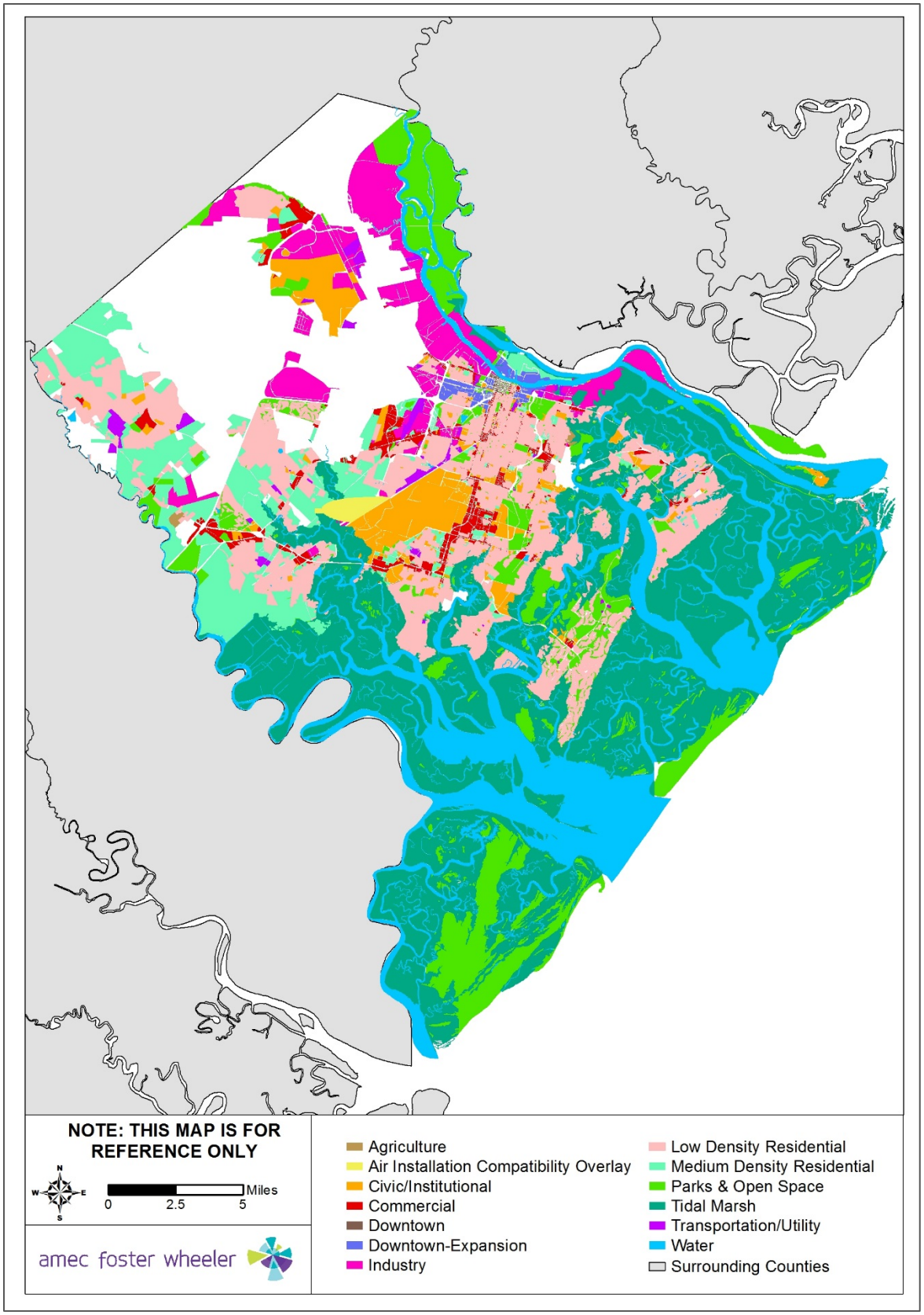
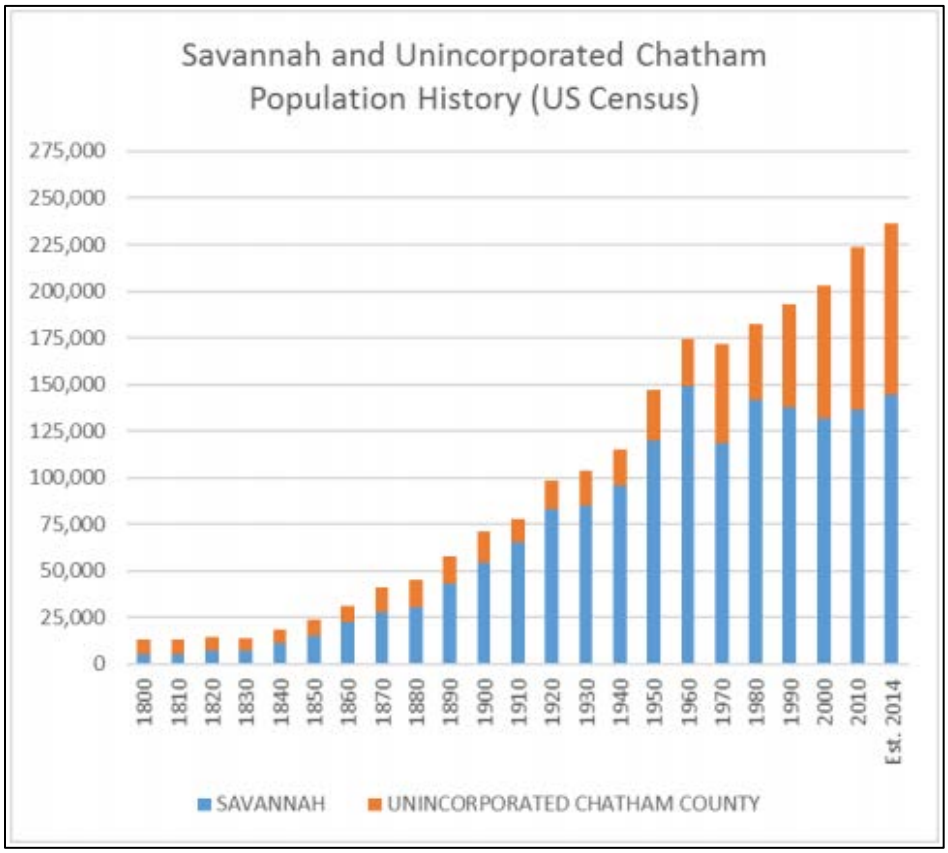


Figure 2.8 – Chatham County and City of Savannah Future Land Use

2.9 GROWTH AND DEVELOPMENT TRENDS

According to data from the Governor's Office of Planning and Budget (OPB), as of 2014, Chatham County was the fifth largest in the State, following four counties in the Atlanta metropolitan area (Fulton, Gwinnett, Cobb, and DeKalb). From 2010 to 2015, Chatham County grew at a rate of 5.3%. According to the Chatham County – Savannah Comprehensive Plan, most growth in recent decades has occurred in unincorporated Chatham County, as illustrated by the chart comparing growth in the County and the City of Savannah in Figure 2.9, below.

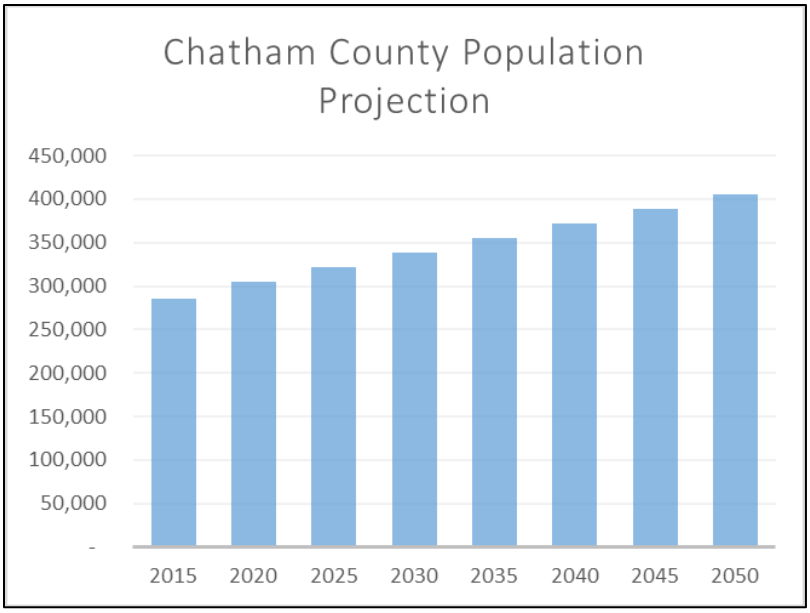


Source: Chatham County – Savannah Comprehensive Plan, 2016

Figure 2.9 – Recent Growth Trends in Chatham County

The Chatham County – Savannah Comprehensive Plan divides the County into four planning areas: East Chatham, Savannah Area, Municipalities, and West Chatham. East Chatham is developed at low densities and has limited capacity for growth due to its natural setting among marshes and tidal creeks. Savannah is already highly urbanized and grows primarily through annexation. As a result, West Chatham has emerged as a high growth area, as have the westernmost municipalities in the County.

According to the OPB Population Projections, the County is expected to reach a population of 405,573 by 2050, representing a 45% rate of growth from the 2015 population. The OPB projections are shown below in Figure 2.10.



Source: Georgia Governor's Office of Planning and Budget, 2017

Figure 2.10 – Population Projections for Chatham County

3 PLANNING PROCESS

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan. To develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
Requirement §201.6(c)(1): The plan shall include the following:
1) Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

This Floodplain Management Plan was developed under the guidance of a Floodplain Management Planning Committee (FMPC). The Committee's representatives included representatives of County Departments, federal and state agencies, citizens and other stakeholders.

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. This plan identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by floods.

3.1 LOCAL GOVERNMENT PARTICIPATION

The DMA planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the FMPC;
- Detail where within the planning area the risk differs from that facing the entire area;
- Identify potential mitigation actions; and
- Formally adopt the plan.

For the Chatham County FMPC, "participation" meant the following:

- Providing facilities for meetings;
- Attending and participating in the FMPC meetings;
- Collecting and providing requested data (as available);
- Managing administrative details;
- Making decisions on plan process and content;
- Identifying mitigation actions for the plan;
- Reviewing and providing comments on plan drafts;
- Informing the public, local officials, and other interested parties about the planning process and providing opportunity for them to comment on the plan;
- Coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan by the Board of Commissioners.

The FMPC met the above participation requirements. The FMPC included representatives from key County departments, local stakeholders, the insurance and real estate industries as well as mortgage

lenders. Among the participants was a representative from the Metropolitan Planning Commission, Nick Helmholdt, who is responsible for community land use and comprehensive planning in Chatham County. The participants comprising the Chatham County FMPC included the following:

1. Michael Blakely, Chatham County Floodplain Administrator
2. David Nash, Chatham County Public Works
3. David Anderson, Chatham County GIS
4. Randall Mathews, Chatham Emergency Management Agency
5. Nick Helmholdt, Metropolitan Planning Commission
6. Tom McDonald, City of Savannah Floodplain Administrator
7. Clifford Growe, Resident
8. Jeffrey Brady, Allstate Insurance
9. Madeleine Russell, University of Georgia
10. Jackie Jackson, Garden City
11. Tim Moody, Armstrong State University

Table 3.1 details the FMPC meeting dates and the FMPC members in attendance. A more detailed summary of FMPC meeting dates including topics discussed and meeting locations follows in Table 3.4. During the planning process, the FMPC members communicated through face-to-face meetings, email, and telephone conversations. Draft documents were posted on the Chatham County website so that the FMPC members could easily access and review them. Although all FMPC members could not be present at every meeting, coordination was ongoing throughout the entire planning process through emails and phone conversations and by direct contact with the Chatham County Department of Engineering.

Table 3.1 – FMPC Meeting Attendance Record

Member Name	Affiliation	Meeting Date				
		5/10/17	6/20/17	10/26/17	11/29/17	2/15/18
Michael Blakely	Chatham County	✓	✓	✓	✓	✓
David Nash	Chatham County		✓			
David Anderson	Chatham County	✓			✓	
Randall Mathews	Chatham County	✓	✓	✓	✓	✓
Nick Helmholdt	Metro. Planning Commission		✓			
Tom McDonald	City of Savannah		✓		✓	✓
Clifford Growe	Resident	✓	✓	✓	✓	✓
Jeffrey Brady	Allstate Insurance	✓	✓		✓	✓
Madeleine Russell	University of Georgia		✓			
Jackie Jackson	Garden City					
Tim Moody	Armstrong State University		✓			

Based on the area of expertise of each County representative participating on the FMPC, Table 3.2 demonstrates the County staff's capability in the six mitigation categories (Prevention, Property Protection, Natural Resource Protection, Emergency Services, Structural Flood Control Projects and Public Information).

Table 3.2 – Chatham County Staff Capability with Six Mitigation Categories

Community Department/Office	Prevention	Property Protection	Natural Resource Protection	Emergency Services	Structural Flood Control Projects	Public Information
Metropolitan Planning Commission	✓	✓	✓		✓	✓
Emergency Management				✓	✓	✓
Public Works	✓	✓	✓		✓	
Engineering	✓	✓	✓		✓	
GIS	✓					✓

Appendix A provides additional information and documentation of the planning process that was implemented for the development of this FMP.

3.2 THE 10-STEP PLANNING PROCESS

The planning process for preparing the Chatham County Floodplain Management Plan was based on DMA planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

1) Planning Process;
2) Risk Assessment;
3) Mitigation Strategy; and
4) Plan Maintenance.

Into this process, the County integrated a more detailed 10-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA's Hazard Mitigation Grant Program; Pre-Disaster Mitigation Program; Community Rating System; Flood Mitigation Assistance Program; Severe Repetitive Loss Program; and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 3.3 shows how the 10-step CRS planning process aligns with the four phases of hazard mitigation planning pursuant to the Disaster Mitigation Act of 2000.

Table 3.3 – Mitigation Planning and CRS 10-Step Process Reference Table

DMA Process	CRS Process
Phase I – Planning Process	
§201.6(c)(1)	Step 1. Organize to Prepare the Plan
§201.6(b)(1)	Step 2. Involve the Public
§201.6(b)(2) & (3)	Step 3. Coordinate
Phase II – Risk Assessment	
§201.6(c)(2)(i)	Step 4. Assess the Hazard
§201.6(c)(2)(ii) & (iii)	Step 5. Assess the Problem
Phase III – Mitigation Strategy	
§201.6(c)(3)(i)	Step 6. Set Goals
§201.6(c)(3)(ii)	Step 7. Review Possible Activities
§201.6(c)(3)(iii)	Step 8. Draft an Action Plan
Phase IV – Plan Maintenance	
§201.6(c)(5)	Step 9. Adopt the Plan
§201.6(c)(4)	Step 10. Implement, Evaluate and Revise the Plan

3.2.1 Phase I – Planning Process

Planning Step 1: Organize to Prepare the Plan

With Chatham County's commitment to participate in the DMA planning process and the CRS, County officials worked to establish the framework and organization for development of the plan. An initial meeting was held with key community representatives to discuss the organizational aspects of the plan development process.

The FMPC Kick-Off meeting was held on Wednesday, May 10, 2017 at 3:00 p.m. in the Chatham County Department of Engineering located at 124 Bull Street, Room 430. The meeting covered the scope of work and an introduction to the DMA, CRS, and FMA requirements.

The formal FMPC meetings followed the CRS Planning Steps. Agendas, minutes, and sign-in sheets for the FMPC meetings are included in Appendix A. The meeting dates and topics discussed are summarized below in Table 3.4. All FMPC meetings were open to the public and all public meetings were properly advertised in the newspaper and on the County's website.

Table 3.4 – Summary of FMPC Meeting Dates

Meeting Type	Meeting Topic	Meeting Date	Meeting Location
FMPC #1 (Kick-off)	1) Introduction to DMA, CRS and the planning process 2) Organize resources: the role of the FMPC, planning for public involvement, and coordinating with other agencies and stakeholders	May 10, 2017 3:00 – 4:00 p.m.	Department of Family and Children Services 761 Wheaton St. Room #1009C Savannah, GA
FMPC #2	1) Review Flood Protection Questionnaire and other public involvement strategies 2) Discuss/develop mitigation goals for the FMP	June 20, 2017 1:30 – 2:30 p.m.	Metropolitan Planning Commission Arthur A. Mendonsa Hearing Room 110 E. State St.
FMPC #3	1) Review Capability Assessment 2) Review/discussion of Flood Risk Assessment (Assess the Hazard) 3) Review/discussion of Vulnerability Assessment (Assess the Problem)	October 26, 2017 5:00 – 7:00 p.m.	Frank Murray Community Center 160 Whitemarsh Island Drive
FMPC #4	1) Review/discussion of Flood Risk and Vulnerability Assessment 2) Discuss/develop mitigation strategies for the FMP	November 29, 2017 1:30 – 3:30 p.m.	Frank Murray Community Center 160 Whitemarsh Island Drive
FMPC #5	1) Review "Draft" Floodplain Management Plan 2) Solicit comments and feedback from the FMPC	February 15, 2018 2:30 – 3:30 p.m.	Department of Family and Children Services 761 Wheaton Street, Room #1009A Savannah, GA

Planning Step 2: Involve the Public

The planning process officially began with a public meeting held on May 10, 2017 at 6:00PM. A press release was distributed on May 4, 2017, and made available on the County website. This notice inviting

members of the public to attend this kickoff meeting is documented in Appendix A. Information about the public meeting was also announced in local news articles and social media. The formal public meetings held during the planning process are summarized in Table 3.5.

Table 3.5 – Summary of Public Meeting Dates

Meeting Type	Meeting Topic	Meeting Date	Meeting Locations
Public Meeting #1	1) Introduction to DMA, CRS and the planning process 2) Introduction to hazard identification	May 10, 2017 6:00 – 7:00 p.m.	Department of Family and Children Services 761 Wheaton St. Room #1009C Savannah, GA
Public Meeting #2	1) Review "Draft" Floodplain Management Plan 2) Solicit comments and feedback from the FMPC	February 15, 2018 5:00 – 6:00 p.m.	Department of Family and Children Services 761 Wheaton Street, Room #1009A Savannah, GA

Involving the Public beyond Attending Public Meetings

Early discussions with the FMPC established the initial plan for public involvement. The FMPC agreed to an approach using established public information mechanisms and resources within the community. Public involvement activities for this plan update included press releases, stakeholder and public meetings, public surveys, and the collection of public and stakeholder comments on the draft plan.

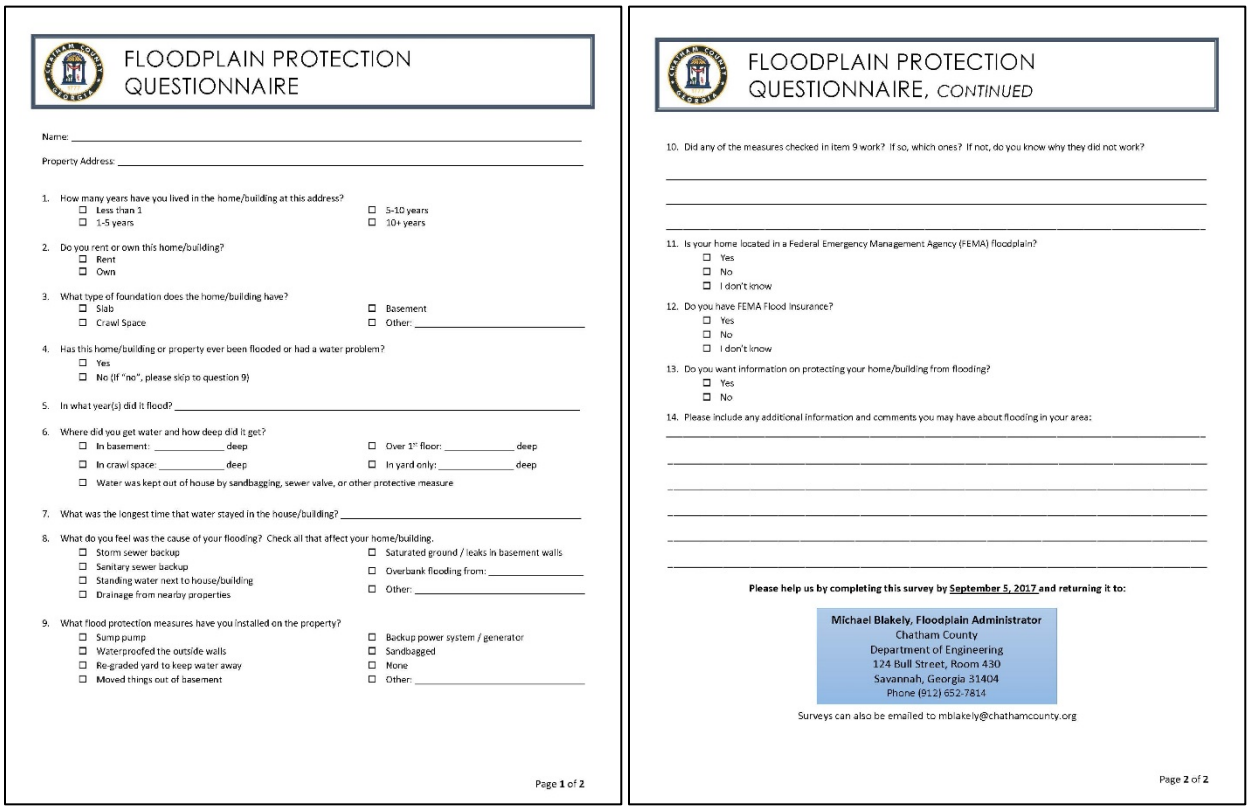
The FMPC found six different ways to involve the public beyond attending public meetings. Documentation to support the additional public outreach efforts can be found in Appendix A. The public outreach activities beyond the formal public meetings are summarized below in Table 3.6.

Table 3.6 – Public Outreach Efforts

Location		Event/Message	Date
1	Forsyth Park Earth Day Event	Informational booth with maps and information on flood risk; staff gathered public input	April 2017
2	Home Depot Hurricane Expo	Information booth with maps and information on flood risk; staff gathered public input	June 2017
3	Local Realtors Group meeting	Presentation to local realtors on flood risk	June 2017
4	County website	Public Survey on flood risk and mitigation strategies	June 2017
5	County/CEMA social media	Public Survey on flood risk and mitigation strategies	June 2017
6	County website	Draft HIRA posted for public comment	January 2018
7	County website	Draft plan posted for public comment	February 2018
8	County website	Planning meeting and information updates posted throughout planning process	April 2017 – February 2018
9	County/CEMA social media	Updates on planning meetings and process posted throughout plan development	April 2017 – February 2018
10	Department of Engineering	Hard copy of plan made available for public review	February 2018

The public survey which requested public input into the Floodplain Management Plan planning process and the identification of mitigation activities to lessen the risk and impact of future flood hazard events is shown in Figure 3.1. Chatham County placed the survey on its website, social media, and on Chatham

Emergency Management Agency's social media pages. A copy of the complete survey is presented in Appendix A along with a full summary of the results.



FLOODPLAIN PROTECTION QUESTIONNAIRE

Name: _____

Property Address: _____

1. How many years have you lived in the home/building at this address?
   - ☐ Less than 1
   - ☐ 1-5 years
   - ☐ 5-10 years
   - ☐ 10+ years
2. Do you rent or own this home/building?
   - ☐ Rent
   - ☐ Own
3. What type of foundation does the home/building have?
   - ☐ Slab
   - ☐ Crawl Space
   - ☐ Basement
   - ☐ Other: _____
4. Has this home/building or property ever been flooded or had a water problem?
   - ☐ Yes
   - ☐ No (If "no", please skip to question 9)
5. In what year(s) did it flood? _____
6. Where did you get water and how deep did it get?
   - ☐ In basement: _____ deep
   - ☐ Over 1st floor: _____ deep
   - ☐ In crawl space: _____ deep
   - ☐ In yard only: _____ deep
   - ☐ Water was kept out of house by sandbagging, sewer valve, or other protective measure
7. What was the longest time that water stayed in the house/building? _____
8. What do you feel was the cause of your flooding? Check all that affect your home/building.
   - ☐ Storm sewer backup
   - ☐ Sanitary sewer backup
   - ☐ Standing water next to house/building
   - ☐ Drainage from nearby properties
   - ☐ Saturated ground / leaks in basement walls
   - ☐ Overbank flooding from: _____
   - ☐ Other: _____
9. What flood protection measures have you installed on the property?
   - ☐ Sump pump
   - ☐ Waterproofed the outside walls
   - ☐ Re-graded yard to keep water away
   - ☐ Moved things out of basement
   - ☐ Backup power system / generator
   - ☐ Sandbagged
   - ☐ None
   - ☐ Other: _____

Page 1 of 2

FLOODPLAIN PROTECTION QUESTIONNAIRE, *CONTINUED*

10. Did any of the measures checked in item 9 work? If so, which ones? If not, do you know why they did not work?

    _____

    _____

    _____
11. Is your home located in a Federal Emergency Management Agency (FEMA) floodplain?
    - ☐ Yes
    - ☐ No
    - ☐ I don't know
12. Do you have FEMA Flood Insurance?
    - ☐ Yes
    - ☐ No
    - ☐ I don't know
13. Do you want information on protecting your home/building from flooding?
    - ☐ Yes
    - ☐ No
14. Please include any additional information and comments you may have about flooding in your area:

    _____

    _____

    _____

    _____

    _____

    _____

Please help us by completing this survey by September 5, 2017 and returning it to:

Michael Blakely, Floodplain Administrator
Chatham County
Department of Engineering
124 Bull Street, Room 430
Savannah, Georgia 31404
Phone (912) 652-7814

Surveys can also be emailed to mblakely@chathamcounty.org

Page 2 of 2

Figure 3.1 – Public Survey

Planning Step 3: Coordinate

Early in the planning process, the FMPC determined that the risk assessment, mitigation strategy development, and plan approval would be greatly enhanced by inviting other local, state and federal agencies and organizations to participate in the process.

Invitations to support the efforts of the FMPC were extended to County officials, citizens, and federal, state, and local stakeholders that might have an interest in participating in the planning process. A letter was sent by Chatham County to the local stakeholders (listed in Appendix A) inviting them to participate in the planning process and to provide technical information to the FMPC. Stakeholders were made aware that updates throughout the planning process, including meeting dates and draft materials, would be made available on the County website. The full list of local stakeholders is included in Appendix A.

Coordination involved contacting these agencies through a variety of mechanisms and informing them on how to participate in the plan development process. Coordination with these groups included holding face-to-face meetings, sending outreach letters, and making phone calls alone to out of area agencies. These groups and agencies were solicited asking for their assistance (did they have documentation to support the planning process) and input in the plan development process. A sample coordination letter is provided in Appendix A.

Coordination with Other Community Planning Efforts and Hazard Mitigation Activities

Coordination with other community planning efforts is also paramount to the success of this plan. Mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's

risk and vulnerability to hazards. Chatham County uses a variety of comprehensive planning mechanisms, such as a Comprehensive Plan, land development regulations, and ordinances to guide growth and development. Integrating existing planning efforts, mitigation policies, and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. The development of this plan incorporated information from the following existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

Table 3.7 – Summary of Existing Studies and Plans Reviewed

Resource Referenced	Use in this Plan
Chatham County-Savannah Comprehensive Plan, 2016	• identify growth and development goals • develop community profile
Chatham County Code Book • Zoning Ordinance • Subdivision Regulation • Flood Damage Prevention Ordinance • Land-Disturbing Activities Ordinance • Stormwater Management Ordinance • Soil Erosion and Sedimentation Control Ordinance	• develop capability assessment • develop mitigation strategy
Chatham County Pre-Disaster Hazard Mitigation Plan, 2015	• identify flood hazards and develop hazard profiles • develop capability assessment • develop mitigation strategy
Georgia Coastal Hazards Portal	• develop erosion hazard profile
Chatham County and Incorporated Areas Flood Insurance Study (FIS), July 2014	• develop flood hazard profile and identify flooding sources in the County • DFIRM used to prepare the 100-/500-year flooding vulnerability assessment
Chatham County Emergency Operations Plan, 2012	• develop capability assessment • develop mitigation strategy
Chatham County Disaster Recovery Plan, 2015	• develop vulnerability assessment • develop capability assessment • develop mitigation strategy

These and other documents were reviewed and considered, as appropriate, during the collection of data to support the planning process and plan development, including the hazard identification, vulnerability assessment, and capability assessment. Data from these plans and ordinances were incorporated into the risk assessment and hazard vulnerability sections of the plan as appropriate. The data was also used in determining the capability of the community in being able to implement certain mitigation strategies. The Capability Assessment can be found in Section 6.

3.2.2 Phase II – Risk Assessment

Planning Steps 4 and 5: Identify/Assess the Hazard and Assess the Problem

The FMPC completed a comprehensive effort to identify, document, and profile all flood hazards that have, or could have, an impact on the planning area. Data collection worksheets were developed and used in this effort to aid in determining hazards and vulnerabilities and where the risk varies across the planning area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. A draft of the risk and vulnerability assessment was posted on the County's website for FMPC and public review and comment.

The FMPC also conducted a capability assessment to review and document the planning area's current capabilities to mitigate risk from and vulnerability to hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the FMPC could assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process and the results are included in Section 5 Hazard Risk and Vulnerability Assessment.

3.2.3 Phase III – Mitigation Strategy

Planning Steps 6 and 7: Set Goals and Review Possible Activities

Amec Foster Wheeler facilitated brainstorming and discussion sessions with the FMPC that described the purpose and process of developing planning goals and objectives, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This information is included in Section 7 Mitigation Strategy. Additional documentation of the alternatives the FMPC assessed to develop the mitigation strategy is included in Appendix B.

Planning Step 8: Draft an Action Plan

A complete first draft of the plan was prepared based on input from the FMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7. This draft was posted for FMPC and public review and comment on the County's website. Other agencies were invited to comment on this draft as well. FMPC, public, and agency comments were integrated into the final draft for the GEMA/HS and FEMA Region IV to review and approve, contingent upon final adoption by the County.

3.2.4 Phase IV – Plan Maintenance

Planning Step 9: Adopt the Plan

To secure buy-in and officially implement the plan, the plan will be reviewed and adopted by the Chatham County Board of Commissioners, as shown in the corresponding resolution in Section 8 Plan Adoption.

Planning Step 10: Implement, Evaluate and Revise the Plan

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. Up to this point in the planning process, the FMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Section 6 Plan Implementation and Maintenance provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The Section also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

4 HAZARD IDENTIFICATION

Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.
Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type…of all natural hazards that can affect the jurisdiction.

This section describes the Hazard Identification and Risk Assessment process for the development of the Chatham County Floodplain Management Plan. It describes how the County met the following requirements from the 10-step planning process:

- Planning Step 4: Assess the Hazard
- Planning Step 5: Assess the Problem

As defined by FEMA, risk is a combination of hazard, vulnerability, and exposure. "It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage."

This flood risk assessment covers the unincorporated areas of Chatham County. The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of a jurisdiction's potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events. This risk assessment followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (FEMA 386-2, 2002), which breaks the assessment down to a four-step process:

Data collected through this process has been incorporated into the following sections of this chapter:

- **Section 4**: **Hazard Identification** identifies the natural flood hazards that threaten the planning area.
- **Section 5**: **Hazard Profiles** discusses the threat to the planning area and describes previous occurrences of flood hazard events and the likelihood of future occurrences.
- **Section 6: Vulnerability Assessment** assesses the planning area's exposure to natural flood hazards; considering assets at risk, critical facilities, and future development trends.
- **Section 7: Capability Assessment** inventories existing mitigation activities and policies, regulations, and plans that pertain to mitigation and can affect net vulnerability.

Chatham County's FMPC conducted a hazard identification study to determine the natural flood hazards that threaten the planning area.

4.1 HAZARD IDENTIFICATION METHODOLOGY AND RESULTS

Using existing flood hazard data, local knowledge, and input gained through planning meetings, the FMPC agreed upon a list of natural flood hazards that could affect the County. Flood hazard data from the Chatham County Hazard Mitigation Plan, Georgia Emergency Management Agency (GEMA), FEMA, the

National Centers for Environmental Information (NCEI), and other sources were examined to assess the significance of these hazards to the planning area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage.

The National Oceanic and Atmospheric Administration's National Center for Environmental Information (NCEI) has been tracking various types of severe weather since 1950. Their Storm Events Database contains an archive of destructive storm or weather data and information which includes local, intense and damaging events. NCEI receives storm data from the National Weather Service (NWS). The NWS receives their information from a variety of sources, which include but are not limited to: county, state and federal emergency management officials, local law enforcement officials, SkyWarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public, among others. This database contains 83 unique records of flood-related severe weather events that occurred in Chatham County between January 1996 and March 2017. Table 4.1 summarizes these events. These NCEI events are provided in more detail within each hazard profile. Where duplicate entries existed in the NCEI database for the same event, the impacts (damages, deaths, and injuries) have been condensed into a single line of data to simplify reporting in this plan and provide an overall count of events.

Table 4.1 – NCEI Severe Weather Reports for Chatham County, January 1996 – March 2017

Type	# of Events	Property Damage	Crop Damage	Deaths	Injuries
Coastal Flood	17	$40,000	$0	0	0
Flash Flood	36	$8,405,000	$0	0	2
Flood	2	$0	$0	0	0
Heavy Rain	3	$0	$0	0	0
Hurricane/Typhoon	4	$0	$0	0	0
Storm Surge/Tide	2	$0	$0	0	0
Tropical Storm	19	$14,500	$0	0	0
Total:	**83**	**$8,459,500**	**$0**	**0**	**2**

Source: National Center for Environmental Information Events Database, July 2017
Note: Losses reflect totals for all impacted areas for each event.

Disaster Declaration History

The FMPC researched past events that resulted in a federal and/or state emergency or disaster declaration in the planning area for Chatham County in order to identify priority flood hazards. Federal and/or state disaster declarations may be granted when the Governor certifies that the combined local, county and state resources are insufficient and that the situation is beyond their recovery capabilities. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. If the disaster is so severe that both the local and state government capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

Records of designated counties for FEMA major disaster declarations start in 1964. Since then, Chatham County has been designated in one major disaster declaration: Hurricane Matthew on October 8, 2016.

A lack of past disaster declarations is not necessarily indicative of limited hazard risk. As such, the FMPC maintained that all six flood-related hazards identified in Table 4.2 be profiled and assessed.

The FMPC's list of hazards was compared to the Georgia State Hazard Mitigation Plan and Chatham County Hazard Mitigation Plan's flood-related hazards to further identify known hazards and ensure consistency across planning efforts. Ultimately, the flood hazards identified in Table 4.2 were evaluated as part of this plan.

Table 4.2 – Summary of Flood Hazard Identification

Flood Hazard	Included in 2014 State HMP?	Included in Chatham County HMP?	Identified as a significant hazard to be included in the Chatham FMP?
Climate Change/Sea Level Rise	No	Yes	Yes
Dam/Levee Failure	Yes	Yes	Yes
Flood: 100-/500-year	Yes	Yes	Yes
Flood: Stormwater/Localized Flooding	No	No	Yes
Hurricane/Tropical Storm	Yes	Yes	Yes
Coastal/Stream Bank Erosion	No	Yes	Yes

4.2 RISK AND VULNERABILITY ASSESSMENT METHODOLOGY

All hazards listed above are profiled in Section 5 Risk and Vulnerability Assessment. The Disaster Mitigation Act regulations require that the FMPC evaluate the risks associated with each of the hazards identified in the planning process. Each hazard was evaluated to determine its probability of future occurrence and potential impact. More significant hazards with the potential to cause significant human and/or monetary losses in the future have a detailed vulnerability assessment included in their profile.

Each hazard is profiled in the following format:

Hazard Description

This section provides a description of the hazard followed by details specific to the Chatham County planning area. Where available, this section also includes information on the hazard extent, seasonal patterns, speed of onset/duration, magnitude and any secondary effects.

Location / Spatial Extent

This section includes information on the hazard extent, seasonal patterns, speed of onset/duration, magnitude and any secondary effects.

Past Occurrences

This section contains information on historical events, including the extent or location of the hazard within or near the Chatham County planning area.

Probability of Future Occurrence

This section gauges the likelihood of future occurrences based on past events and existing data. The frequency is determined by dividing the number of events observed by the number of years on record and multiplying by 100. This provides the percent chance of the event happening in any given year according to historical occurrence (e.g. 10 hurricanes or tropical storms over a 30-year period equates to a 33 percent chance of experiencing a hurricane or tropical storm in any given year). The likelihood of future occurrences is categorized into one of the classifications as follows:

- ***Highly Likely*** – Near 100 percent chance of occurrence within the next year
- ***Likely*** – Between 10 and 100 percent chance of occurrence within the next year (recurrence interval of 10 years or less)
- ***Possible*** – Between 1 and 10 percent chance of occurrence within the next year (recurrence interval of 11 to 100 years)
- ***Unlikely*** – Less than 1 percent chance or occurrence within the next 100 years (recurrence interval of greater than every 100 years)

Climate Change

This section discusses how climate change may or may not influence the risk posed by the hazard on the planning area in the future.

Physical Vulnerability

This section quantifies, to the extent feasible using best available data, assets at risk to natural hazards and estimates potential losses. Properties, people, and critical facilities that are vulnerable to the hazard are identified. Future development is also discussed in this section, including how exposure to the hazard may change in the future or how development may affect hazard risk.

The vulnerability assessments followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (August 2001). The vulnerability assessment first describes the total vulnerability and values at risk and then discusses vulnerability by hazard. Data used to support this assessment included the following:

- Geographic Information System (GIS) datasets, including building footprints, topography, aerial photography, and transportation layers;
- Hazard layer GIS datasets from state and federal agencies;
- Written descriptions of inventory and risks provided by the State Hazard Mitigation Plan; and
- Written descriptions of inventory and risks provided by the Regional Hazard Mitigation Plan.

Two distinct risk assessment methodologies were used in the formation of the vulnerability assessment. The first consists of a ***quantitative*** analysis that relies upon best available data and technology, while the second approach consists of a ***qualitative*** analysis that relies on local knowledge and rational decision making. The quantitative analysis involved the use of FEMA's Hazus-MH, a nationally applicable standardized set of models for estimating potential losses from earthquakes, floods, and hurricanes. Hazus uses a statistical approach and mathematical modeling of risk to predict a hazard's frequency of occurrence and estimated impacts based on recorded or historic damage information. The Hazus risk assessment methodology is parametric, in that distinct hazard and inventory parameters—such as wind speed and building type—were modeled using the Hazus software to determine the impact on the built environment. Chatham County's GIS-based flood risk assessment was completed using data collected from local, regional and national sources that included Chatham County, GEMA/HS, and FEMA.

Vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances, the numbers and types of buildings subject to the identified hazard can be counted and their values tabulated. Other information can be collected in regard to the hazard area, such as the location of critical facilities, historic structures, and valued natural resources (e.g., an identified wetland or endangered species habitat). Together, this information conveys the vulnerability of that area to that hazard.

Priority Risk Index

The conclusions drawn from the hazard profiling and vulnerability assessment process can be used to prioritize all potential hazards to the Chatham County planning area. The Priority Risk Index (PRI) is a good practice to use when prioritizing hazards because it provides a standardized numerical value so that hazards can be compared against one another (the higher the PRI value, the greater the hazard risk). PRI values are obtained by assigning varying degrees of risk to five categories for each hazard (probability, impact, spatial extent, warning time, and duration). Each degree of risk has been assigned a value (1 to 4) and a weighting factor as summarized below in Table 4.3.

Table 4.3 – Priority Risk Index

RISK ASSESSMENT CATEGORY	LEVEL	DEGREE OF RISK CRITERIA	INDEX	WEIGHT
PROBABILITY What is the likelihood of a hazard event occurring in a given year?	**UNLIKELY**	LESS THAN 1% ANNUAL PROBABILITY	**1**	**30%**
	POSSIBLE	BETWEEN 1 & 10% ANNUAL PROBABILITY	**2**	
	LIKELY	BETWEEN 10 &100% ANNUAL PROBABILITY	**3**	
	HIGHLY LIKELY	100% ANNUAL PROBABILTY	**4**	
IMPACT In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	**MINOR**	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	**1**	**30%**
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR > 1 DAY	**2**	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR > 1 WEEK.	**3**	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES > 30 DAYS.	**4**	
SPATIAL EXTENT How large of an area could be impacted by a hazard event? Are impacts localized or regional?	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED	**1**	**20%**
	SMALL	BETWEEN 1 & 10% OF AREA AFFECTED	**2**	
	MODERATE	BETWEEN 10 & 50% OF AREA AFFECTED	**3**	
	LARGE	BETWEEN 50 & 100% OF AREA AFFECTED	**4**	
WARNING TIME Is there usually some lead time associated with the hazard event? Have warning measures been implemented?	**MORE THAN 24 HRS**	SELF DEFINED	**1**	**10%**
	12 TO 24 HRS	SELF DEFINED	**2**	
	6 TO 12 HRS	SELF DEFINED	**3**	
	LESS THAN 6 HRS	SELF DEFINED	**4**	
DURATION How long does the hazard event usually last?	**LESS THAN 6 HRS**	SELF DEFINED	**1**	**10%**
	LESS THAN 24 HRS	SELF DEFINED	**2**	
	LESS THAN 1 WEEK	SELF DEFINED	**3**	
	MORE THAN 1 WEEK	SELF DEFINED	**4**	

The sum of all five risk assessment categories equals the final PRI value, demonstrated in the equation below (the highest possible PRI value is 4.0).

PRI VALUE = [(PROBABILITY x .30) + (IMPACT x .30) + (SPATIAL EXTENT x .20) + (WARNING TIME x .10) + (DURATION x .10)]

The purpose of the PRI is to categorize and prioritize all potential hazards for the Chatham County planning area as high, moderate, or low risk. The summary hazard classifications generated through the use of the PRI allows for the prioritization of those high hazard risks for mitigation planning purposes.

4.3 ASSET INVENTORY

An inventory of assets within Chatham County was compiled to identify those structures potentially at risk to the identified hazards. Assets include elements such as buildings, property, business/industry goods, and civil infrastructure. Building footprint, foundation type, and building value data were provided by the County. Critical infrastructure and key resources, as defined by FEMA, were the focus of the non-building data collection. By understanding the type and number of assets that exist and where they are in relation to known hazard areas, the relative risk and vulnerability for such assets can be assessed.

4.3.1 County Building Exposure

The properties identified to be at risk include all improved properties in Chatham County according to building footprint data provided by Chatham County. The information is provided in Table 4.4. This risk information is further detailed by flood zone in Table 5.7 in Section 5.3.

Table 4.4 – Chatham County Building Exposure

Occupancy Type	Total Number of Buildings	Total Building Value	Estimated Content Value	Total Value
Agricultural	172	$37,867,482	$37,867,482	$75,734,964
Commercial	3,773	$1,010,684,961	$1,010,684,961	$2,021,369,922
Education	84	$50,100,420	$50,100,420	$100,200,840
Government	4	$0	$0	$0
Industrial	2,170	$1,433,689,017	$2,150,533,525	$3,584,222,542
Religious	18	$41,041,700	$41,041,700	$82,083,400
Residential	31,227	$5,215,897,502	$2,607,948,751	$7,823,846,253
Total	**37,448**	**7,789,281,082**	**5,898,176,839**	**$13,687,457,921**

Source: Chatham County, FEMA 2014 Effective DFIRM

Note: Content value estimations are generally based on the FEMA Hazus methodology of estimating value as a percent of improved structure values by property type. The residential property type assumes a content replacement value equal to 50% of the building value. Agricultural, commercial, education, government, and religious property types assume a content replacement value equal to 100% of the building value. The industrial property type assumes a content replacement value equal to 150% of the building value.

4.3.2 Critical Facilities and Infrastructure at Risk

Of significant concern with respect to any disaster event is the location of critical facilities and infrastructure in the planning area. Critical facilities are often defined as those essential services and facilities in a major emergency which, if damaged, would result in severe consequences to public health and safety or a facility which, if unusable or unreachable because of a major emergency, would seriously and adversely affect the health, safety, and welfare of the public. Critical facilities and infrastructure in Chatham County are listed by type in Table 4.5 and shown Figure 4.1. These facilities were identified through a review of Chatham County parcel data and by running Hazus to locate additional facilities within the floodplain. Structure values by type are estimated using Chatham County parcel data; values were not available for all critical facilities.

Table 4.5 – Critical Facilities and Infrastructure at Risk in Chatham County

Facility Name	Count	Structure Value
Civic	1	$ 8,897,000
Cultural	64	$ 188,167,997

Facility Name	Count	Structure Value
Fire	43	$ 96,524,672
Government	75	$ 235,304,518
Hazmat	4	$ 4,343,500
Health	14	$ 267,988,346
Police	20	$ 63,556,740
School	58	$ 256,093,593
Transportation	4	$ 36,230,950
Utility	19	$ 25,325,531
Water	376	$ 655,781,716
Total	679	$ 1,838,214,563

Planning for Critical Facility and Infrastructure Protection

Chatham County has several options to consider in planning to reduce the vulnerability of these critical facilities and infrastructure. Per FEMA guidance, of primary concern is the protection of essential systems and equipment in order to maintain the function of these critical facilities for community resilience during and after hazard events. One way to protect critical facilities is to ensure that electrical systems, mechanical systems, and other essential equipment is sufficiently elevated above the base flood elevation. Another option is to install dry floodproofing in order to protect these critical components from floodwaters, flood forces, and leakage. Among the components that should be considered for protection are electrical service and distribution systems; data systems; heating, ventilation, and air conditioning systems; water and wastewater systems; emergency power systems, and elevators.

Alternatively, the County can consider relocating some vulnerable critical facilities to new locations outside the floodplain. However, additional protection may still be required because areas outside the 1%-annual-chance and 0.2%-annual-chance floodplain are still at low risk to flooding. According to FEMA, properties outside of high-risk flood areas account for over 20 percent of NFIP claims and one-third of disaster assistance for flooding.

The Chatham County FMPC considered these concerns in developing their mitigation strategies. The FMPC is most concerned about Hazmat and Utility facilities as being the priority for protection and/or relocation because of the imminent hazard these facilities pose in the event of a flood. In the future, the FMPC will consider grant opportunities for modifications to these facilities.

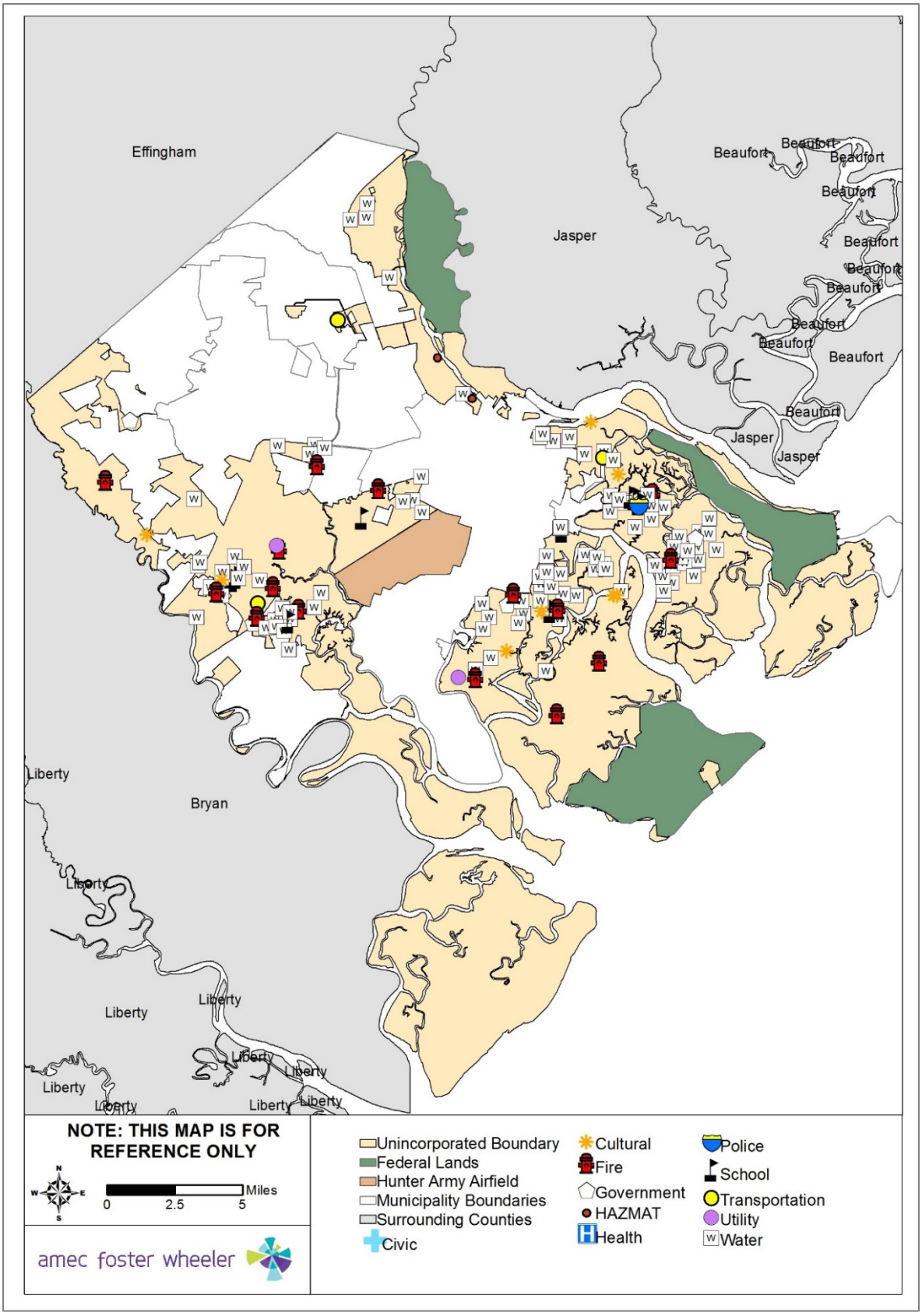


Figure 4.1 – Chatham County Critical Facilities

4.4 FLOOD HAZARDS PROFILE SUMMARY

Table 4.6 summarizes the results of the hazard profile for Chatham County based on hazard identification data and input from the FMPC. For each hazard profiled within Chapter 5, this table includes the likelihood of future occurrence and whether or not a vulnerability assessment was done for the hazard.

Table 4.6 – Summary of Flood Hazard Profile Results

Hazard	Likelihood of Future Occurrence	Vulnerability Assessment	Priority Hazard
Climate Change & Sea Level Rise	Highly Likely	Yes	Yes
Dam/Levee Failure	Unlikely	Yes	No
Flood: 100-/500-year	Possible	Yes	Yes
Flood: Stormwater/Localized Flooding	Highly Likely	Yes	Yes
Hurricane/Tropical Storm	Likely	Yes	Yes
Coastal/Stream Bank Erosion	Possible	Yes	Yes

5 HAZARD RISK AND VULNERABILITY ASSESSMENT

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

44 CFR Subsection D §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. Plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:

A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;

(B): An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; and

(C): Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

The hazards identified in Section 4 Hazard Identification, are profiled individually in this section. Information provided by members of the FMPC has been integrated into this section with information from other data sources, as discussed in Section 4.

5.1 CLIMATE CHANGE AND SEA LEVEL RISE

Hazard Description

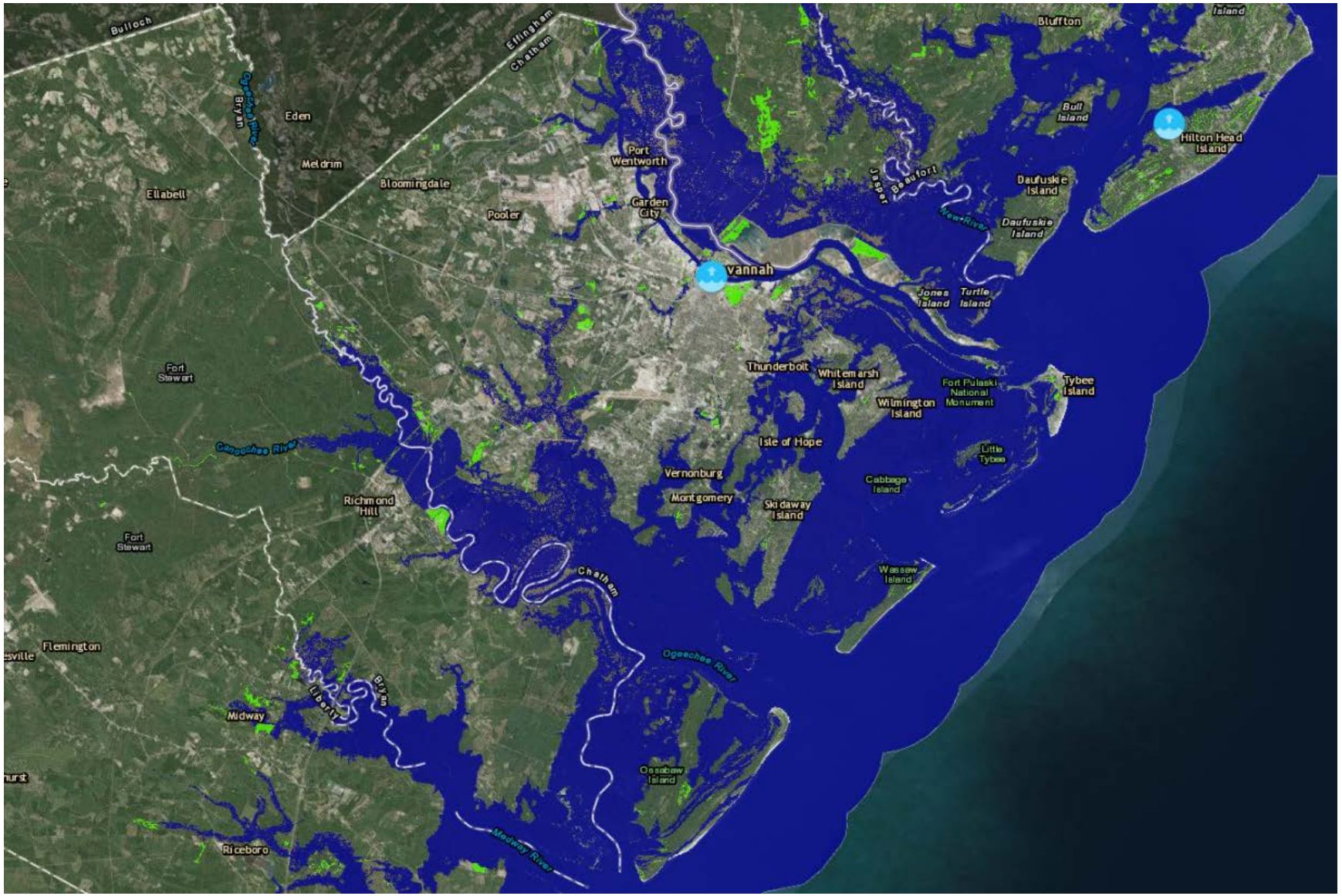
Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2014). Climate change is a natural occurrence in which the earth has warmed and cooled periodically over geologic time. The recent and rapid warming of the earth over the past century has been cause for concern, as this warming is due to the accumulation of human-caused greenhouse gases, such as CO_2, in the atmosphere (IPCC, 2007). This warming is occurring almost everywhere in the world which suggests a global cause rather than changes in localized weather patterns.

Due to sea-level rise projected throughout the 21st century and beyond, coastal systems and low-lying areas will increasingly experience adverse impacts such as submergence, coastal flooding, and coastal erosion. The population and assets projected to be exposed to coastal risks as well as human pressures on coastal ecosystems will increase significantly in the coming decades due to population growth, economic development, and urbanization (IPCC, 2014).

It can reasonably be assumed that the following climate risks could impact the Chatham County planning area: 1) increasing temperatures; 2) increasing frequency and strength of severe weather events; 3) more heavy rain/flooding; and 4) more frequent and prolonged drought. A discussion of the effect of these climate risks on the individual hazards profiled in this plan has been included in the "Probability of Future Occurrence" subsection for each flood hazard as applicable.

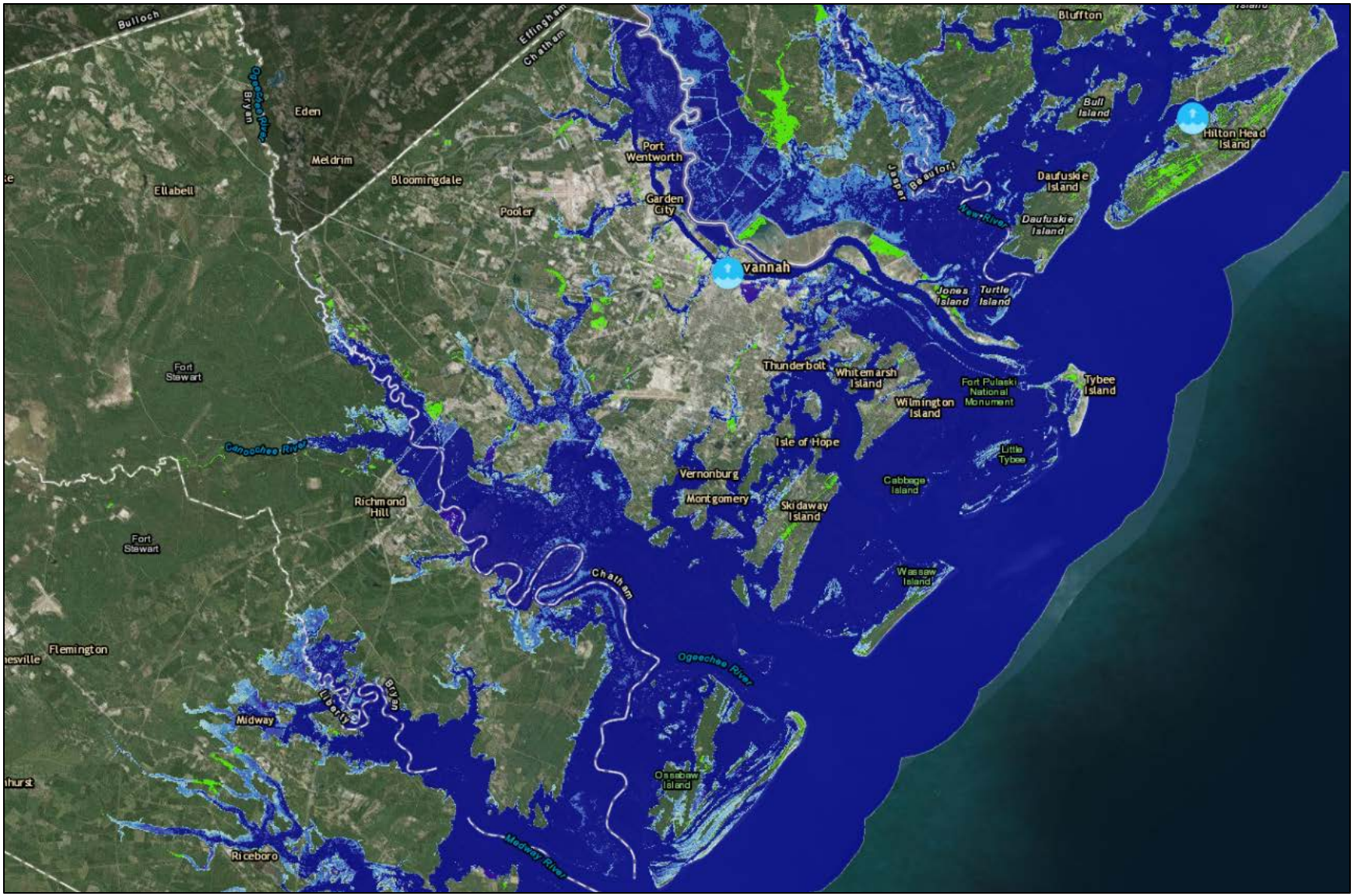
Location / Spatial Extent

Estimates of current mean higher high water (MHHW) as well as the impact of 2-foot, 3-foot, and 4-foot sea level rise (SLR) are shown in Figure 5.1, through Figure 5.4. The SLR estimate maps show inundation above mean higher high water (the average of each day's higher high tide line). SLR will likely affect coastal marsh lands as well as land along the Ogeechee and Savannah rivers and their tributaries. Additionally, SLR will likely increase future risk of flooding from the other flood hazards discussed in this chapter, as more land will have a lower elevation relative to sea level. For example, with much of the barrier islands and marsh land inundated, inland areas will lose their natural protection and may become susceptible to coastal flooding with velocity wave action.



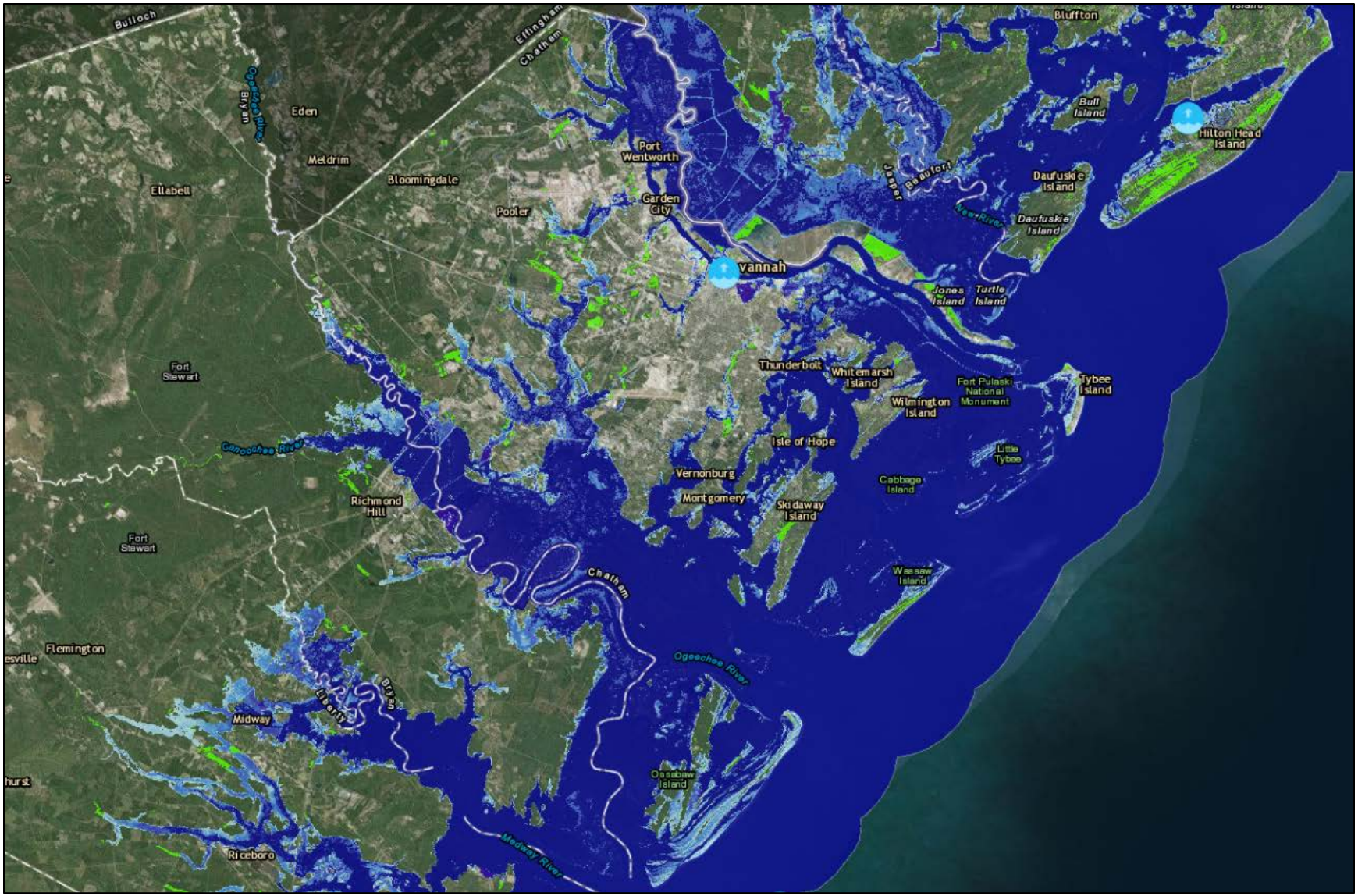
Source: NOAA Office for Coastal Management Sea Level Rise Viewer, July 2017

Figure 5.1 – Current Mean Higher High Water



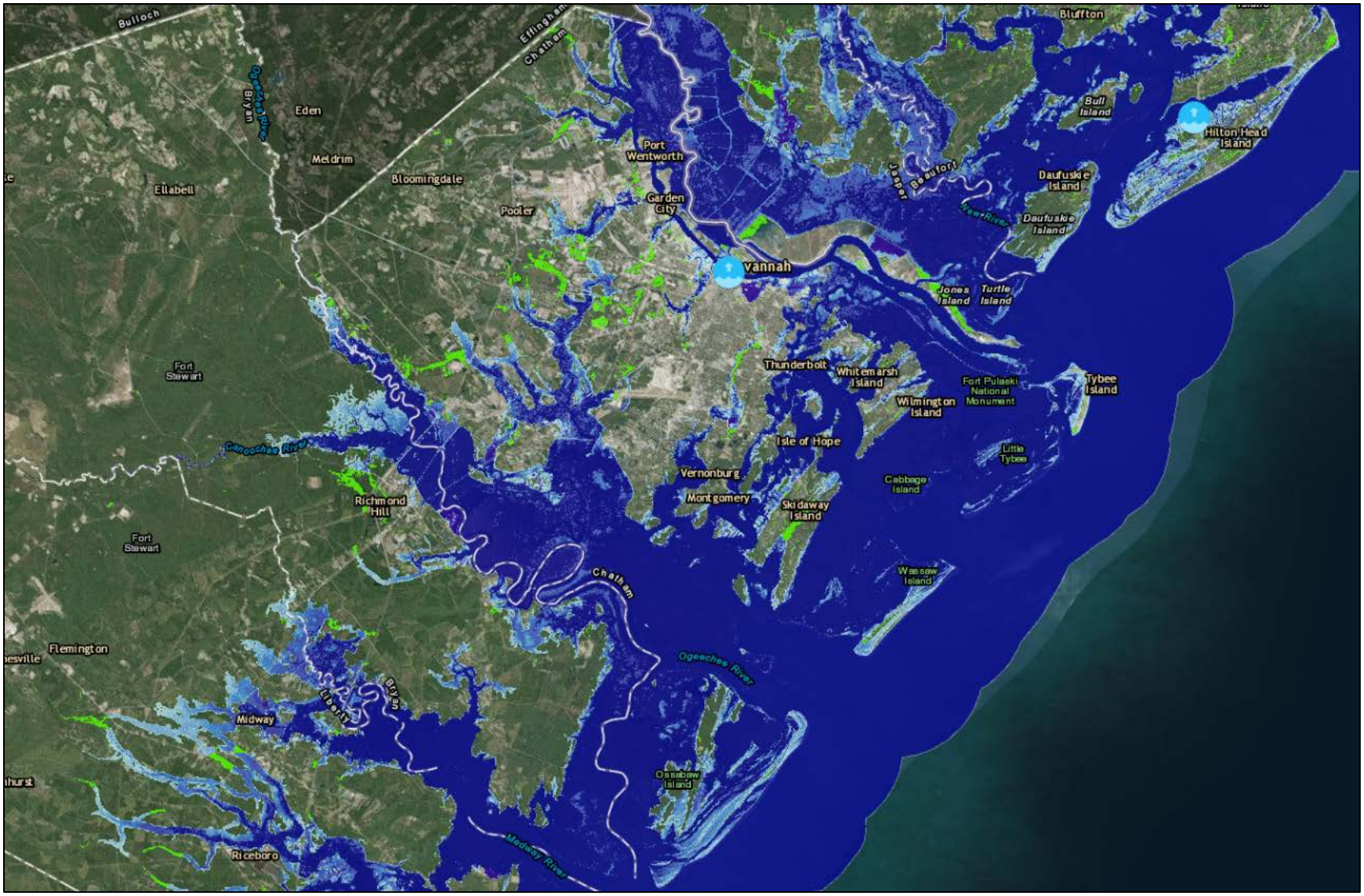
Source: NOAA Office for Coastal Management Sea Level Rise Viewer, July 2017

Figure 5.2 – Estimated Impact of 2 Foot SLR on Chatham County



Source: NOAA Office for Coastal Management Sea Level Rise Viewer, July 2017

Figure 5.3 – Estimated Impact of 3 Feet SLR on Chatham County



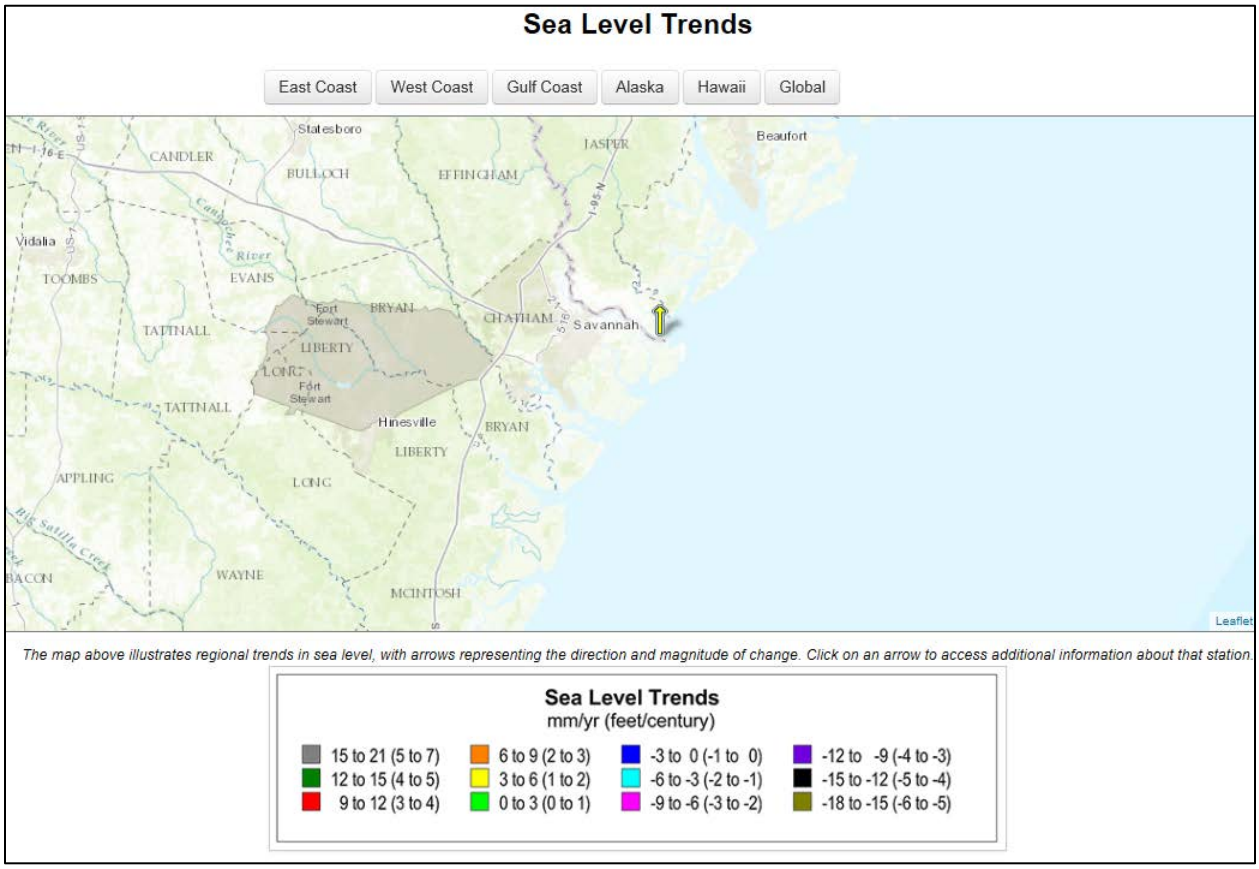
Source: NOAA Office for Coastal Management Sea Level Rise Viewer, July 2017

Figure 5.4 – Estimated Impact of 4 Feet SLR on Chatham County

Past Occurrences

There are generally two separate mechanics involved in global sea level rise. The first is directly attributed to global temperature increases, which warm the oceans waters and cause them to expand. The second is attributed to the melting of ice over land which simply adds water to the oceans. Global sea level rise is likely caused by a combination of these two mechanics and can be exasperated on the local level by factors such as erosion and subsidence. The rate of sea level rise has varied throughout geologic history, and studies have shown that global temperature and sea level are strongly correlated.

Historic trends in local MSL are best determined from tide gauge records. The Center for Operational Oceanographic Products and Services (CO-OPS) has been measuring sea level for over 150 years, with tide stations operating on all U.S. coasts. Changes in Mean Sea Level (MSL), either a sea level rise or sea level fall, have been computed at 128 long-term water level stations using a minimum span of 30 years of observations at each location. These measurements have been averaged by month to remove the effect of higher frequency phenomena (e.g. storm surge) in order to compute an accurate linear sea level trend. Figure 5.5 illustrates regional trends in sea level from NOAA. At the Fort Pulaski, GA station (indicated by the yellow arrow), the mean sea level trend is 3.23 mm/year with a 95% confidence interval of +/- 0.28 mm/year based on monthly mean sea level data from 1953 to 2015 which is equivalent to a change of 1.06 feet in 100 years.

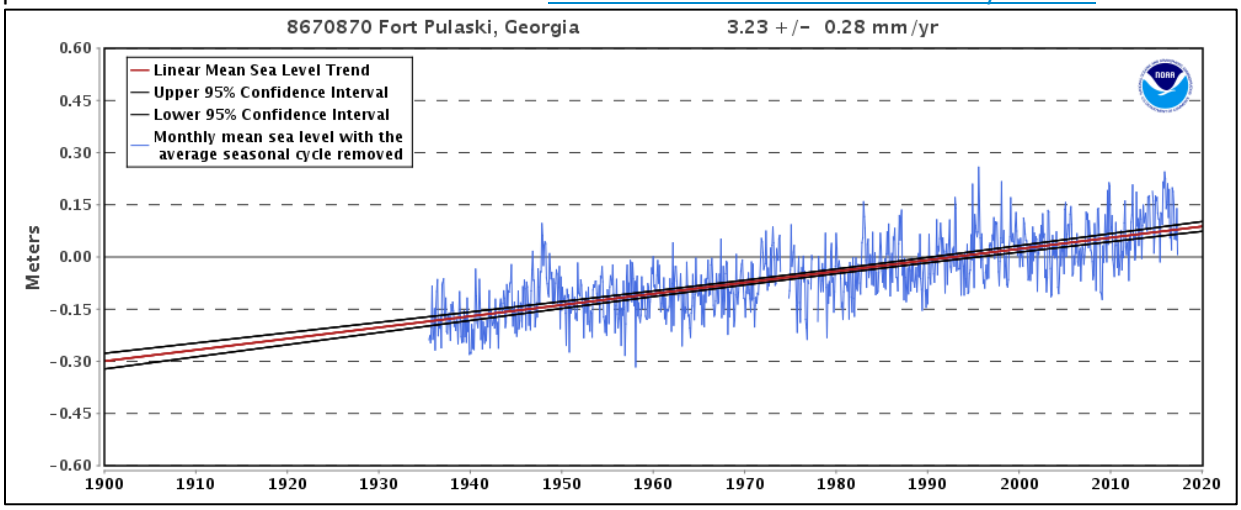


Source: http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml

Figure 5.5 – Gulf/Atlantic Coast Sea Level Trends

Figure 5.6 shows the monthly mean sea level at NOAA's Fort Pulaski, GA station without the regular seasonal fluctuations due to coastal ocean temperatures, salinities, winds, atmospheric pressures, and

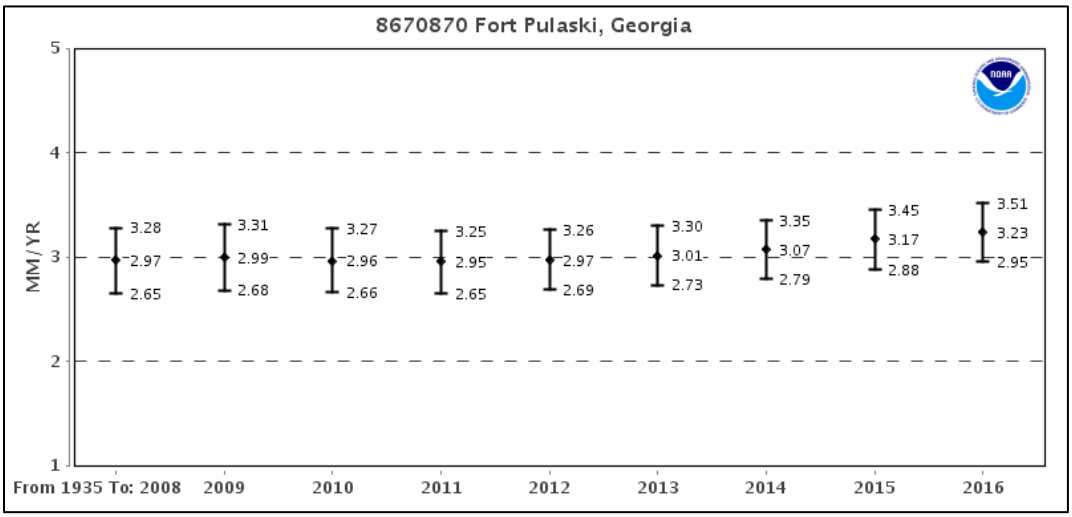
ocean currents. The long-term linear trend is also shown, including its 95% confidence interval. The plotted values are relative to the most recent Mean Sea Level datum established by CO-OPS.



Source: NOAA Tides and Currents, July 2017

Figure 5.6 – Mean Sea Level Trend for Fort Pulaski, Georgia

As more data are collected at water level stations, the linear mean sea level trends can be recalculated each year. Figure 5.7 compares linear mean sea level trends and 95% confidence intervals calculated from the beginning of the Fort Pulaski, GA station record to recent years. The values do not indicate the trend in each year, but the trend of the entire data period up to that year.



Source: http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml

Figure 5.7 – Previous Mean Sea Level Trends for Fort Pulaski, GA

Since 1901, the average surface temperature across the contiguous 48 states has risen at an average rate of 0.14°F per decade. Average temperatures have risen more quickly since the late 1970s (0.29 to 0.46°F per decade since 1979). Nine of the top 10 warmest years on record for the contiguous 48 states have occurred since 1998, and 2016, 2015, and 2014 have been the three warmest years on record.

Worldwide, 2016 was the warmest year on record and 2007–2016 was the warmest decade on record since thermometer-based observations began. Global average surface temperature has risen at an average rate of 0.15°F per decade since 1901, similar to the rate of warming within the contiguous 48 states. Since the late 1970s, however, the United States has warmed faster than the global rate.

Figure 5.8, based on data from NOAA and prepared by the EPA, shows how annual average air temperatures have changed in different parts of the United States since 1901.

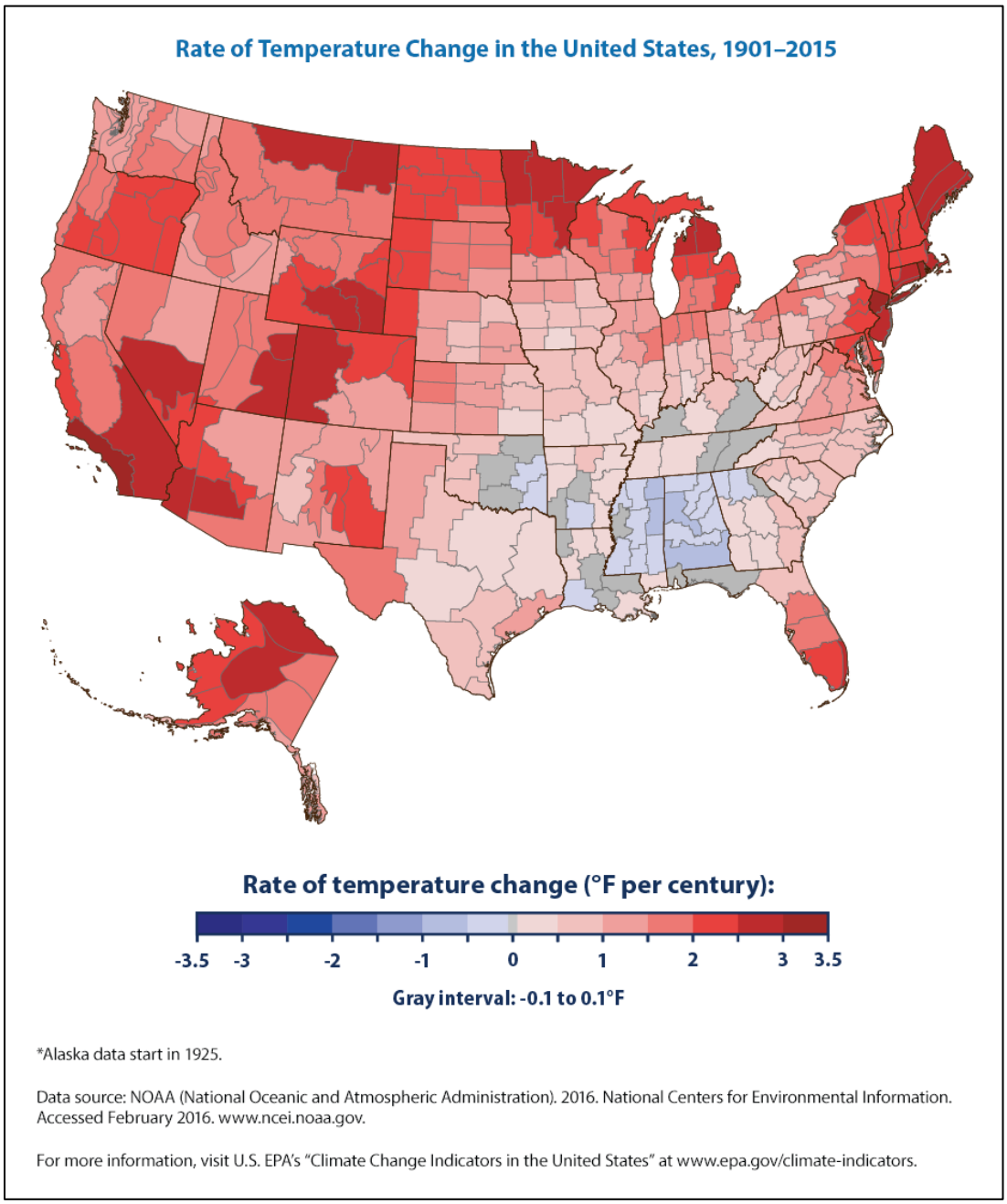


Figure 5.8 – Temperature Change in the United States, 1901-2015

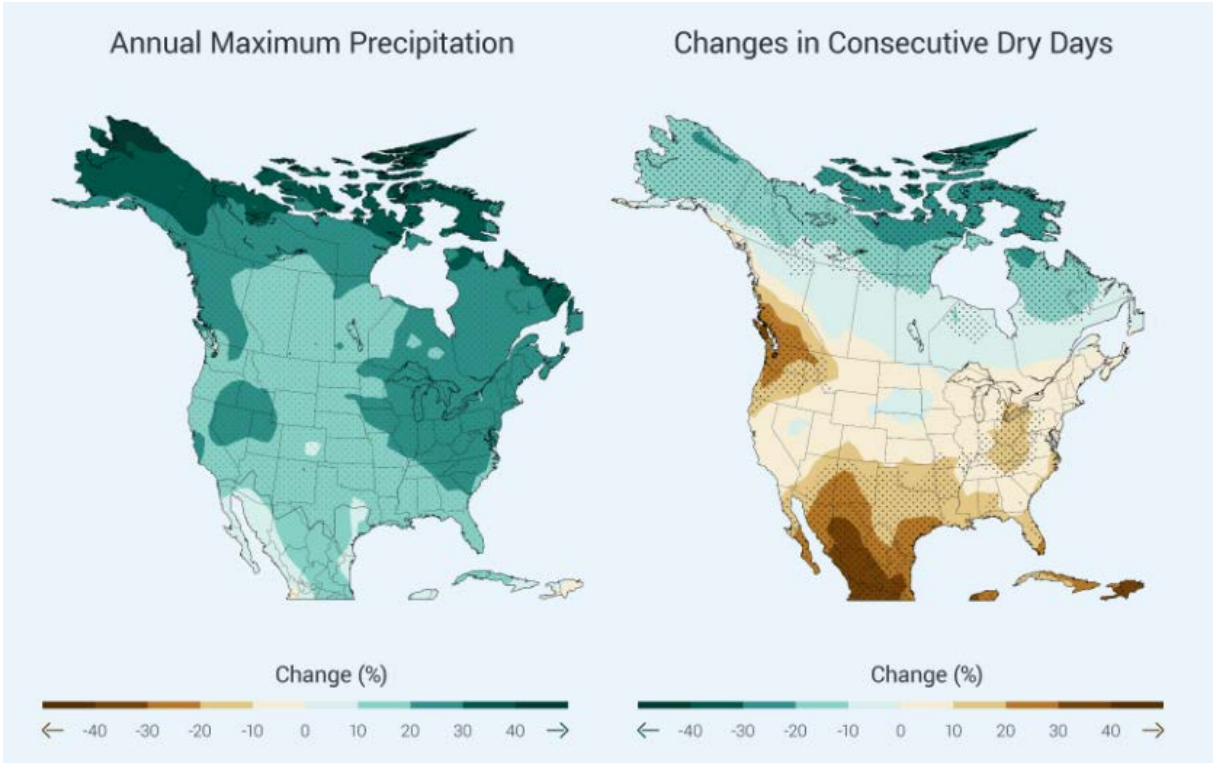
According to the 2014 National Climate Assessment, average annual precipitation in the U.S. has increased by 5% since 1900. However, there is significant regional variability in these changes. The southeastern U.S. has experienced changes in the frequency and intensity of rainfall, with a 27% increase in very heavy precipitation events. Recent increases in hurricane frequency and intensity have also been recorded as a result of increased sea surface temperature.

Probability of Future Occurrence

Highly Likely – Under current climate change models, changes in global temperatures, hydrologic cycles, and storm frequency and intensity are expected to continue. Current science projects that the southeastern United States could experience a general increase in average temperatures anywhere from 4.5°F to 9°F in the coming century (Karl et al, 111).

With continued high emissions, annual consecutive dry days are expected to increase in the southeastern U.S. in 2070-2099 compared to 1971-2000, as shown in Figure 5.95. Along with this increase in consecutive dry days, drought is also expected to increase over most of the southern U.S. Annual maximum precipitation may increase or may remain constant, but precipitation is more likely to occur in fewer overall days, meaning heavy rain events are expected to increase. However, rainfall may also increase as a result of increased hurricane activity. The overall number of hurricanes is projected to decline slightly, but the number of strong storms (Category 4 and 5) is expected to increase. Additionally, hurricane precipitation rates are expected to increase by up to 20%. The combination of higher temperatures and increased heavy precipitation events suggests that the likelihood of flood events may increase as a result of climate change.

Additionally, sea level rise rates are expected to continue to increase. According to tools and analysis from Climate Central, NOAA's 2017 intermediate sea level rise scenario predicts 4.1 feet of sea level rise compared to a 1992 baseline by year 2100. Similarly, the 2012-2014 National Climate Assessment intermediate scenarios range from 2.1 to 4.2 feet of sea level rise by 2100.



Source: National Climate Assessment, 2014

Figure 5.9 – Precipitation Change Projections for 2070-2099

Physical Vulnerability

Probability	Impact	Spatial Extent	Warning Time	Duration
Highly Likely	Minor	Moderate	> 24 hours	> 1 week

Chatham County is highly vulnerable to the potential impacts of climate change and sea level rise. Climate-driven hazards such as hurricanes and flooding are likely to increase in intensity, and possibly frequency, in the future. Thus the 25-year flood of today may become the 10-year event in the future. The reader should refer to the vulnerability assessment discussions on Flood, Erosion, and Hurricane for the current exposure and risk to these hazards with the perspective that climate change has the potential to exacerbate the existing risk and vulnerabilities. The potential impacts of climate change include increased flooding frequency, potential damage to critical infrastructure, and increasing public costs associated with flood insurance claims, infrastructure repair and maintenance, environmental impacts, and emergency management efforts.

5.2 DAM/LEVEE FAILURE

Hazard Description

Dam Failure

A dam is a barrier constructed across a watercourse that stores, controls, or diverts water. Dams are usually constructed of earth, rock, or concrete. The water impounded behind a dam is referred to as the reservoir and is measured in acre-feet. One acre-foot is the volume of water that covers one acre of land to a depth of one foot. Dams can benefit farm land, provide recreation areas, generate electrical power, and help control erosion and flooding issues.

A dam failure is the collapse or breach of a dam that causes downstream flooding. Dam failures may be caused by natural events, human-caused events, or a combination. Due to the lack of advance warning, failures resulting from natural events, such as hurricanes, earthquakes, or landslides, may be particularly severe. Prolonged rainfall and subsequent flooding is the most common cause of dam failure.

Dam failures usually occur when the spillway capacity is inadequate and water overtops the dam or when internal erosion in dam foundation occurs (also known as piping). If internal erosion or overtopping cause a full structural breach, a high-velocity, debris-laden wall of water is released and rushes downstream, damaging or destroying anything in its path. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can result from any one or a combination of the following:

- Prolonged periods of rainfall and flooding;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross-section of the dam and abutments, or maintain gates, valves, and other operational components;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including the failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway; and
- High winds, which can cause significant wave action and result in substantial erosion.

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major casualties and loss of life could result, as well as water quality and health issues. Potentially catastrophic effects to roads, bridges, and homes are also of major concern. Associated water quality and health concerns could also be issues. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

Each state has definitions and methods to determine the Hazard Potential of a dam. In Georgia, dams are recognized by the state if they are 25 feet or more in height or impound 100 acre-feet or more. The height of a dam is from the highest point on the crest of the dam to the lowest point on the downstream toe, and the storage capacity is the volume impounded at the elevation of the highest point on the crest of the dam. A dam is regulated only if it is deemed that its failure would result in loss of human life.

Georgia Safe Dams Program engineers determine the "hazard potential" of a dam, meaning the probable damage that would occur if the structure failed, in terms of loss of human life. Dams are assigned one of two categories based on the nature of their hazard potential:

1. Category II (Low Hazard) includes dams located where failure will not cause loss of human life.
2. Category I (High Hazard) includes dams located where failure will likely cause loss of human life.

Category I dams are then further classified by their size with corresponding minimum spillway design requirements expressed in terms of probable maximum precipitation (PMP), as follows:

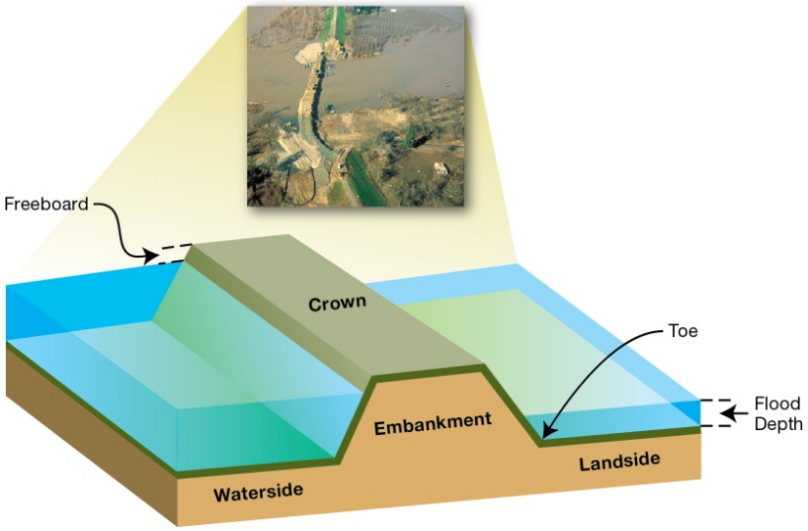
- Small: 25% PMP
- Medium: 33.3% PMP
- Large: 50% PMP
- Very Large: 100% PMP

Category I dams are assessed bi-annually by Georgia Environmental Protection Division staff and quarterly by their owners to ensure safety and compliance with regulations. Category II dams are reevaluated every 5 years for any hazard potential. The Safe Dams Program notes that there is a significant backlog in work which means many Category II and proposed dams throughout the state need further study.

Levee Failure

FEMA defines a levee as “a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water in order to reduce the risk from temporary flooding.” Levee systems consist of levees, floodwalls, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices. Levees often have “interior drainage” systems that work in conjunction with the levees to take water from the landward side to the water side. An interior drainage system may include culverts, canals, ditches, storm sewers, and/or pumps.

Levees and floodwalls are constructed from the earth, compacted soil or artificial materials, such as concrete or steel. To protect against erosion and scouring, earthen levees can be covered with grass and gravel or hard surfaces like stone, asphalt, or concrete. Levees and floodwalls are typically built parallel to a waterway, most often a river, in order to reduce the risk of flooding to the area behind it. Figure 5.10 shows the components of a typical levee.



Source: FEMA, *What is a Levee Fact Sheet*, August 2011

Figure 5.10 – Components of a Typical Levee

Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events. Levees reduce, not eliminate, the risk to individuals and structures behind them. A levee system failure or overtopping can create severe flooding and high-water velocities. It is important to remember that no levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

Location / Spatial Extent

Table 5.1 provides details for four dams listed in the Georgia Safe Dams Program Inventory as of February 2017 that are located within Chatham County. None of these dams is considered a high hazard. Note that the Ottowa Farms Lake Dam is currently only proposed. In addition to these dams, the Army Corps of Engineers' National Inventory of Dams (NID) database identified two federally owned and operated dams located off stream and operated for fish and wildlife ponds, detailed in Table 5.2. Figure 5.11 on the following page reflects the location of these dams within the County.

Table 5.1 – Georgia Dam Inventory Listings for Chatham County, GA

Dam Name	NIDID	Owner	Height (Ft.)	NID Storage (acre-feet)	Primary Purpose	Hazard Category
Lake Mayer Dam	GA00927	Local Government	9	382	Recreation	II
Forest City Gun Club Lake Dam	GA00928	Private	10	273	Recreation	II
Proposed Ottowa Farms Lake Dam	GA04907	Private	8.5	144	n/a	II

Source: Georgia Dam Inventory, 2017

Table 5.2 – National Inventory of Dams Additional Listings for Chatham County, GA

Dam Name	NIDID	Owner	Height (Ft.)	NID Storage (acre-feet)	Primary Purpose	Hazard Category
Pond 29	GA82309	Federal	19	71	Recreation, Fish & Wildlife Pond	n/a
Pond 24	GA82208	Federal	26	45	Recreation, Fish & Wildlife Pond	n/a

Source: National Inventory of Dams, July 2017

Source: National Inventory of Dams, July 2017
Note: Location of proposed dam in an approximation

Figure 5.11 – Location of Dams in Chatham County, GA

The U.S. Army Corps of Engineers National Levee Database (NLD) does not identify any levees within Chatham County.

Past Occurrences

There are no past reported dam breaches or levee failures within Chatham County.

Probability of Future Occurrence

Unlikely – There are three low hazard dams within Chatham County that could impact the County, but a flooding hazard from future dam failure is unlikely. However, regular monitoring is still necessary to prevent these events from occurring. There are no significant levees located within the County.

Climate Change and Dam Failure

Studies have been conducted to investigate the impact of climate change scenarios on dam safety. Dam failure is already tied to flooding and the increased pressure flooding places on dams. Climate change impacts on dam failure will most likely be those related to changes in precipitation and flood likelihood. Climate change projections suggest that precipitation may increase and occur in more extreme events, which may increase risk of flooding, putting stress on dams and increasing likelihood of dam failure. The

safety of dams for the future climate can be based on an evaluation of changes in design floods and the freeboard available to accommodate an increase in flood levels. The results from the studies indicate that the design floods with the corresponding outflow floods and flood water levels will increase in the future, and this increase will affect the safety of the dams in the future. Studies concluded that the total hydrological failure probability of a dam will increase in the future climate and that the extent and depth of flood waters will increase by the future dam break scenario (Chernet, 2013).

Vulnerability

Probability	Impact	Spatial Extent	Warning Time	Duration
Unlikely	Minor	Negligible	< 6 hours	< 6 hours

The 2014 Georgia Infrastructure Report Card prepared by ASCE, gave Georgia dams a grade of D- for a low level of staff and funding as well as an increase in regulated dams and a high percentage of high-hazard dams considered deficient. This report indicates a high level of vulnerability in the State to dam failure. However, given the location and size of dams in Chatham County and its nearby upstream areas, the County's vulnerability to flooding from dam failure or overtopping is very low.

5.3 FLOOD: 100-/500-YEAR

Hazard Description

Flooding is defined by the rising and overflowing of a body of water onto normally dry land. As defined by FEMA, a flood is a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties. Flooding can result from an overflow of inland waters or an unusual accumulation or runoff of surface waters from any source.

Certain health hazards are also common to flood events. While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where farm animals are kept or their wastes are stored can contribute polluted waters to the receiving streams.

Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as e.coli and other disease causing agents.

The second type of health problem arises after most of the water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If the County's water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and personal belongings destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term

problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

Sources and Types of Flooding

Flooding within Chatham County can be attributed to three main sources as noted below. Due to its low-lying coastal setting, flooding can occur anywhere in the County.

Coastal Tidal Flooding: All lands bordering the coast along the Atlantic Ocean and in low-lying coastal plains are susceptible to tidal effects and flooding. Coastal land such as sand bars, barrier islands and deltas provide a buffer zone to help protect human life and real property relative to the sea much as flood plains provide a buffer zone along rivers and other bodies of water. Coastal floods usually occur because of abnormally high tides or tidal waves, storm surge and heavy rains in combination with high tides, tropical storms and hurricanes. As noted in the 2014 Flood Insurance Study (FIS) report, Chatham County is particularly susceptible to coastal flooding due to "its openness to Atlantic Ocean surges and unfavorable bathymetry extending offshore. Many of the large streams near the coast have wide mouths and are bordered by extensive areas of low marsh. In addition, the terrain at the coast is generally too low to provide an effective barrier, and the offshore ocean depths are shallow for great distances, generating a high Atlantic Ocean surge."

***Riverine Flooding*:** Chatham County has numerous rivers and canals running throughout its jurisdiction that are susceptible to overflowing their banks during and following excessive precipitation events. While flash flooding caused by surface water runoff is not uncommon in Chatham County, riverine flood events (such as the "100-year flood") will cause significantly more damage and economic disruption for the area. Chatham County's Effective FIRM is dated July 7, 2014. The Savannah River and the Ogeechee River, along with their many tributaries, are the primary riverine flood sources in the County. The 2014 FIS notes that "the Savannah River (northern boundary) and the Ogeechee River (southern boundary) have drainage areas extending far beyond the limits of Chatham County. Other streams have chiefly tidal estuaries within the county and include the Little Ogeechee River, Vernon River, Bear River, Wilmington River, Bull River, and numerous tributaries to these. Main openings to the Atlantic Ocean are Ossabaw Sound and Wassaw Sound, both of which are wide and deep. Much of the land situated in the floodplain is undeveloped marshland, with some residential, commercial, and industrial development."

***Flash or Rapid Flooding*:** Flash flooding is the result of heavy, localized rainfall, possibly from slow-moving intense thunderstorms that cause small streams and drainage systems to overflow. Flash flood hazards caused by surface water runoff are most common in urbanized cities, where greater population density generally equates to more impervious surface (e.g., pavement and buildings) which increases the amount of surface water generated. Flooding can occur when the capacity of the stormwater system is exceeded or if conveyance is obstructed by debris, sediment and other materials that limit the volume of drainage.

Flooding and Floodplains

In the case of riverine flooding, the area adjacent to a channel is the floodplain, as shown in Figure 5.12. A floodplain is flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current. Floodplains are made when floodwaters exceed the capacity of the main channel or escape the channel by eroding its banks. When this occurs, sediments (including rocks and debris) are deposited that gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream.

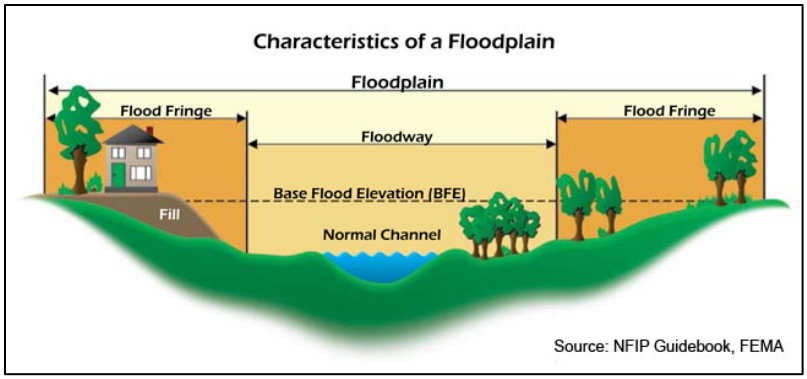
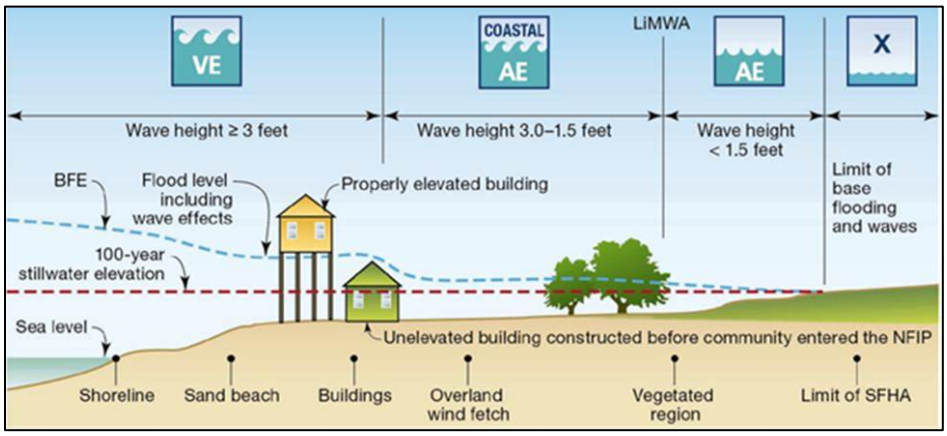


Figure 5.12 – Characteristics of a Floodplain

In coastal areas, flooding occurs due to high tides, tidal waves, storm surge, or heavy rains in combination with these other sources. In these areas, flood hazards typically include the added risk of wave action delineated by the VE Zone and Coastal AE Zone. Wave height and intensity decreases as floodwaters move inland. Figure 5.13 shows the typical coastal floodplain and the breakdown of flood zones in these settings. These flood zones are discussed further in Table 5.3.



Source: FEMA

Figure 5.13 – Characteristics of a Coastal Floodplain

In its common usage, the floodplain most often refers to that area that is inundated by the "100-year flood," which is the flood that has a 1% chance in any given year of being equaled or exceeded. The 500-year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

The 100-year flood, which is the minimum standard used by most federal and state agencies, is used by the NFIP as the standard for floodplain management and to determine the need for flood insurance. Participation in the NFIP requires adoption and enforcement of a local floodplain management ordinance which is intended to prevent unsafe development in the floodplain, thereby reducing future flood damages. Participation in the NFIP allows for the federal government to make flood insurance available within the community as a financial protection against flood losses. Since floods have an annual probability of occurrence, have a known magnitude, depth and velocity for each event, and in most cases, have a map indicating where they will occur, they are in many ways often the most predictable and manageable hazard.

Regulated floodplains are illustrated on inundation maps called Flood Insurance Rate Maps (FIRMs). It is the official map for a community on which FEMA has delineated both the SFHAs and the risk premium zones applicable to the community. SFHAs represent the areas subject to inundation by the 100-year flood event. Structures located within the SFHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage. Flood prone areas were identified within Chatham County using the Effective FIRMs. Table 5.3 summarizes the flood insurance zones identified by the DFIRMs.

Table 5.3 – Mapped Flood Insurance Zones within Chatham County, GA

Zone	Description
VE	Also known as the coastal high hazard areas. They are areas subject to high velocity water including waves; they are defined by the 1% annual chance (base) flood limits (also known as the 100-year flood) and wave effects 3 feet or greater. The hazard zone is mapped with base flood elevations (BFEs) that reflect the combined influence of stillwater flood elevations, primary frontal dunes, and wave effects 3 feet or greater.
AE	AE Zones, also within the 100-year flood limits, are defined with BFEs that reflect the combined influence of stillwater flood elevations and wave effects less than 3 feet. The AE Zone generally extends from the landward VE zone limit to the limits of the 100-year flood from coastal sources, or until it reaches the confluence with riverine flood sources. The AE Zones also depict the SFHA due to riverine flood sources, but instead of being subdivided into separate zones of differing BFEs with possible wave effects added, they represent the flood profile determined by hydrologic and hydraulic investigations and have no wave effects. The Coastal AE Zone is differentiated from the AE Zone by the Limit of Moderate Wave Action (LiMWA), and includes areas susceptible to wave action between 1.5 to 3 feet.
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.
0.2% Annual Chance (shaded Zone X)	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
Zone X (unshaded)	Minimal risk areas outside the 1-percent and .2-percent-annual-chance floodplains. No BFEs or base flood depths are shown within these zones. Zone X (unshaded) is used on new and revised maps in place of Zone C.

Location / Spatial Extent

Figure 5.14 reflects the effective mapped flood insurance zones for Chatham County. Approximately 76% of the County's unincorporated areas fall within the SFHA. Table 5.4 below summarizes acreage of land area and water area by flood zone on the effective and preliminary maps.

Table 5.4 – Flood Zone Acreage in Chatham County

Jurisdiction	Flood Zone Acreage							
	Zone A	Zone AE	Zone A99	Zone VE	Open Water (100-year)	Zone X Shaded (500-year)	Zone X Unshaded	Total
Unincorporated Chatham County	559.78	64,892.65	3,030.79	73,540.53	8,693.09	9,043.57	26,302.39	186,062.80

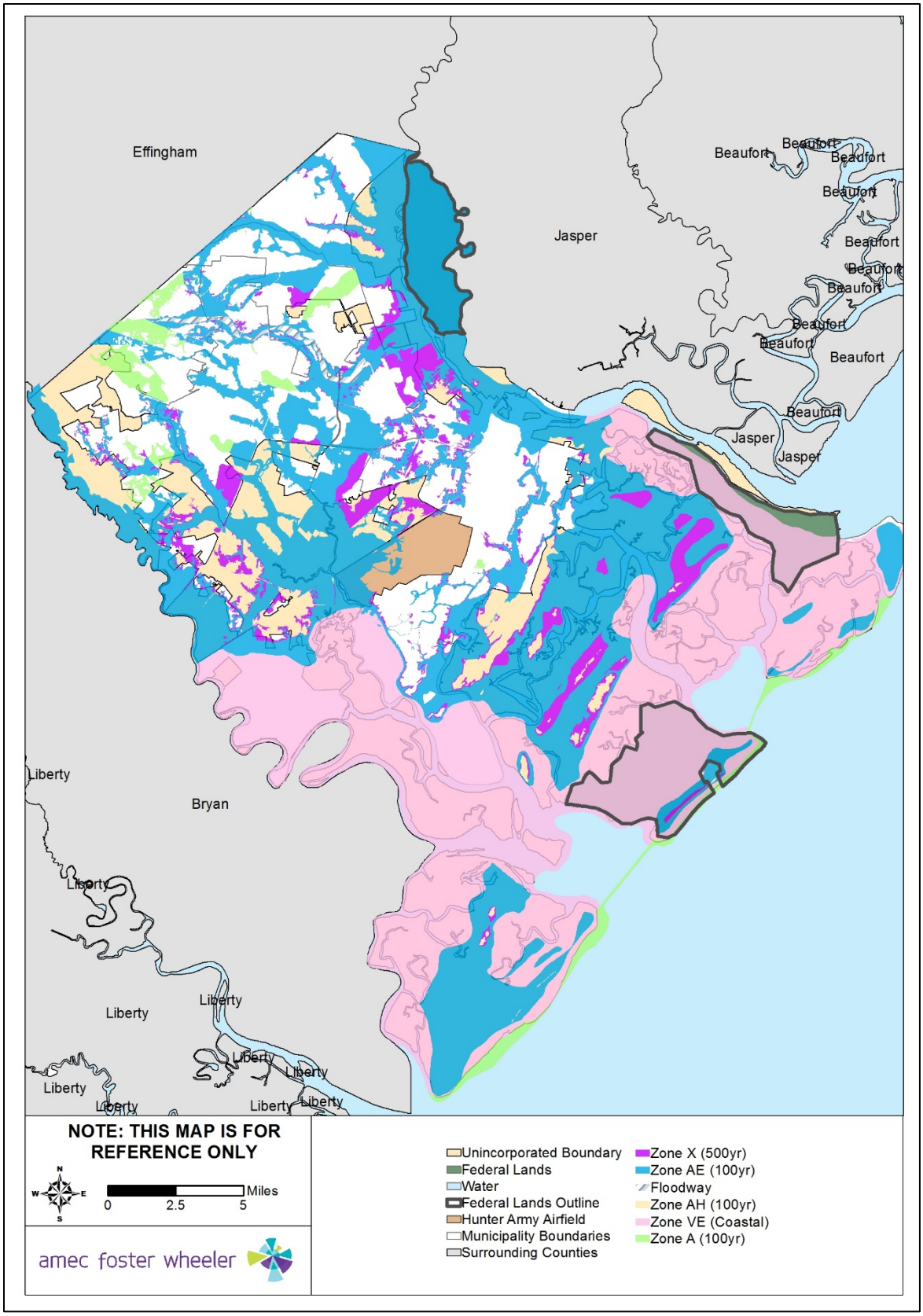


Figure 5.14 – Chatham County Effective DFIRM Flood Zones

The NFIP utilizes the 100-year flood as a basis for floodplain management. The Flood Insurance Study (FIS) defines the probability of flooding as flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 100-year period (recurrence intervals). Or considered another way, properties within a 100-year flood zone have a one percent probability of being equaled or exceeded during any given year. Mortgage lenders require that owners of properties with federally-backed mortgages located within SFHAs purchase and maintain flood insurance policies on their properties. Consequently, newer and recently purchased properties in the community are typically insured against flooding.

Past Occurrences

Table 5.5 shows detail for flood events reported by the NCEI since 1996 for Chatham County.

Table 5.5 – NCEI Flooding in Chatham County – January 1996 to March 2017

Location	Date	Event Type	Injuries /Deaths	Property Damage	Crop Damage
COASTAL CHATHAM (ZONE)	9/30/2007	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	6/22/2009	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	6/23/2009	Coastal Flood	0/0	$25,000	$0
COASTAL CHATHAM (ZONE)	1/30/2010	Coastal Flood	0/0	$15,000	$0
COASTAL CHATHAM (ZONE)	5/7/2012	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	6/5/2012	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	6/6/2012	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	8/19/2013	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	9/28/2015	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	9/29/2015	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	9/30/2015	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	10/27/2015	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	10/28/2015	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	11/25/2015	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	11/26/2015	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	10/17/2016	Coastal Flood	0/0	$0	$0
COASTAL CHATHAM (ZONE)	11/13/2016	Coastal Flood	0/0	$0	$0
WALTON (ZONE)	9/7/2004	Flood	0/0	$0	$0
WALTON (ZONE)	7/11/2005	Flood	0/0	$0	$0
WALTON (ZONE)	3/1/2001	Heavy Rain	0/0	$0	$0
WALTON (ZONE)	10/6/2002	Heavy Rain	0/0	$0	$0
CHATHAM CO.	6/23/2014	Heavy Rain	0/0	$0	$0
		Total	**0/0**	**$40,000**	**$0**

Source: NCEI, July 2017

The following provides details on select flood events recorded in the NCEI database as well as other known flood events that have occurred in Chatham County. These scenarios represent the types of flood events that can be expected in the future in the Chatham County.

July 5, 1996 – Eight to ten (8-10) inches of rain fell in 3-4 hours in and around Savannah. As a result, 50 streets and 100 homes were flooded to various degrees. Numerous businesses had water several inches deep. There were 31,000 residents without power for several hours. This event also occurred close to high tide. Some streets had water up to headlights on cars while some homes had water almost knee deep. Several car dealerships had significant damage to some cars. Two elderly men barely escaped with their lives when their car stalled. By the time they were rescued, water was within six (6) inches of filling the inside of the car.

August 7, 1996 – Four to eight inches of rain fell in two to four hours causing flash flooding of streets and small streams in Savannah.

June 29, 1999 – Slow moving showers and thunderstorms developed repeatedly across Chatham County and Effingham County during the day. Twenty-four hour rainfall amounts ranged from about 7 inches to over 13 inches. As a result of the flooding, over 500 homes and businesses were damaged to varying degrees and almost 600 automobiles were damaged. Water was as much as 6 ft deep in some places. Numerous roads were washed out and/or closed during the flooding. Estimated dollar damage for public property was 4.5 million dollars and at least another 2.5 million dollars for private property.

July 30, 2007 – Numerous road closures were reported in Downtown Savannah. High water was reported entering some apartments. Cars floating down the roadway at 65th and Abercorn Street.

June 22, 2009 – Anomalously high Perigean Spring Tides resulted in significant coastal flooding along the Georgia coast. The Chatham County Emergency Manager reported numerous yards flooded in Wilmington Island and Burnside areas of the County. Highway 80 was severely flooded between Bull Street and Tybee Island. Law Enforcement reported flooding on 5th Avenue, 10th Street, 14th Street, and the intersection of 6th Street and Lewis Avenue in Savannah.

January 30, 2010 – The combination of astronomical high tides and strong easterly winds due to strong high pressure north of the region and strong low pressure to the south, resulted in coastal flooding along the Georgia coast. The Tybee Island, Georgia Police reported that Highway 80 between Savannah and Tybee Island was flooded for around 20 to 30 minutes near the time of high tide Saturday morning. One lane was closed in various sections due to salt water flooding. Two cars were stuck in the flooding and it took about an hour to remove both vehicles. Several properties on Tybee Island, mainly on 6th Street were also flooded as waters rose from nearby creeks. The Fort Pulaski tide gauge peaked at 9.95 feet mean lower low water at 8:06 am.

June 23, 2014 – A line of stationary thunderstorms produced between 4-10 inches of rain across Chatham County, which resulted in flash flooding. KSAV observed the wettest June day on record since observations began in 1871. A trained spotter measured 4.75 inches of rainfall in under two hours. The Savannah Airport ASOS measured 6.65 inches of rainfall for the day.

October 27, 2015 – A combination of persistent and strong east/northeast winds, the Perigean spring tide and a full moon produced 2 days of elevated high tide cycles along the southeast Georgia coast. Major coastal flood stage levels were recorded at the Fort Pulaski, GA (FPKG1) tide gauge on Oct 27, 2015, which claimed 3rd place on the all-time historic crest list with a high tide of 10.43 feet mean lower low water. Moderate coastal flood stage levels were also recorded at the Fort Pulaski, GA (FPKG1) tide gauge on Oct 28, 2015, which claimed 9th place on the all-time historic crest list. Roads reported closed included Highway 80 between Savannah and Tybee Island; Shipyard Road to Burnside Island; La Roche Avenue near Norwood Avenue and Raleigh Drive; Barley Drive near the Islands Expressway; the road to Elba Island; Jones Avenue, 6th Avenue, 10th Street, Chatham Avenue and Lewis Avenue in Tybee Island; Mercer Road; Whippoorwill Road and Bobwhite Road on Wilmington Island; and Catalina Boulevard leading to Spanish Hammock Island.

November 13, 2016 – A combination of astronomical and meteorological influences resulted in a very high high tide cycle along the southeast Georgia coast. A full moon and the annual proxigee produced an elevated astronomical influence and elevated northeast winds further locally enhanced the tide. The result was a high tide measured at Fort Pulaski, GA that ranked in the top 10 highest on record, at 10.05 feet above Mean Lower Low Water.

Probability of Future Occurrence

Possible – By definition of the 100-year flood event, SFHAs are defined as those areas that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. Properties located in these areas have a 26 percent chance of flooding over the life of a 30-year mortgage.

Climate Change and Flooding

It is likely (66-100% probability) that the frequency of heavy precipitation or the proportion of total rainfall from heavy falls will increase in the 21st century across the globe. More specifically, it is "very likely" (90-100% probability) that most areas of the United States will exhibit an increase of at least 5% in the maximum 5-day precipitation by late 21st century. The mean change in the annual number of days with rainfall over 1 inch for the Southeastern United States is 0.5 to 1.5 days. As the number of heavy rain events increase, more flooding and pooling water can be expected (Romero-Lankao, et.al 2014).

Vulnerability

Probability	Impact	Spatial Extent	Warning Time	Duration
Possible	Limited	Moderate	6 to 12 hours	< 1 week

Flood damage is directly related to the depth of flooding by the application of a depth damage curve. In applying the curve, a specific depth of water translates to a specific percent damage to the structure, which translates to the same percentage of the structure's replacement value. Figure 5.15 depicts the depth of flooding that can be expected within the County during the 100-year flood event based on the July 7, 2014 Effective DFIRM.

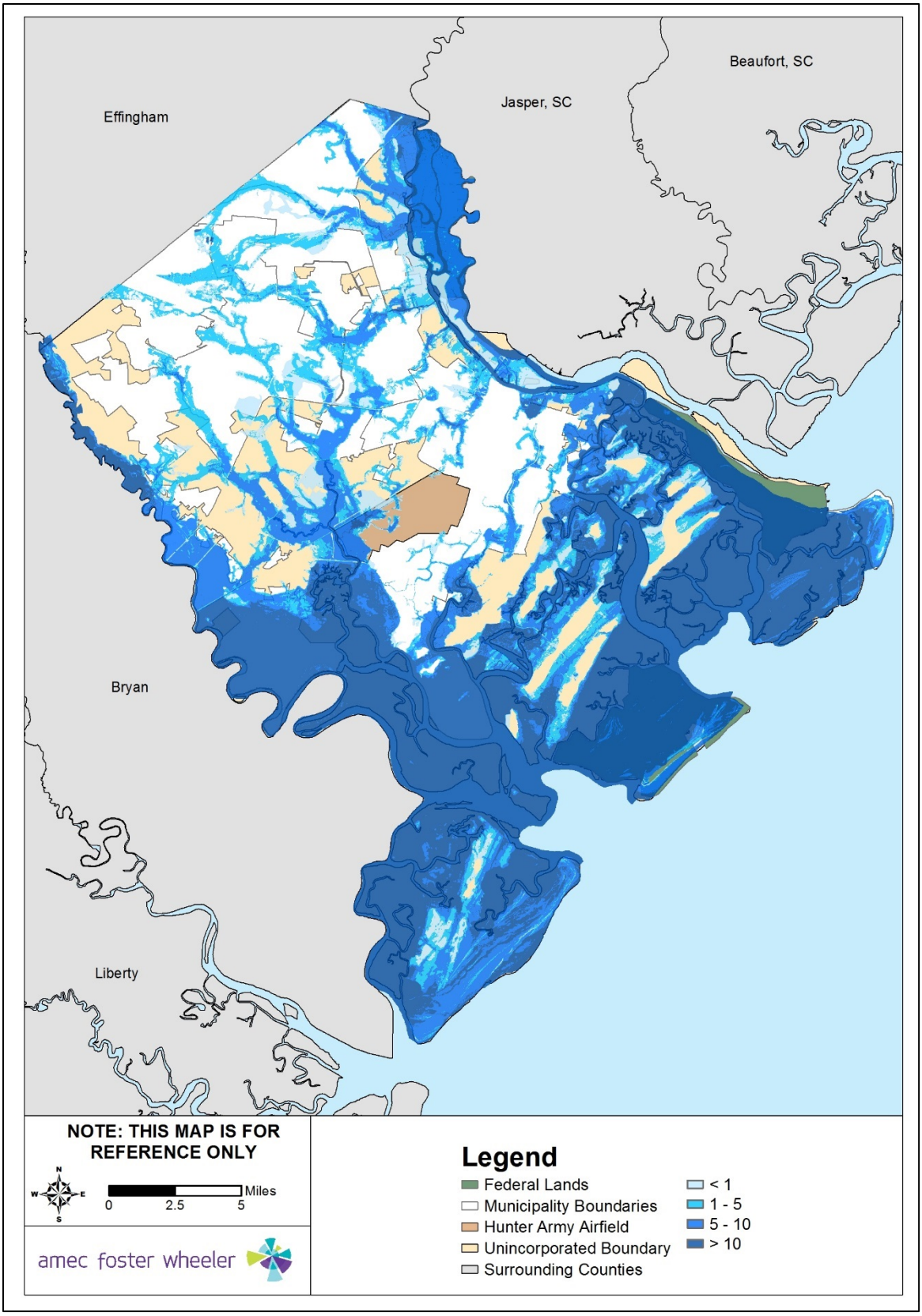
A flood risk assessment for Chatham County was performed using FEMA's Hazus tool. Building counts by FEMA flood zone were determined using a spatial intersection of the Effective FEMA flood zones and building footprints provided by the Chatham County GIS Department. The land use codes provided in the Chatham County tax parcel data were translated into the following occupancy types which are specific to FEMA's Hazus software: Agricultural, Commercial, Education, Government, Industrial, Religious and Residential. The occupancy types were standardized to ensure the correct depth damage factor was applied to each building based on its occupancy class, producing a more accurate damage assessment of the building.

Content value estimations are based on FEMA Hazus methodologies of estimating value as a percent of improved structure values by property type. Table 5.6 shows the breakdown of the different property types and their estimated content replacement value percentages.

Table 5.6 – Content Replacement Factors

Property Type	Content Replacement Values
Residential	50%
Commercial	100%
Education	100%
Government	100%
Religious	100%
Industrial	150%

Source: Hazus 2.1



Source: Depths derived from FEMA 2014 Effective DFIRM

Figure 5.15 – 100-yr Effective Flood Depths for Chatham County

Property at Risk

The loss estimate for flood is based on the total of improved building value and contents value. Land value is not included in any of the loss estimates as generally the land is not subject to loss from floods. Once the potential value of affected parcels was calculated, damage factors were applied to obtain loss estimates by flood zone.

Properties at risk are detailed by flood zone in Table 5.7, below. Building footprint data was used to provide an accurate assessment of how many buildings are located in hazard areas.

Table 5.7 – Properties at Risk by Flood Zone

Occupancy Type	Total Number of Buildings	Total Building Value	Estimated Content Value	Total Value
Zone A				
Agricultural	0	$0	$0	$0
Commercial	0	$0	$0	$0
Education	0	$0	$0	$0
Government	0	$0	$0	$0
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	4	$1,020,366	$510,183	$1,530,549
Total	**4**	**$1,020,366**	**$510,183**	**$1,530,549**
Zone AE				
Agricultural	97	$27,615,982	$27,615,982	$55,231,964
Commercial	1,005	$184,618,041	$184,618,041	$369,236,082
Education	63	$43,699,270	$43,699,270	$87,398,540
Government	0	$0	$0	$0
Industrial	1,128	$309,721,728	$464,582,592	$774,304,320
Religious	0	$0	$0	$0
Residential	11,734	$2,420,100,851	$1,210,050,425	$3,630,151,276
Total	**14,027**	**$2,985,755,872**	**$1,930,566,310**	**$4,916,322,182**
Zone VE				
Agricultural	26	$3,089,000	$3,089,000	$6,178,000
Commercial	1	$5,656	$5,656	$11,313
Education	0	$0	$0	$0
Government	0	$0	$0	$0
Industrial	14	$471,315	$706,973	$1,178,288
Religious	0	$0	$0	$0
Residential	413	$82,143,258	$41,071,629	$123,214,887
Total	**454**	**$85,709,230**	**$44,873,258**	**$130,582,488**
Zone X (500-year)				
Agricultural	19	$2,928,616	$2,928,616	$5,857,232
Commercial	329	$113,714,304	$113,714,304	$227,428,608
Education	12	$5,303,850	$5,303,850	$10,607,700
Government	2	$0	$0	$0
Industrial	631	$148,335,477	$222,503,216	$370,838,693
Religious	1	$4,256,625	$4,256,625	$8,513,250
Residential	7302	$1,321,526,269	$660,763,134	$1,982,289,403
Total	**8,296**	**$1,596,065,141**	**$1,009,469,745**	**$2,605,534,886**

Zone X (Unshaded)				
Agricultural	30	$4,233,883	$4,233,883	$8,467,766
Commercial	2,438	$712,346,959	$712,346,959	$1,424,693,918
Education	9	$1,097,300.00	$1,097,300	$2,194,600
Government	2	$0	$0	$0
Industrial	397	$975,160,495	$1,462,740,743	$2,437,901,238
Religious	17	$36,785,075	$36,785,075	$73,570,150
Residential	11,774	$1,391,106,756	$695,553,378	$2,086,660,134
Total	**14,667**	**$3,120,730,468**	**$2,912,757,338**	**$6,033,487,806.00**

Table 5.8 shows the building count, total value, estimated damages and loss ratio for buildings that fall within the 100-year floodplain of the Effective FIRM, detailed by land use type.

The loss ratio is the loss estimate divided by the total potential exposure (i.e., total of improved and contents value for all buildings located within the 100-year floodplain) and displayed as a percentage of loss. FEMA considers loss ratios greater than 10% to be significant and an indicator a community may have more difficulties recovering from a flood. Loss ratios for all occupancy types with identified structures in Chatham County are well above 10%, meaning that in the event of a flood with a magnitude of the 1%-annual-chance event or greater, the County would face extreme difficulty in recovery. Even smaller, more probabilistic floods may also result in the County having difficulty recovering.

Table 5.8 – Estimated Building Damage and Content Loss

Occupancy Type	Total Number of Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agricultural	73	$37,832,008	$2,937,363	$8,298,888	$11,236,251	29.7%
Commercial	542	$232,663,013	$8,284,789	$25,826,279	$34,111,068	14.7%
Education	56	$58,941,192	$2,401,055	$15,177,131	$17,578,186	29.8%
Government	0*	--	--	--	--	--
Industrial	715	$626,046,635	$27,695,636	$55,716,850	$83,412,486	13.3%
Religious	0*	--	--	--	--	--
Residential	7078	$2,338,943,317	$400,112,028	$218,105,946	$618,217,974.00	26.4%
Total	**8464**	**$3,294,426,165**	**$441,430,871**	**$323,125,094**	**$764,555,965**	**23.2%**

Source: Hazus v.2, FEMA 2014 Effective DFIRM

*All Religious and Government buildings identified in this analysis are located outside the 1%-annual-chance floodplain modeled for losses.

Population at Risk

A separate analysis was performed to determine the population at risk in each FEMA flood zone. Using GIS, the DFIRM flood zones were intersected with the building footprint layer. Those residential buildings that intersected the flood zones were counted and multiplied by a household factor for Chatham County of 2.55. This household factor was derived from a weighted average of the 2011-2015 American Community Survey's average household size for owner- and renter-occupied housing. The resulting estimates of population at risk are shown in Table 5.9.

Table 5.9 – Chatham County Population at Risk to Flood

Flood Zone	Residential Property Count	Population at Risk
Zone VE	413	1,053
Zone AE	11,734	29,922
Zone A	4	10
Zone X (500-yr)	7,302	18,620
Zone X (unshaded)	11,744	29,947
Total	**31,225**	**79,552**

Source: FEMA, U.S. Census Bureau 5-year Community Survey (2011-2015)

Critical Facilities at Risk

A separate analysis was performed to determine critical facilities located in the 100- and 500-year floodplains. Using GIS, the DFIRM flood zones were overlaid on the critical facility location data. Critical facilities are detailed by facility type and flood zone in Table 5.10. Figure 5.16 depicts the location of these critical facilities relative to flood zones for the Effective FIRM.

Table 5.10 – Critical Facilities by Flood Zone

Facility Name	Location	Facility Type	Estimated 100-yr Flood Depth (Ft)
Zone AE			
Booster Station	Lathrop Ave	Water	1.96
COLONIAL OIL GROUP	101 N LATHROP	Hazmat	4.93
County Causton Mechanical Bri	Hwy 80 East	Transportation	17.18
County Lift Station	Rice Mill	Water	2.13
County Lift Station	3 Paxton	Water	4.88
County Lift Station	Central	Water	2.25
County Lift Station	Galebreak	Water	2.36
County Lift Station	Hopecrest	Water	1.91
County Lift Station	Modena Island	Water	1.39
County Lift Station	Salcedo	Water	-0.92
County Lift Station	Wylly Island	Water	3.47
County Skidaway Isl Draw Brid	Diamond Causeway	Transportation	15.31
County Water Well	Diamond Causweay	Water	-11.46
County Water Well	Kings Ferry	Water	4.10
Crawford Landing Airport	Crawford Landing	Transportation	3.30
Generator - Kayton Canal Water	Kayton Street Statio	Water	3.31
Oatland Island Education Cent	711 Sandtown Road	Cultural	7.02
Old Fort Jackson	1 Fort Jackson Rd.	Cultural	6.06
President St. WPCP	1400 President St.	Water	1.50
Pump Station #2	Coldstream Road	Water	0.47
Sav Lift Stations #012	Halcyon Bluff / Lavon Ave. & 8815 Whitfield Ave.	Water	6.12

Facility Name	Location	Facility Type	Estimated 100-yr Flood Depth (Ft)
Sav Lift Stations #037	Battery Point / 212 Stonebridge Ln. & Bobstay Ct.	Water	5.15
Sav Lift Stations #039	Wilmington Park / 1121 Wilmington Island Rd. & Devonshire Rd.	Water	3.95
Sav Lift Stations #043	Manchester / 110 Manchester Ct. & Wellington Ct.	Water	1.31
Sav Lift Stations #048	Piggly Wiggly / 100 Johnny Mercer Blvd. @ Wilm Townhouses	Water	6.11
Sav Lift Stations #058	Woodridge / 803Woodridge Dr. & Walthour Rd.	Water	1.73
Sav Lift Stations #070	Betz Creek / 2 Teakwood Dr. & Point Cove Rd.	Water	2.94
Sav Lift Stations #081	Ford's Point / Ford's Pointe @ Basin Rd.	Water	1.18
Sav Lift Stations #102	Bull River Shoals / Johnny Mercer @ 100 River Walk Dr.	Water	-2.33
Sav Lift Stations #103	Sheftall Landings / 2 Bradford Ct. @ Penn Waller	Water	5.97
Sav Lift Stations #105	Old Town / 101-L Brompton Rd. & Dorsey Ct.	Water	0.41
Sav Lift Stations #108	Village Green Lift Station - 599 King George Blvd. behind 210 Westminister	Water	0.87
Sav Lift Stations #109	Forest Cove / 105 Sea Ln. south of Mariner's Way	Water	0.40
Sav Lift Stations #110	Westwing Landing / 450 Johnny Mercer Blvd.	Water	9.09
Sav Lift Stations #117	Whitemarsh #2 / Johnny Mercer Blvd. behind 141 Summer Winds	Water	0.14
Sav Lift Stations #118	Long Point #1 / 205 Lyman Hall Rd. @ Grays Creek Dr.	Water	5.64
Sav Lift Stations #121	Dutch Island #1 / Behind 263 Meriweather Dr.	Water	7.33
Sav Lift Stations #126	Grove Point / Hwy. 204 @ 1499 Grove Point Rd.	Water	3.91
Sav Lift Stations #129	Windfield / 5707 LaRoche Ave. @ Windfield Dr.	Water	-7.60
Sav Lift Stations #134	Southbridge #1 / Wedgefield Crossing @ 415 Southbridge	Water	0.88
Sav Lift Stations #144	Marsh Harbor / 105 Marsh Harbor Dr.	Water	-0.15
Sav Lift Stations #146	Long Point #2 / Lyman Hall Rd. & Johnny Mercer	Water	-0.18
Sav Lift Stations #161	Wilmington Golf Course / 501 Wilmington Isl Rd.	Water	-2.21
Sav Lift Stations #162	Southbridge #2 / 105 Greenview Drive @ Southbridge Blvd.	Water	0.17
Sav Lift Stations #175	Village of Vallambrosa /	Water	3.61
Sav Lift Stations #180	Northport #2 / International Trade Pkwy. Georgia Ports	Water	-1.00
Sav Lift Stations #197	Rice Mill / 183 Rice Mill Rd.	Water	2.25
Sav Lift Stations #198	Wild Heron Villas / 240 Wild Heron Rd.	Water	1.06
Sav Well #20	Sapelo Rd. @ Pennwaller	Water	2.84
Sav Well #21	Wellington Cir. @ Millward Rd. 31410	Water	3.97
Sav Well #22	Wilmington Island Rd. @ Cromwell	Water	3.68
Sav Well #28	Bryan Wood Rd. @ Hwy 80	Water	-0.02
Sav Well #30	King George Blvd.14 Beaver Run Dr.	Water	2.17
Sav Well #32	Johnny Mercer Blvd. & Hwy 80	Water	0.28

Facility Name	Location	Facility Type	Estimated 100-yr Flood Depth (Ft)
Sav Well #33	401 Herb River Dr.	Water	2.37
Sav Well #39	Same as Site #28	Water	5.08
Savannah-Ogeechee Canal Society	681 Fort Argyle Rd.	Cultural	2.47
Skidaway Institute of Oceanography Library	10 Ocean Science Cir	Cultural	2.44
Southside Fire Dept Sta # 02	1831 East Montgomery Crossroads	Fire	-1.93
Southside Fire Dept Sta # 05	553 McWhorter Dr	Fire	-0.36
Southside Fire Dept Sta # 07	1440 Grove Point Rd	Fire	3.25
Southside Fire Dept Sta # 08	4800 US Hwy 80 East	Fire	-0.70
Storm Water Pump Station	President St	Water	3.55
Storm Water Pump Station	Fell St/Georgia Port	Water	14.06
University of Georgia - Skidaway Aquarium	20 & 30 Ocean Science Cir	Cultural	1.46
VOPAK Terminal	Brampton Rd	Hazmat	-0.30
Waste Water Mgmt Bldg	Agonic Road	Water	1.63
Water Tank	Sapelo Road - 500,000 Gallons	Water	4.49
Wormsloe State Historic Site	7601 Skidaway Rd.	Cultural	3.03
Zone A			
N/A	N/A	N/A	N/A
Zone VE			
County Water Well	Island Expressway	Water	9.88
Zone X Shaded (500-yr)			
Bethesda Museum	9520 Ferguson Ave.	Cultural	0
Islands Branch Library	125 Wilmington Island Rd.	Cultural	0
Southside Fire Dept Sta # 09	59 Log Landing Rd	Fire	0
Fire Station #15	740 Chevis Road	Fire	0
Isle of Hope Fire Station	409 Parkersburg Rd (Isle of Hope)	Fire	0
Southside Fire Dept Sta # 04	155 Wilmington Island Road	Fire	0
Southside Fire Dept Sta # 10	4501 Ogeechee Road	Fire	0
Wilmington Land Fill	Wilmington Island Road	Government	0
Frank G Murray Center	160 Whitemarsh Rd	Government	0
Police Precinct #5 (County)	54 Johnny Mercer Blvd	Police	0
Isle of Hope Elementary	100 Parkersburg Rd.	School	0
Howard Elementary	115 Wil. Island Rd.	School	0
Islands High	170 Whitmarsh Is. Rd	School	0
Marshpoint Elementary	135 Whitemarsh Isl R	School	0
Coastal Middle	4595 US 80 East	School	0

Facility Name	Location	Facility Type	Estimated 100-yr Flood Depth (Ft)
Sav Lift Stations #132	Mistwoode / 9312 Whitfield Ave. @ Mistwoode Lane	Water	0
County Lift Station	The Colony	Water	0
Sav Lift Stations #199	Habitat / 210 Habitat Dr.	Water	0
County Lift Station	21 Nancy Place	Water	0
County Lift Station	Marian Circle	Water	0
Sav Lift Stations #153	Lexington / Walthour Rd. @ Penn Waller 8 Ballastone	Water	0
Sav Well #34	840 Kolb Dr.	Water	0
Sav Lift Stations #130	Dutch Island #2 / 153 Dutch Island Dr. @ Meriweather Dr.	Water	0
Sav Lift Stations #157	Henderson Lake / Hwy. 17 @ Hwy 204 on Brown Thrush Rd	Water	0
Sav Lift Stations #069	Deerwood Lift Station / Can Station Deerwood Rd. & Cromwell Place	Water	0
Sav Well #38	Dutch Island Dr.@ Verdell Dr.	Water	0
Sav Well #24	Off Leaning Oaks Dr. (Cobb Rd. @ Pennwaller)	Water	0
Sav Lift Stations #124	Shell House Restaurant / 8 Gateway Blvd. & Hwy. 204	Water	0
Sav Lift Stations #112	Buccaneer Trace / 1 Lantern Lane @ Cromwell Rd.	Water	0
Sav Lift Stations #079	Brown Thrush / 300-P Brown Thrush Rd. @ Vahalla Dr.	Water	0
Sav Lift Stations #104	Oemler Loop / 604 Walthour Rd. @ Palmetto Cove Rd.	Water	0
Sav Lift Stations #038	Wilmington Park Islandwood / 29 Sapelo Rd. & Port Royal Dr.	Water	0
Sav Lift Stations #142	Crows Nest / 3-L Wilmington Island Rd. & Burns Lane	Water	0
County Well	Charlie Brooks Park	Water	0
Sav Well #25	Gamble Rd. @ Hwy 17	Water	0
Sav Lift Stations #119	Marshes / East US Hwy. 80 @ Johnny Mercer Blvd	Water	0
Sav Lift Stations #131	Whitemarsh #1 / 4777 East US Hwy 80 @ Johnny Mercer Dr.	Water	0
Sav Lift Stations #120	Sam's / 3609 Ogeechee Rd.	Water	0
County Lift Station	Runaway Point	Water	0
Sav Lift Stations #067	Southeastern Shipyard / Walstrom @ 42 Forbes	Water	0

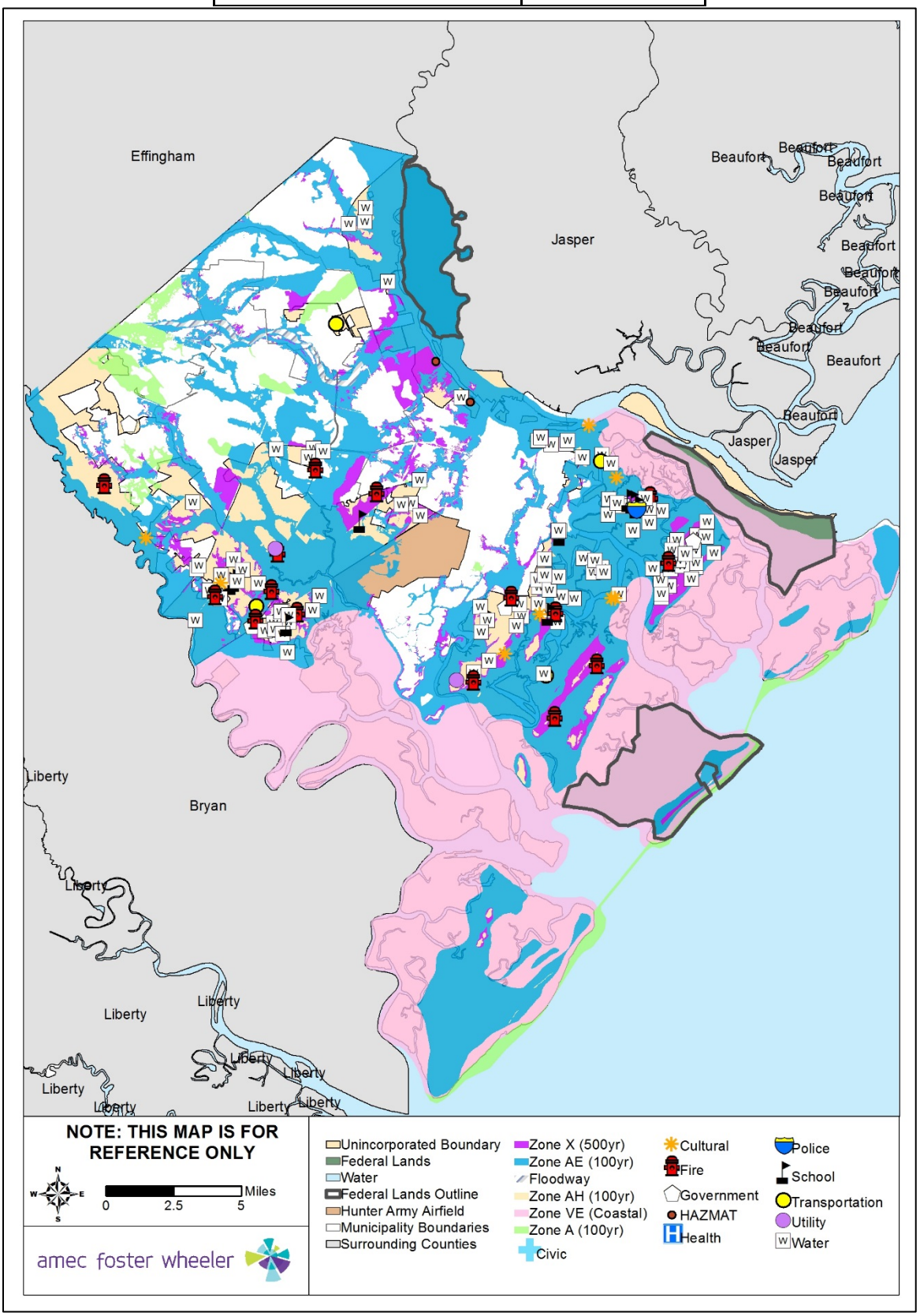
Source: Chatham County, FEMA 2014 Effective DFIRM

Critical facilities located in the Unshaded Zone X are summarize in Table below. No cultural, HAZMAT, or Police critical facilities are located in these areas.

Table 5.11 – Critical Facilities in Zone X Unshaded

Facility Type	Count
Fire	6
Government	3
School	6
Transportation	1
Utility	2

Water	33



Source: Chatham County, FEMA 2014 Effective DFIRM

Figure 5.16 – Critical Facilities and FEMA Flood Zones, Effective FIRM

Flood Insurance Analysis

One valuable source of information on flood hazards is current flood insurance data for active policies and past claims. Flood insurance is required as a condition of federal aid or a mortgage or loan that is federally insured for a building located in a FEMA flood zone.

Chatham County has been a Regular participant in the NFIP since August 1980 and a participant in the CRS program since October 2009. Participation in the NFIP's Community Rating System at a Class 9 or better rewards all policyholders in the County with percent reduction in their flood insurance premiums. Chatham County is currently a Class 6 community, which provides a 20% discount to policyholders in the SFHA. Table 5.12 through Table 5.15 reflect NFIP policy and claims data for the County categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table 5.12 – NFIP Policy and Claims Data by Occupancy Type – Chatham County

Occupancy	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	15,402	$11,078,385	$4,545,986,800	757	$9,398,374.52
2-4 Family	169	$78,305	$34,836,100	17	$105,998.89
All Other Residential	1,115	$388,635	$192,432,200	13	$428,844.33
Non-Residential	401	$657,619	$174,532,400	40	$1,322,462.17
Total	17,087	$12,202,944	$4,947,787,500	827	$11,255,678.00

Source: FEMA Community Information System as of 05/31/2017

Table 5.13 – NFIP Policy and Claims Data by Flood Zone – Chatham County

Flood Zone	Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	11,391	$9,249,167	$3,133,347,700	502	$7,158,535.05
A Zones	15	$17,752	$3,991,800	20	$312,398.47
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	159	$607,952	$42,551,400	5	$89,477.97
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone					
Standard	239	$323,848	$65,088,400	61	$767,912.29
Preferred	5,279	$2,001,825	$1,702,675,000	224	$2,880,651.62
Total	17,083	$12,200,544	$4,947,654,300	812	$11,208,973.00

Source: FEMA Community Information System as of 05/31/2017

Table 5.14 – NFIP Policy and Claims Data Pre-FIRM – Chatham County

Flood Zone	Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	2,607	$3,392,837	$677,711,400	332	$5,208,141.58
A Zones	5	$8,568	$1,374,200	20	$312,398.47
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00

Flood Zone	Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
V01-30 & VE Zones	46	$171,542	$10,543,200	2	$78,332.83
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone					
Standard	80	$116,291	$22,993,600	40	$431,698.13
Preferred	1,417	$535,995	$444,036,000	138	$1,814,444.95
Total	4,155	$4,225,233	$1,156,658,400	532	$7,845,014.00

Source: FEMA Community Information System as of 05/31/2017

Table 5.15 – NFIP Policy and Claims Data Post-FIRM – Chatham County

Flood Zone	Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	8,784	$5,856,330	$2,455,636,300	170	$1,950,393.47
A Zones	10	$9,184	$2,617,600	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	113	$436,410	$32,008,200	3	$11,145.14
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone					
Standard	159	$207,557	$42,094,800	21	$336,214.16
Preferred	3,862	$1,465,830	$1,258,639,000	86	$1,066,206.67
Total	12,928	$7,975,311	$3,790,995,900	280	$3,363,958.00

Source: FEMA Community Information System as of 05/31/2017

Repetitive Loss Analysis

A repetitive loss property is a property for which two or more flood insurance claims of more than $1,000 have been paid by the NFIP within any 10-year period since 1978. An analysis of repetitive loss was completed by the County to examine repetitive loss properties against FEMA flood zones.

According to 2017 NFIP records, there are a total of 4 mitigated and 40 unmitigated repetitive loss properties within Chatham County. Table 5.16 details repetitive loss building counts, FEMA flood zones and total payment for the unmitigated properties.

Table 5.16 – Unmitigated Repetitive Loss Summary

Flood Zone[1]	Building Type		Building Count		Total Building Payment	Total Content Payment	Total Paid
	Commercial	Residential	Insured	Uninsured			
AE		X	X		$54,769.83	$25,675.37	$80,445.20
X		X	X		$21,044.41	$2,329.35	$23,373.76
AE		X	X		$83,644.40	$14,600.00	$98,244.40
AE		X	X		$10,974.67	$0.00	$10,974.67
AE		X	X		$6,107.46	$0.00	$6,107.46
AE		X	X		$27,935.85	$3,168.32	$31,104.17
A15		X		X	$6,395.41	$0.00	$6,395.41
AE		X	X		$70,012.83	$14,392.36	$84,405.19
X		X		X	$6,988.22	$316.41	$7,304.63
X		X		X	$32,340.39	$3,193.56	$35,533.95
X		X		X	$12,381.13	$0.00	$12,381.13
AE		X	X		$2,519.49	$0.00	$2,519.49
X		X		X	$21,603.84	$2,239.14	$23,842.98
AE		X	X		$59,345.87	$0.00	$59,345.87
AE		X	X		$10,070.78	$3,112.25	$13,183.03
A15		X	X		$18,730.44	$8,004.69	$26,735.13
B		X	X		$55,549.85	$41,126.54	$96,676.39
AE		X	X		$9,775.16	$0.00	$9,775.16
X		X		X	$17,976.84	$5,630.53	$23,607.37
AE		X	X		$39,681.71	$21,752.56	$61,434.27
X		X	X		$11,994.51	$0.00	$11,994.51
X		X		X	$4,849.47	$0.00	$4,849.47
X		X		X	$24,744.95	$15,304.17	$40,049.12
AE		X	X		$18,098.63	$10,642.68	$28,741.31
AE		X	X		$25,366.78	$5,900.00	$31,266.78
X		X		X	$9,390.65	$2,307.35	$11,698.00
AE		X	X		$28,438.95	$5,182.07	$33,621.02
AE		X	X		$96,295.54	$0.00	$96,295.54
AE		X	X		$51,419.58	$4,708.25	$56,127.83
X		X		X	$18,480.53	$2,914.08	$21,394.61
AE		X	X		$51,213.54	$38,638.26	$89,851.80
AE		X	X		$8,112.97	$0.00	$8,112.97
A15		X	X		$62,287.60	$0.00	$62,287.60
AE		X	X		$24,523.91	$11,740.90	$36,264.81
A15		X		X	$7,201.74	$0.00	$7,201.74
AE		X	X		$5,086.73	$0.00	$5,086.73
AE		X	X		$25,929.43	$0.00	$25,929.43
X	X			X	$11,524.26	$0.00	$11,524.26
AE		X	X		$50,163.44	$0.00	$50,163.44
AE		X	X		$4,635.66	$0.00	$4,635.66
	1	**39**	**28**	**12**	**$1,107,607.45**	**$242,878.84**	**$1,350,486.29**

Source: NFIP Repetitive Loss Data, 1/31/2017

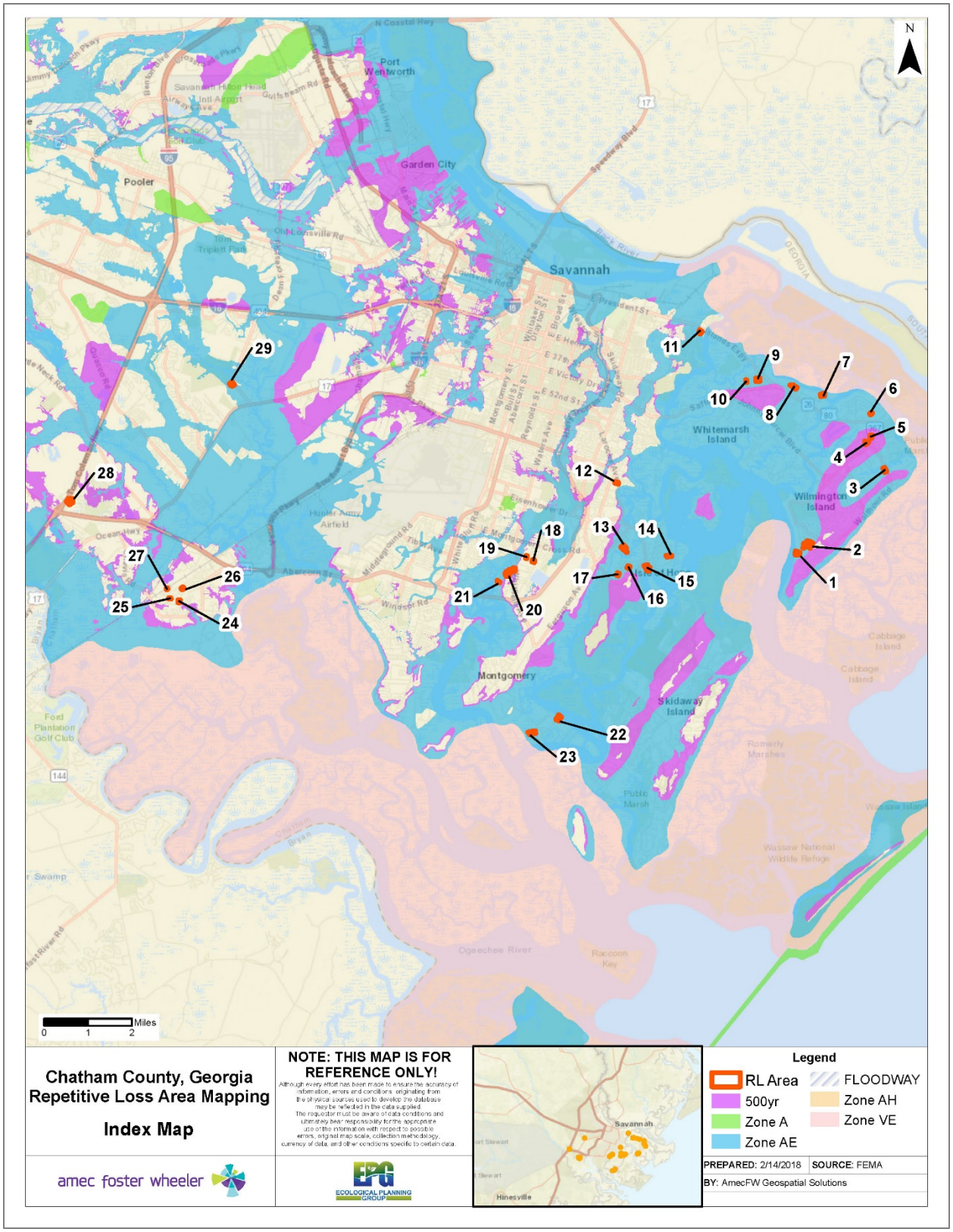
[1]Flood Zone is based on historical FIRM when first loss occurred. These zones do not reflect the current Effective FIRM zone for each property.

Repetitive Loss Area Mapping

The above list of unmitigated repetitive loss properties is not a complete list of properties at risk to repeat flood events. Additional properties with only one past flood claim or with similar flood conditions may also be at risk of becoming repetitive loss properties. In accordance with the principles outlined in the CRS guidance titled Mapping Repetitive Loss Areas dated August 15, 2008, 29 repetitive loss areas were identified in Chatham County. To classify these repetitive loss areas, the FMPC and consulting team mapped the above list of FEMA-identified repetitive loss properties along with historical claim properties (those with one claim paid against the NFIP) and identified additional surrounding properties with similar flood conditions. All of these properties should be assessed for mitigation. The resulting 29 repetitive loss areas are indexed in Figure 5.17 in relation to the FEMA flood zones and shown in detail in Figure 5.18 through Figure 5.46. The structure count within each repetitive loss area is detailed in Table 5.17 below.

Table 5.17 – Structures in Repetitive Loss Areas

Repetitive Loss Area	Number of Repetitive Loss Properties	Number of Additional Structures	Total Number of Properties
1	2	4	6
2	7	22	29
3	1	2	3
4	1	7	8
5	1	4	5
6	1	2	3
7	1	2	3
8	1	8	9
9	2	13	15
10	1	2	3
11	1	3	4
12	1	3	4
13	2	3	5
14	1	4	5
15	1	2	3
16	1	4	5
17	1	3	4
18	1	5	6
19	1	4	5
20	3	29	32
21	1	3	4
22	1	6	7
23	1	2	3
24	1	5	6
25	1	2	3
26	1	5	6
27	1	2	3
28	1	1	2
29	1	2	3
Total	**40**	**154**	**194**



Source: NFIP Repetitive Loss Data, 1/31/2017

Figure 5.17 – Chatham County Repetitive Loss Areas and FEMA Flood Zones

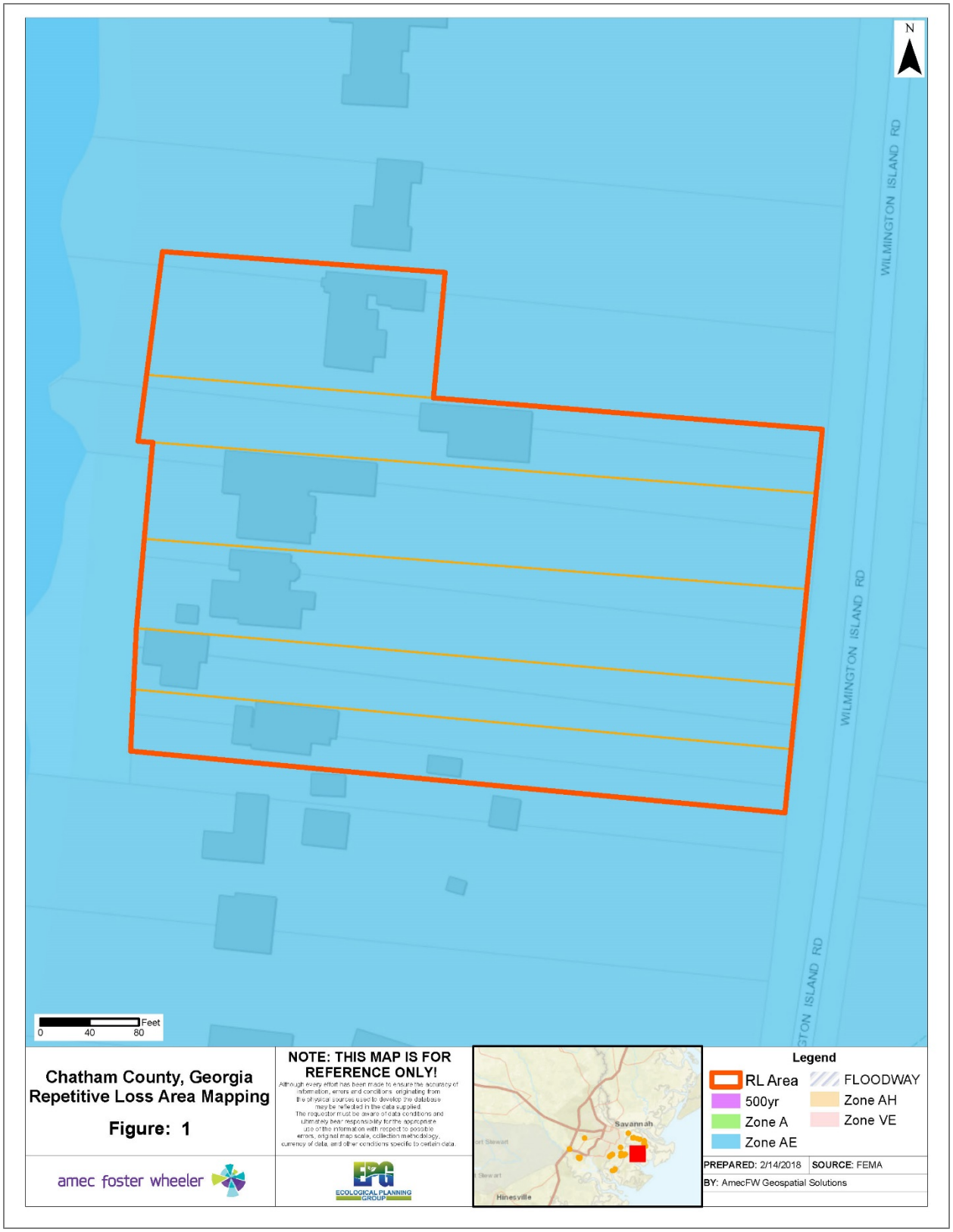


Figure 5.18 – Repetitive Loss Area Mapping, Area 1

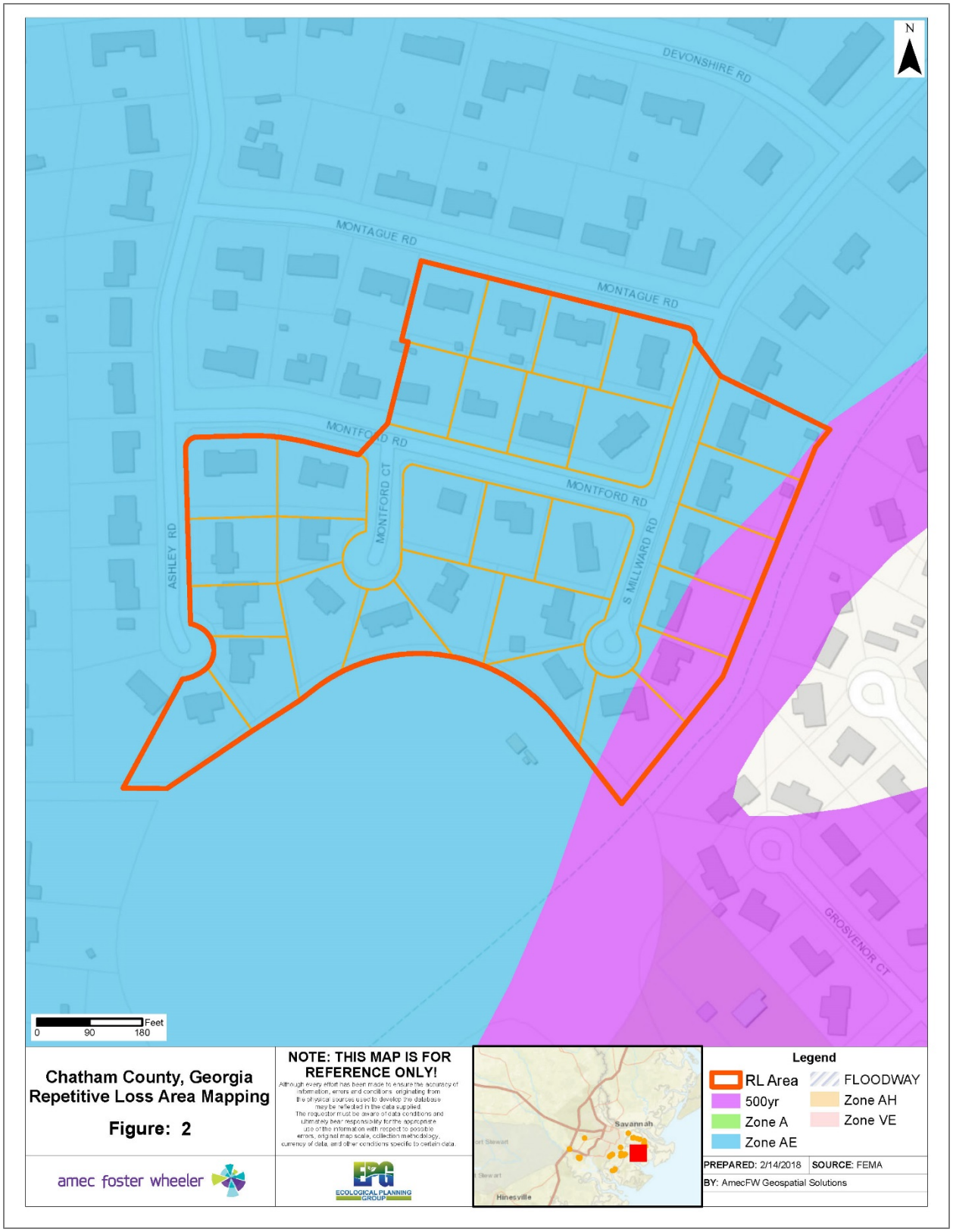


Figure 5.19 – Repetitive Loss Area Mapping, Area 2

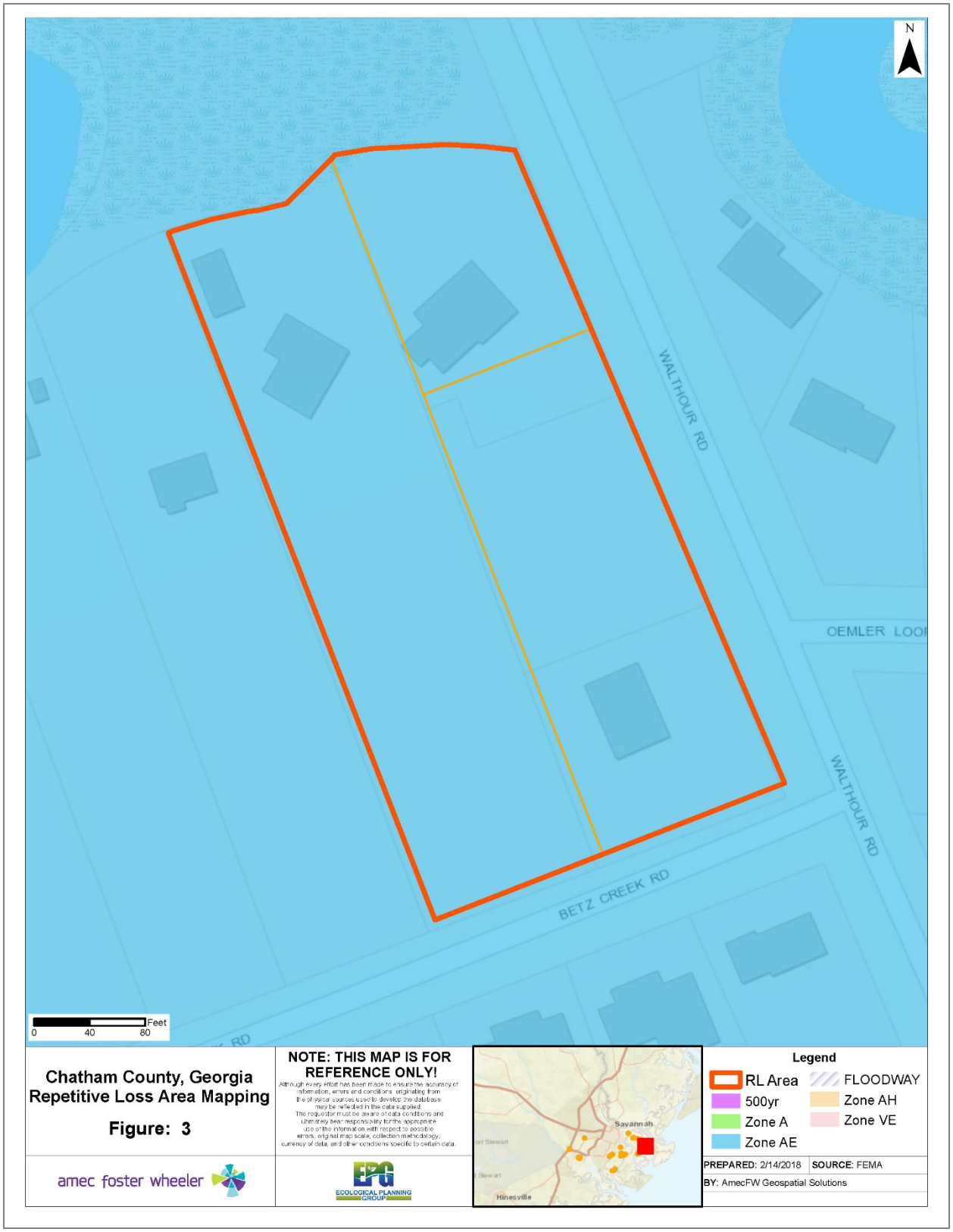


Figure 5.20 – Repetitive Loss Area Mapping, Area 3

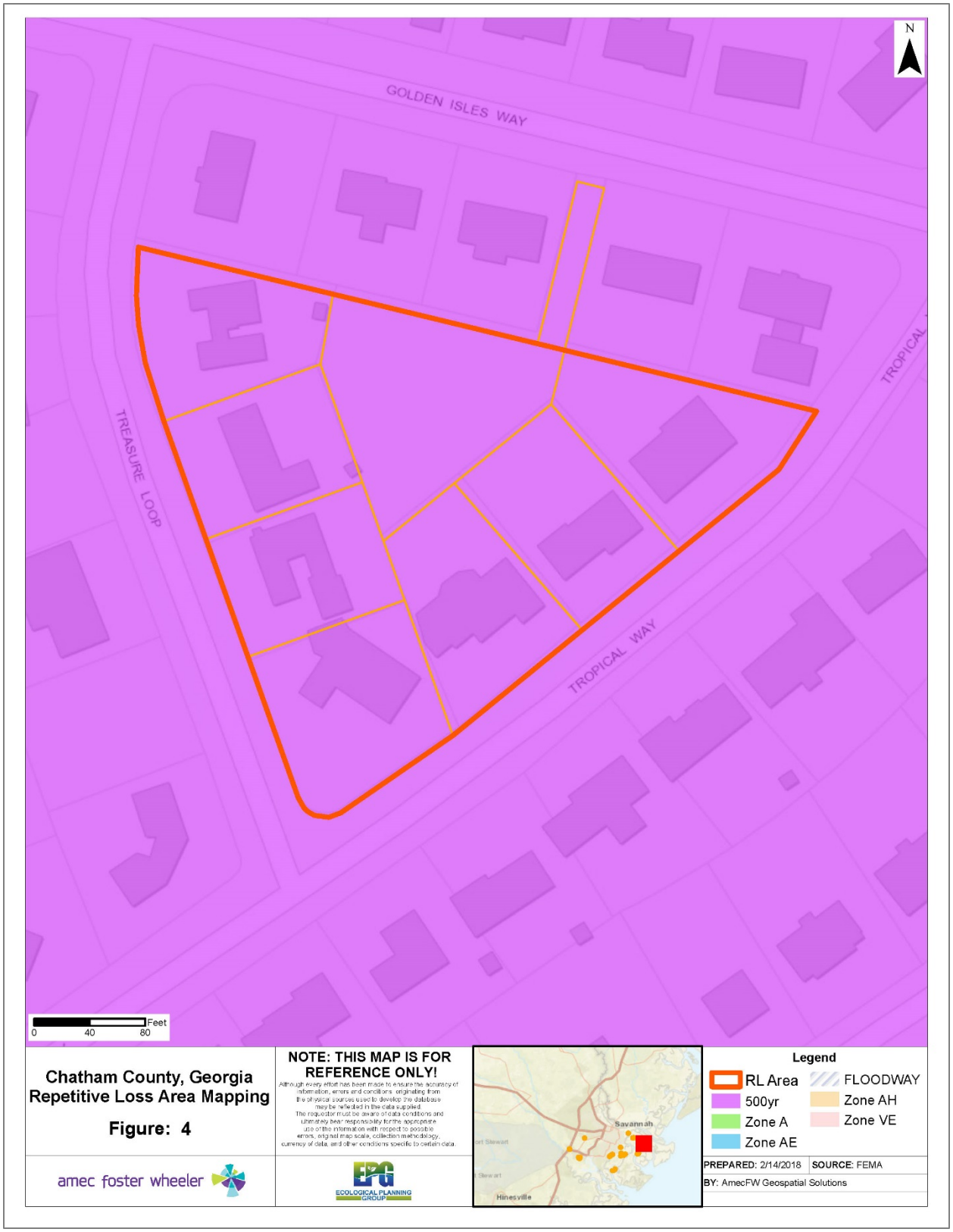


Figure 5.21 – Repetitive Loss Area Mapping, Area 4

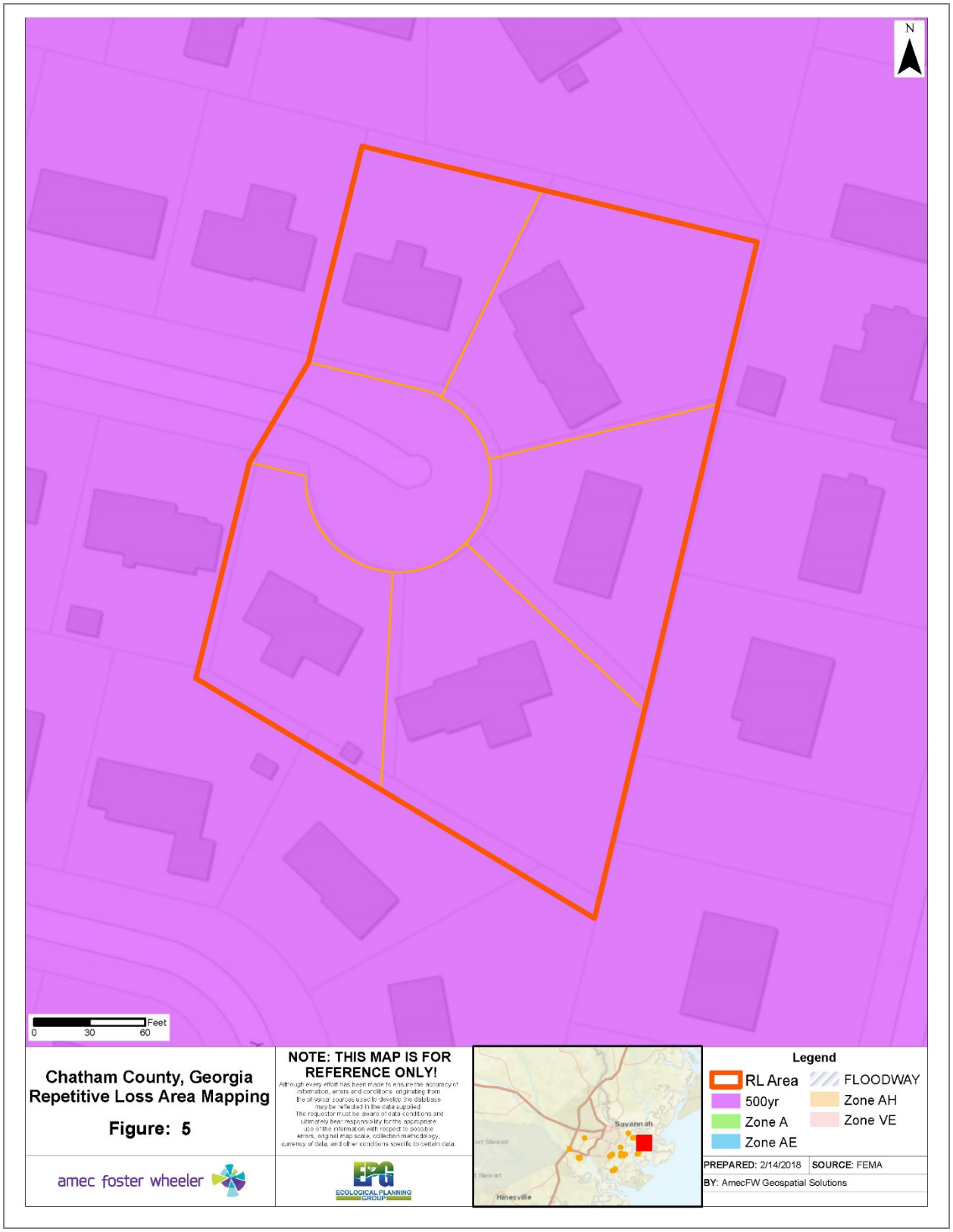


Figure 5.22 – Repetitive Loss Area Mapping, Area 5

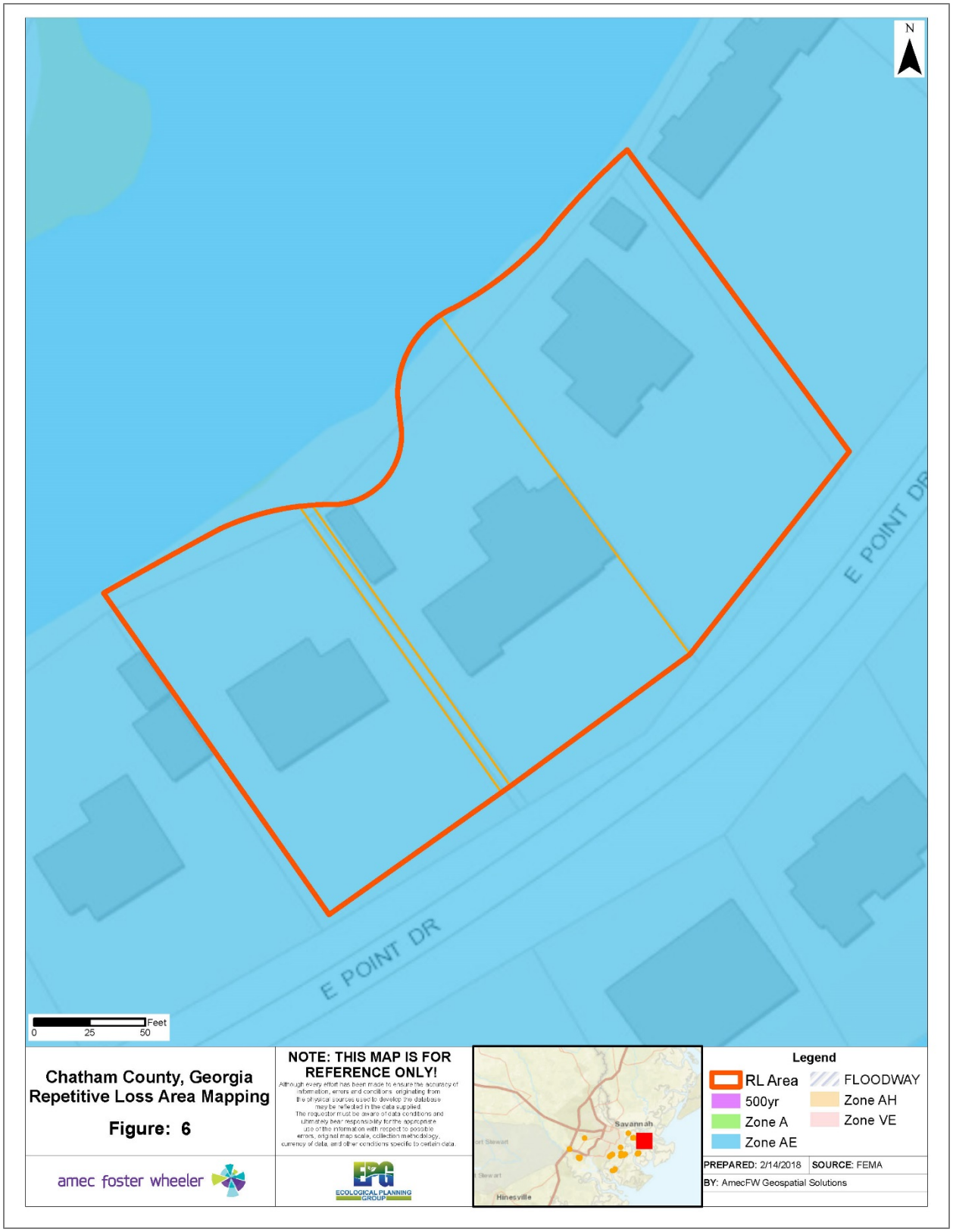


Figure 5.23 – Repetitive Loss Area Mapping, Area 6

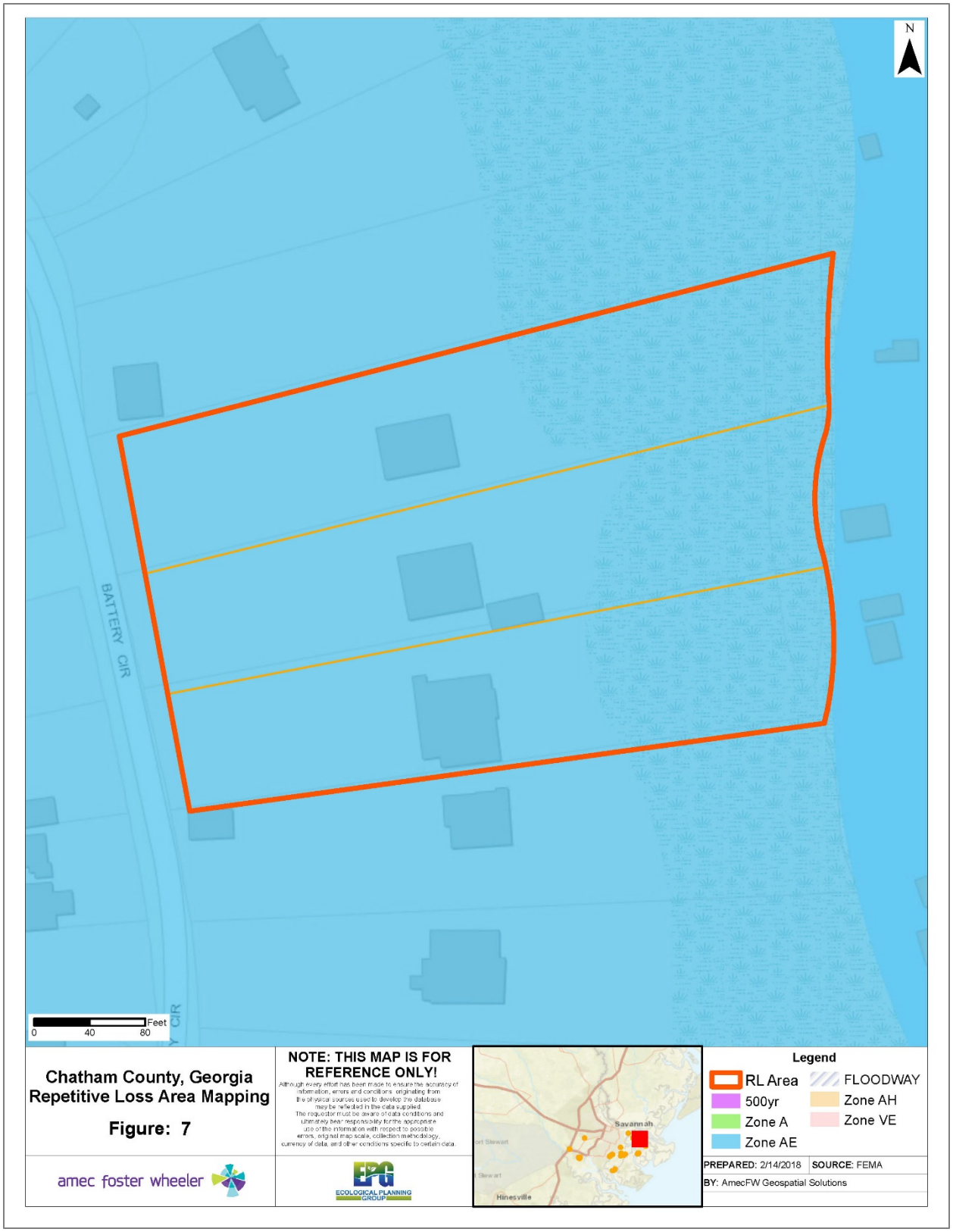


Figure 5.24 – Repetitive Loss Area Mapping, Area 7

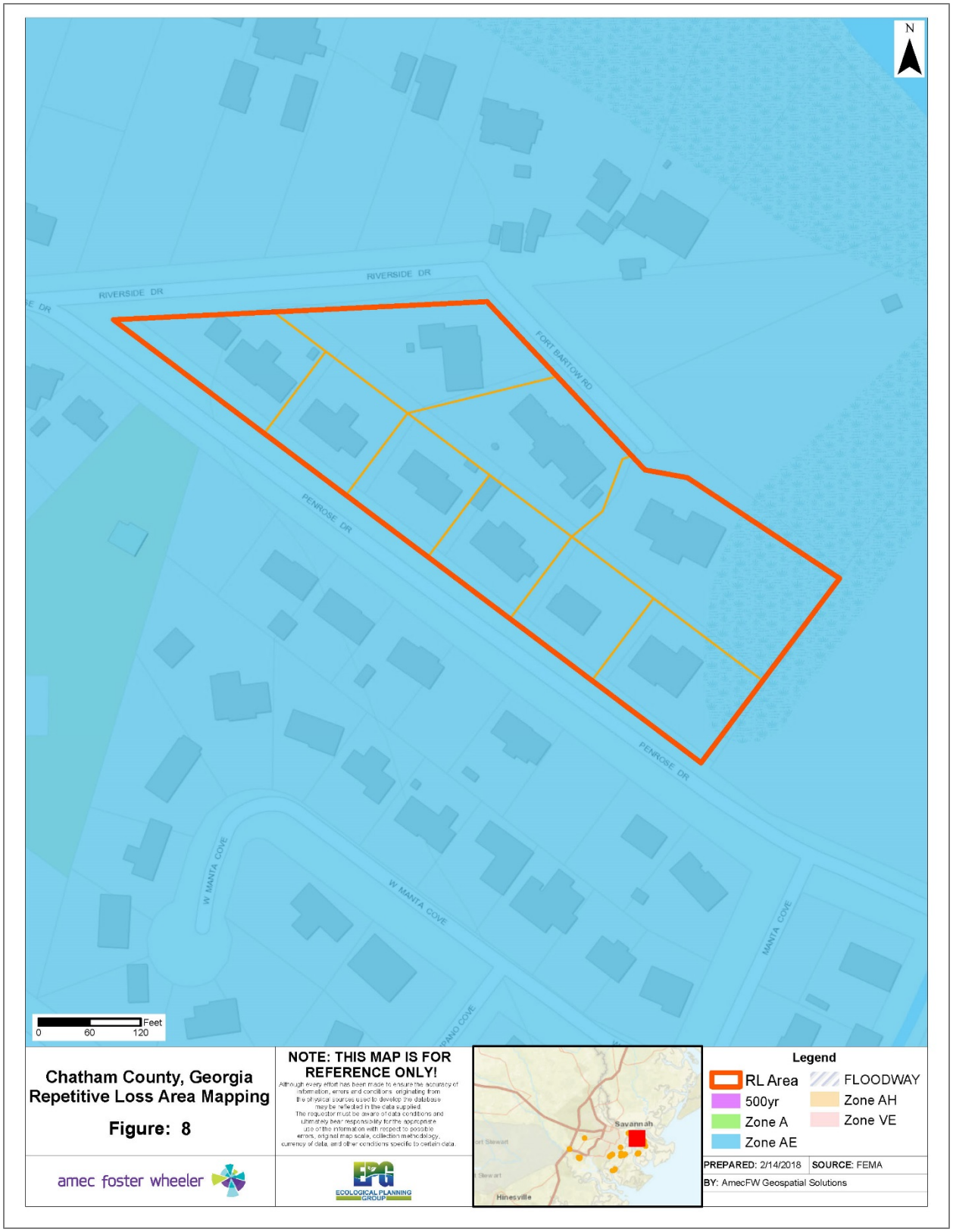


Figure 5.25 – Repetitive Loss Area Mapping, Area 8

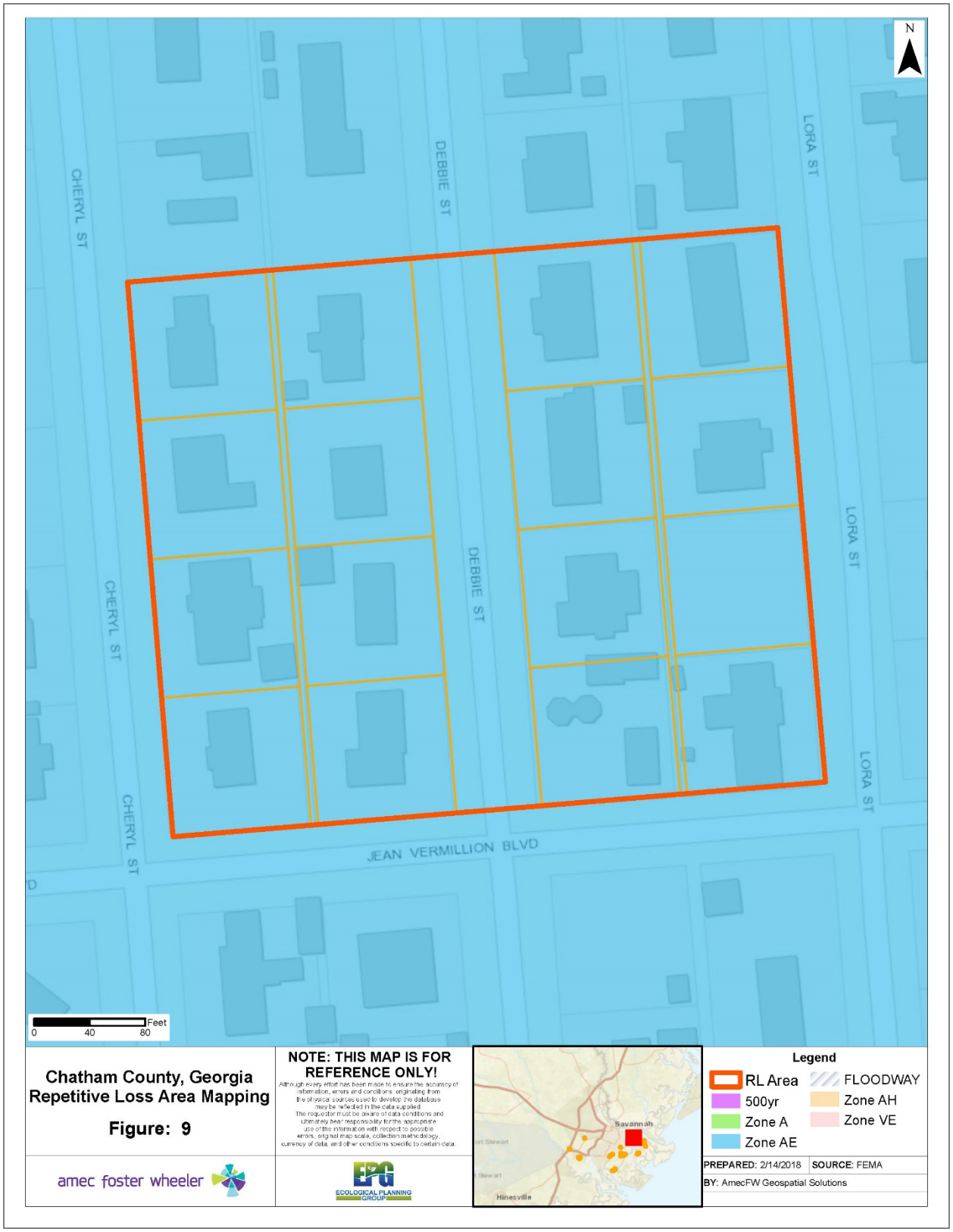


Figure 5.26 – Repetitive Loss Area Mapping, Area 9

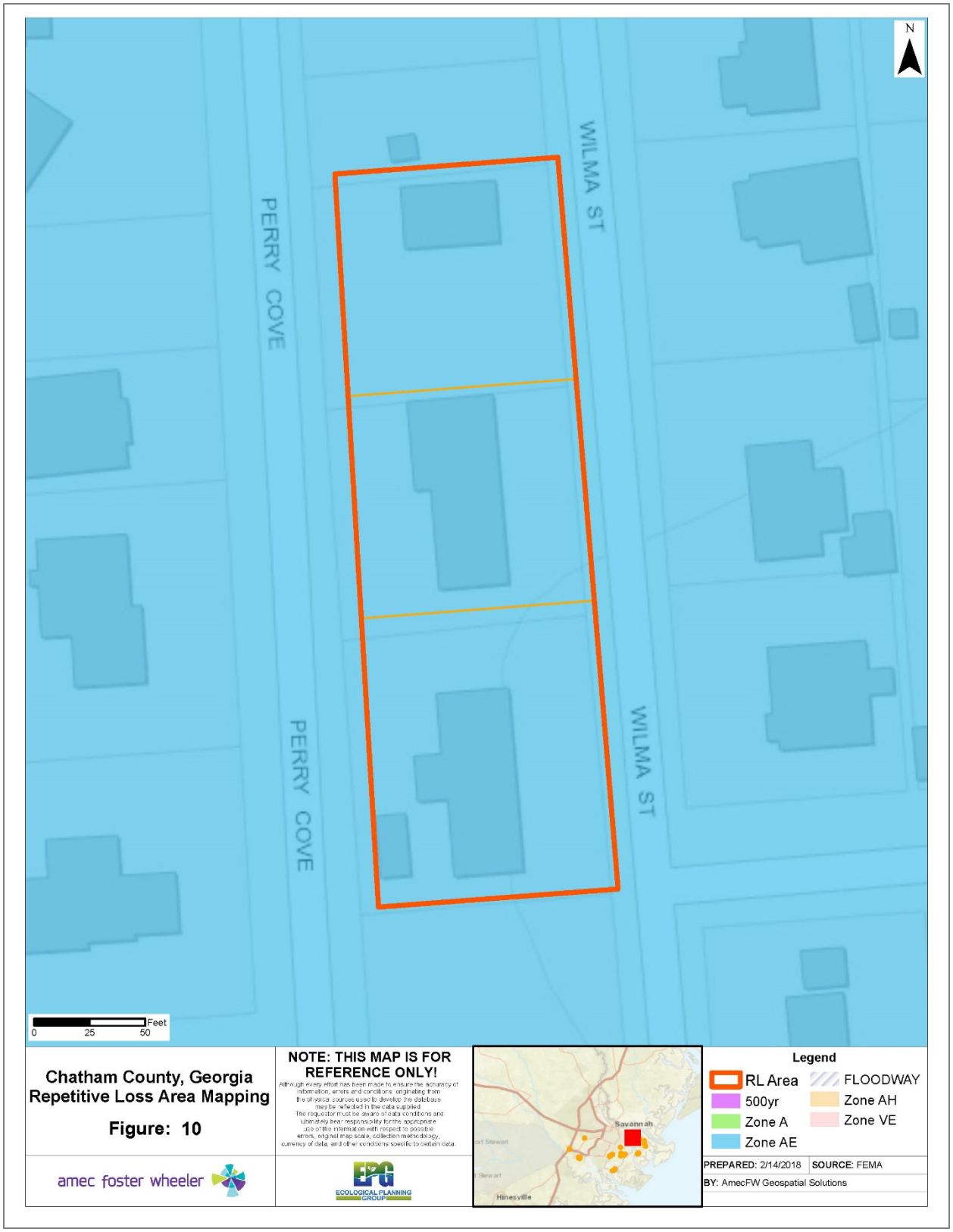


Figure 5.27 – Repetitive Loss Area Mapping, Area 10

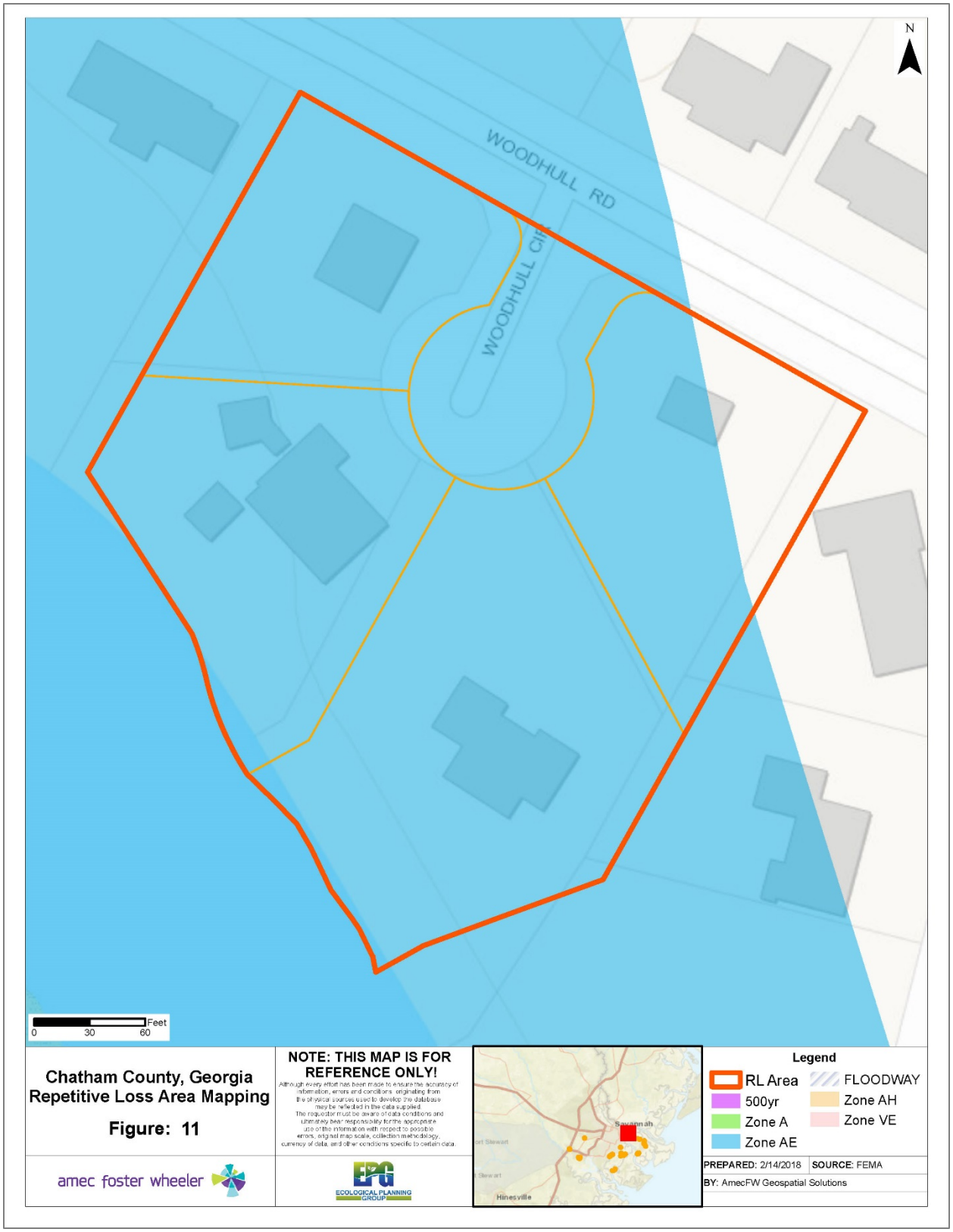


Figure 5.28 – Repetitive Loss Area Mapping, Area 11

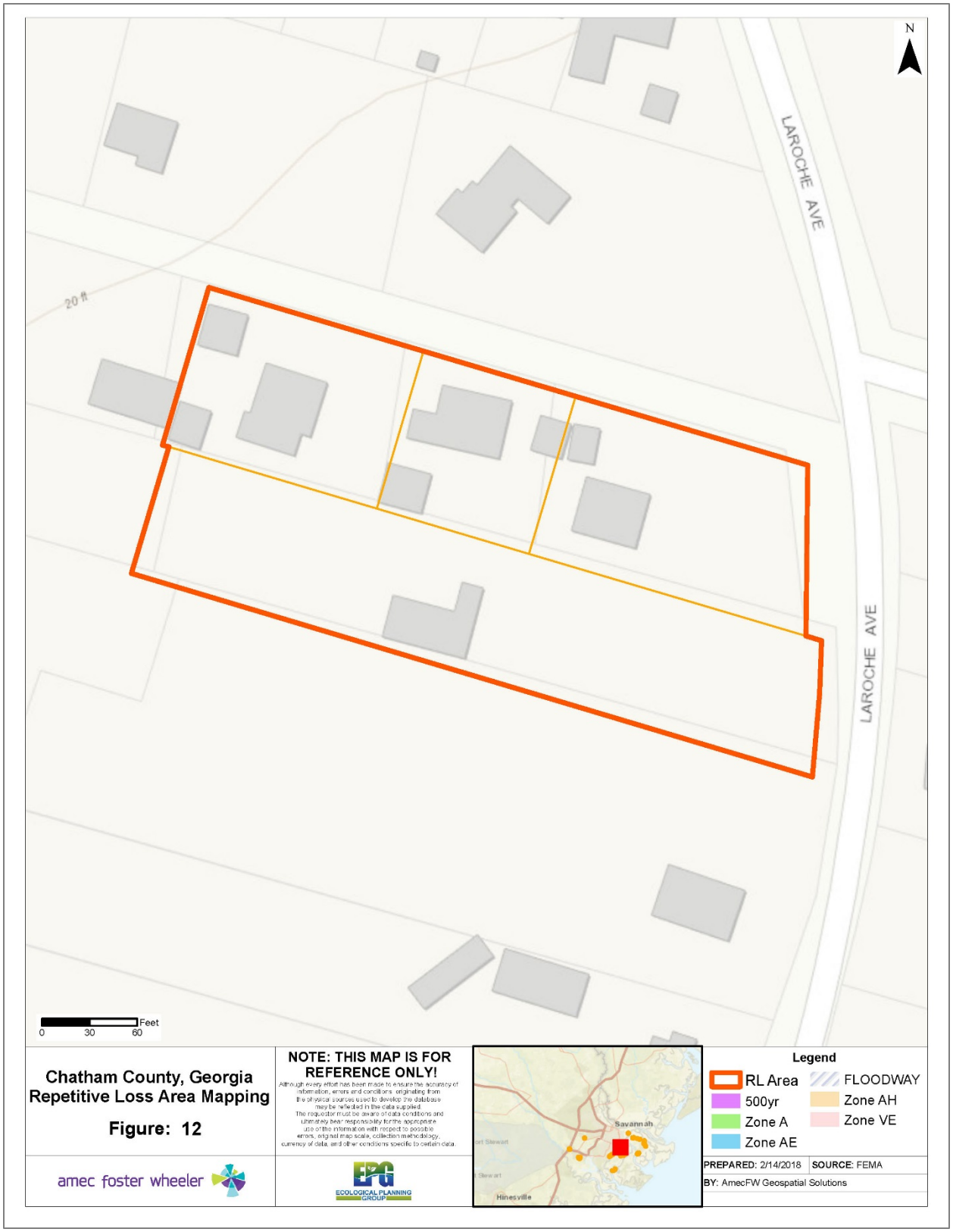


Figure 5.29 – Repetitive Loss Area Mapping, Area 12

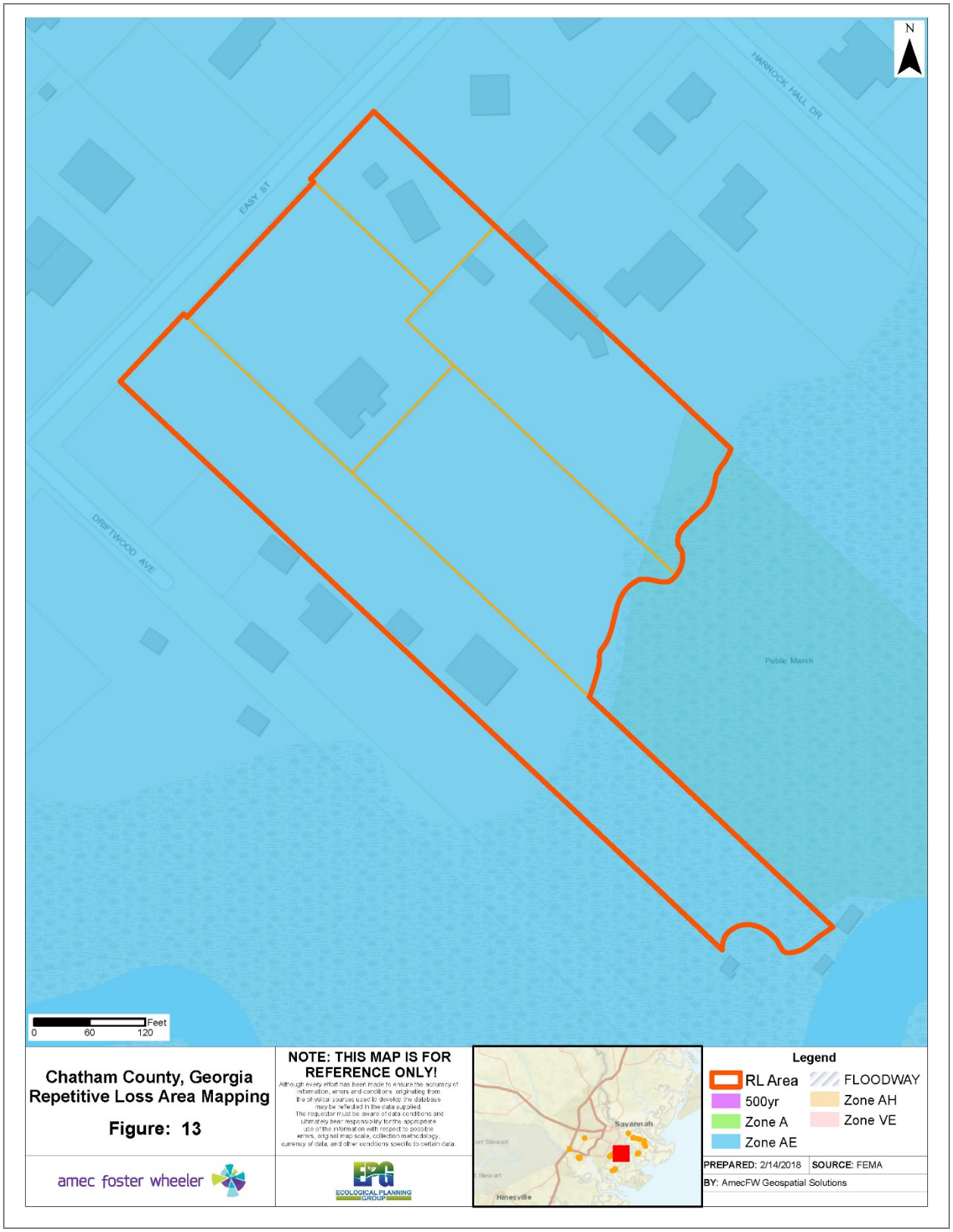


Figure 5.30 – Repetitive Loss Area Mapping, Area 13

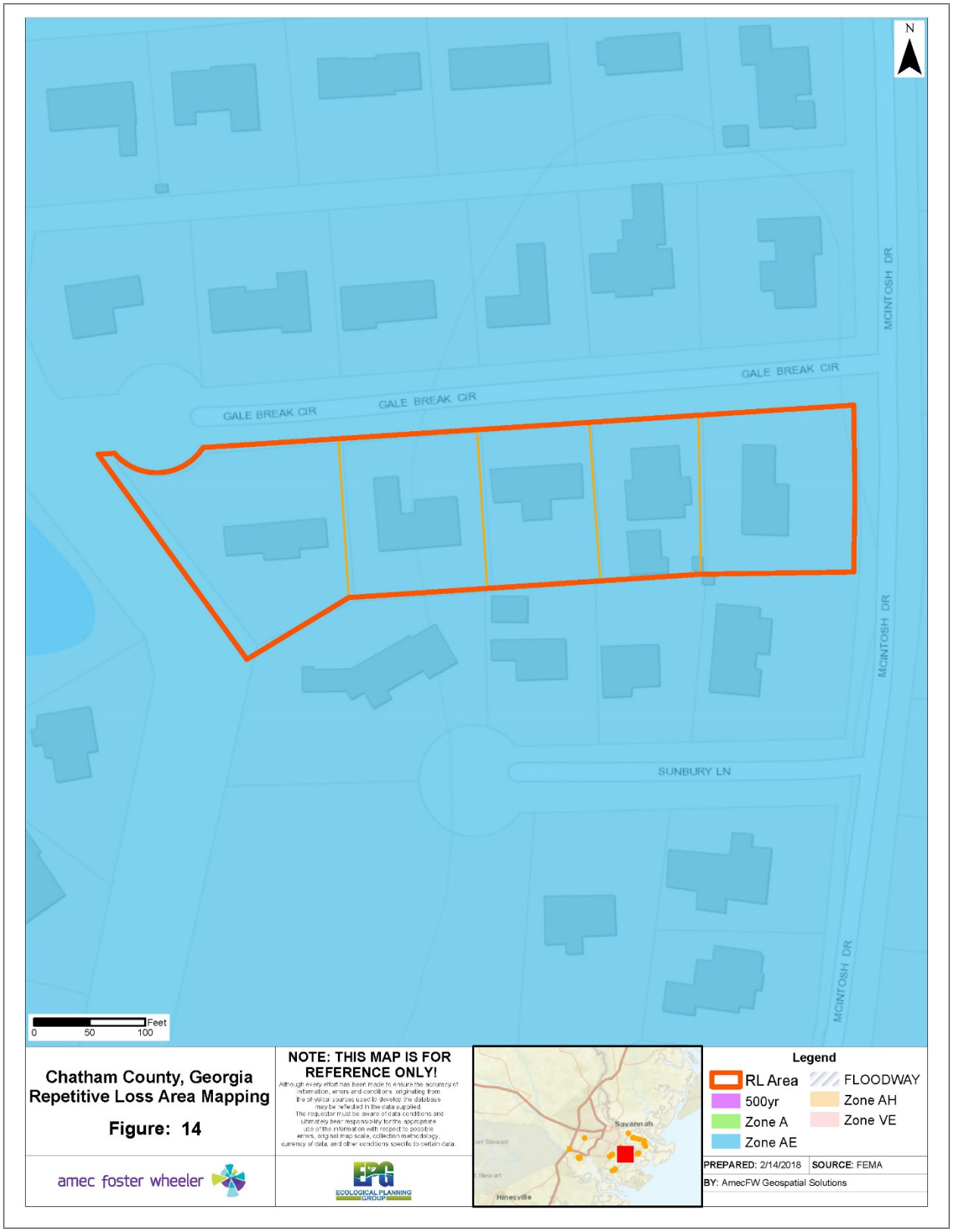


Figure 5.31 – Repetitive Loss Area Mapping, Area 14

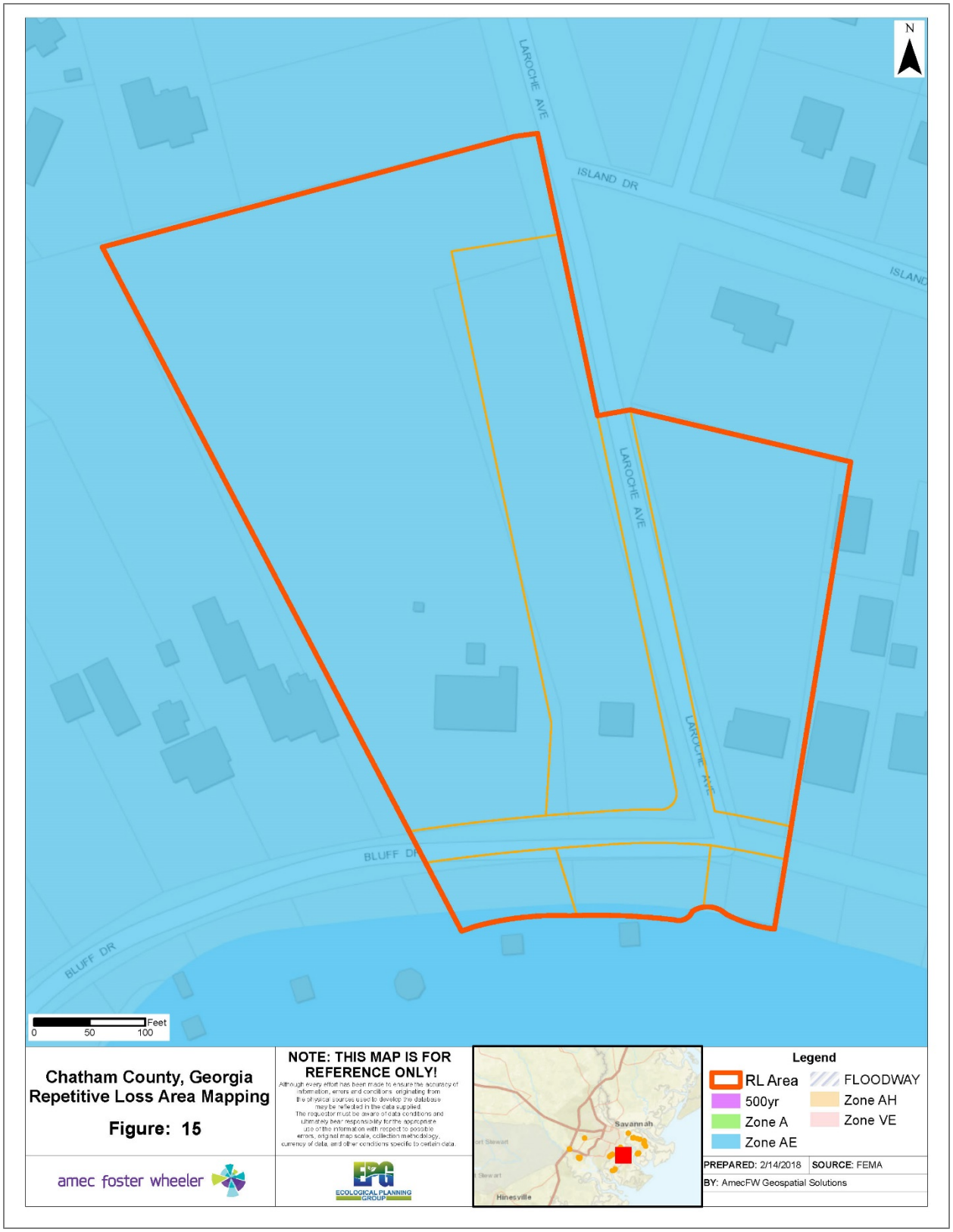


Figure 5.32 – Repetitive Loss Area Mapping, Area 15

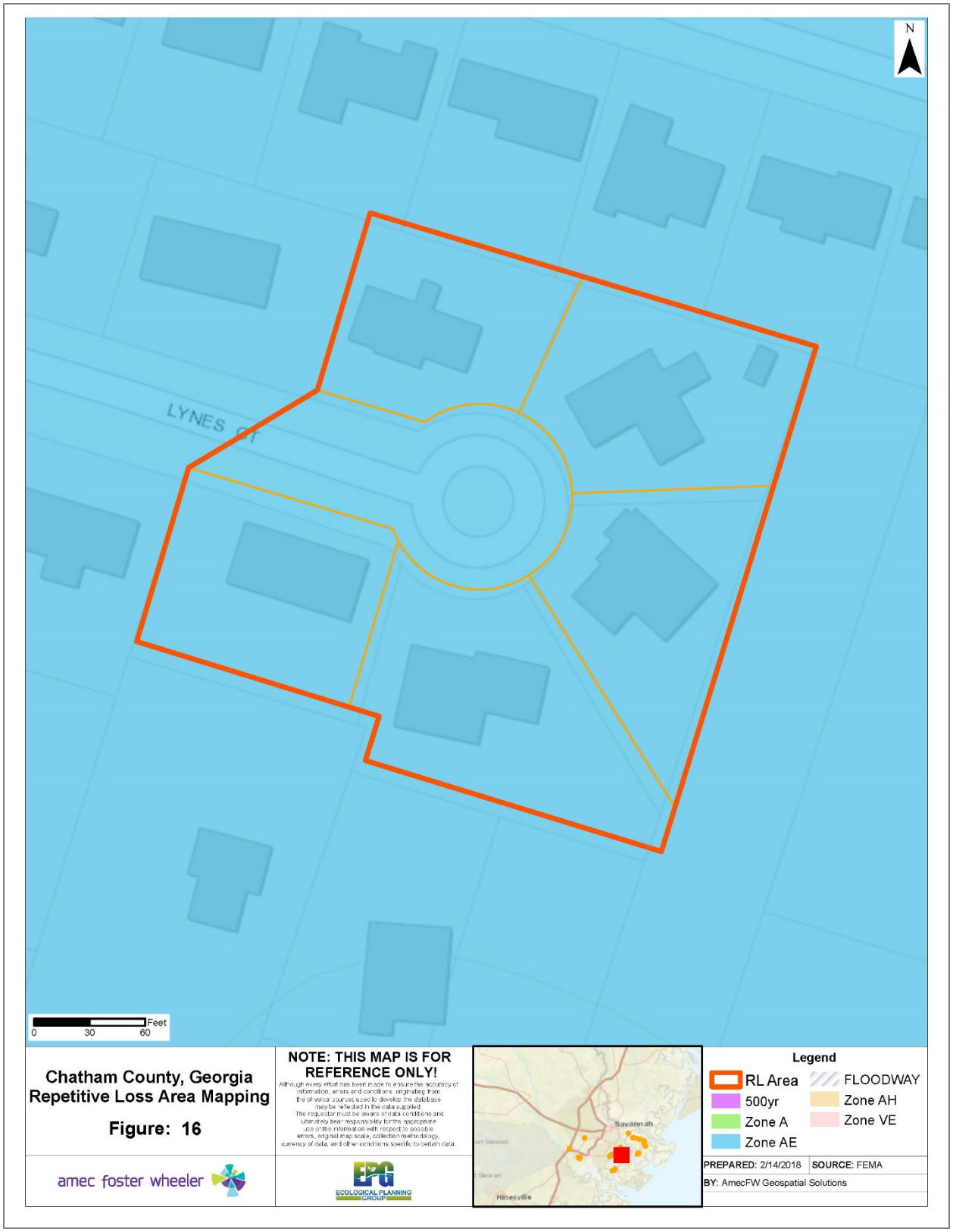


Figure 5.33 – Repetitive Loss Area Mapping, Area 16

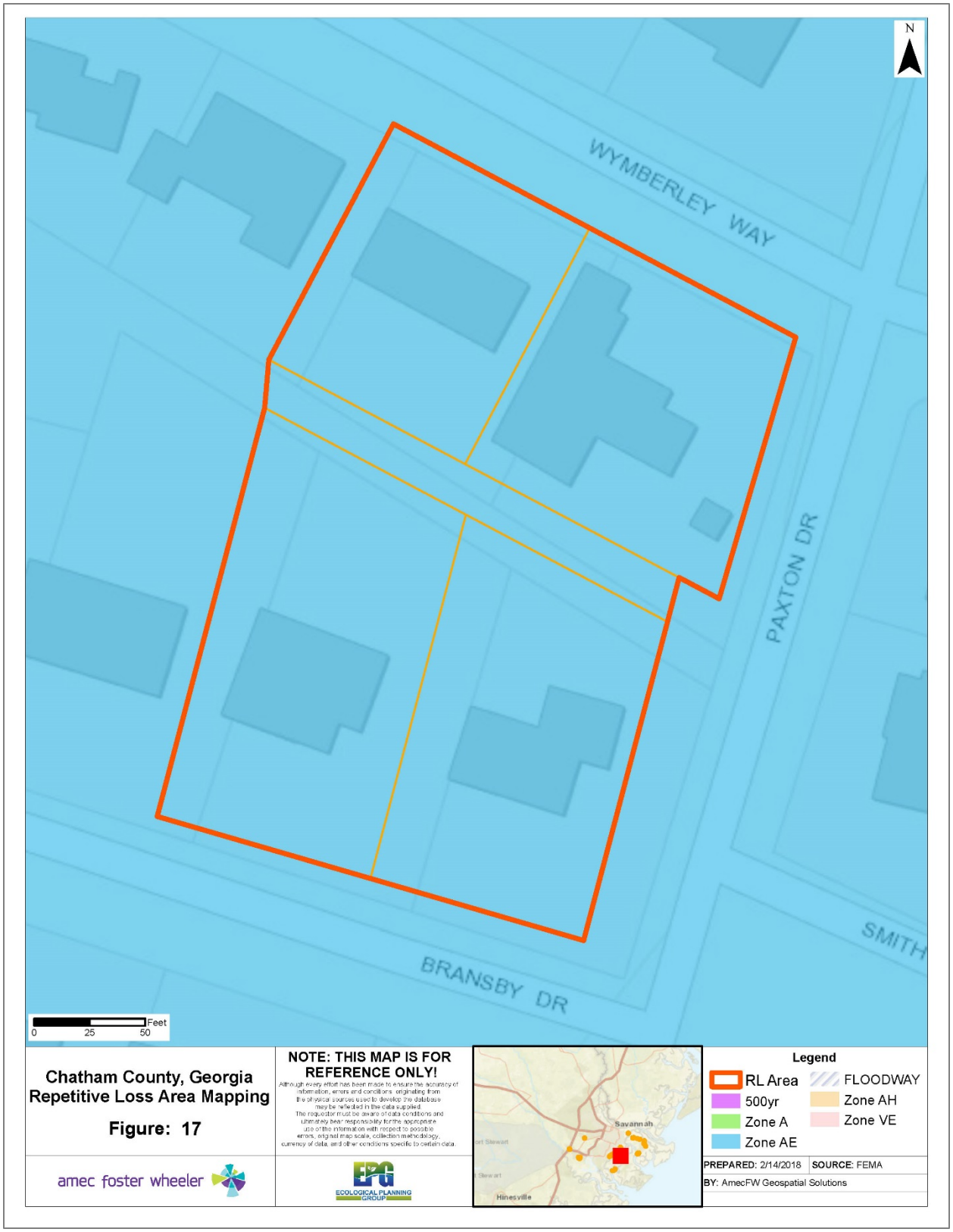


Figure 5.34 – Repetitive Loss Area Mapping, Area 17

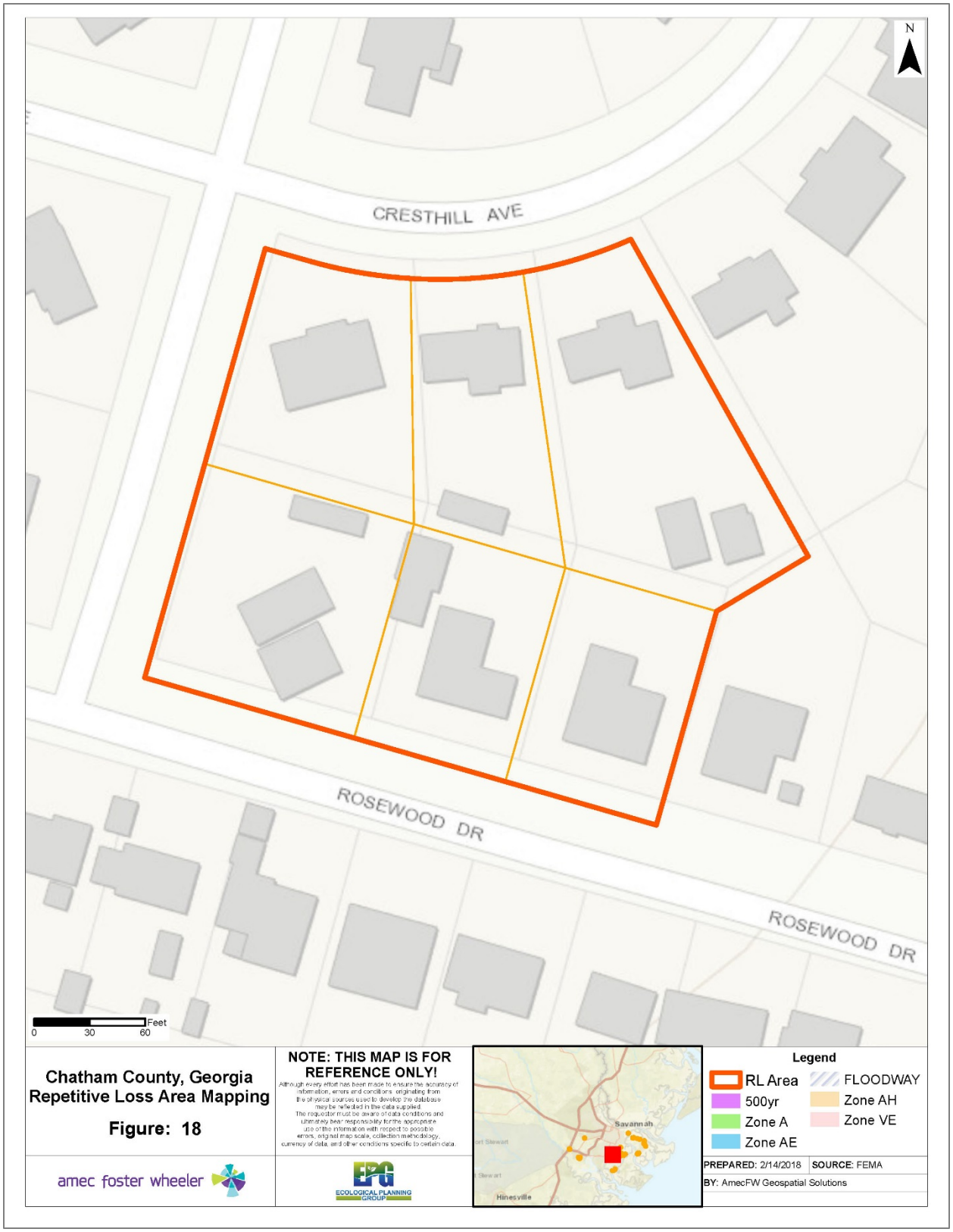


Figure 5.35 – Repetitive Loss Area Mapping, Area 18

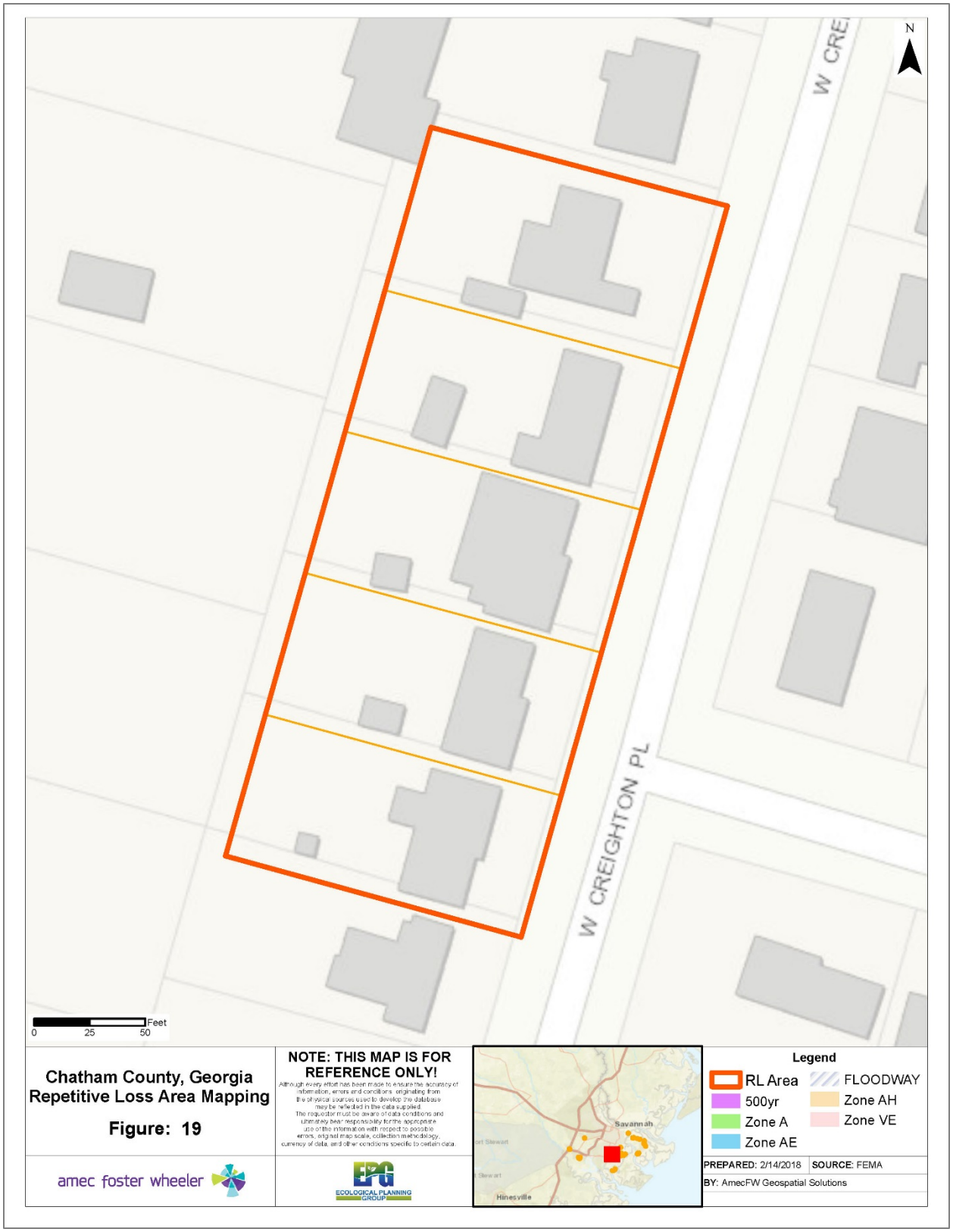


Figure 5.36 – Repetitive Loss Area Mapping, Area 19

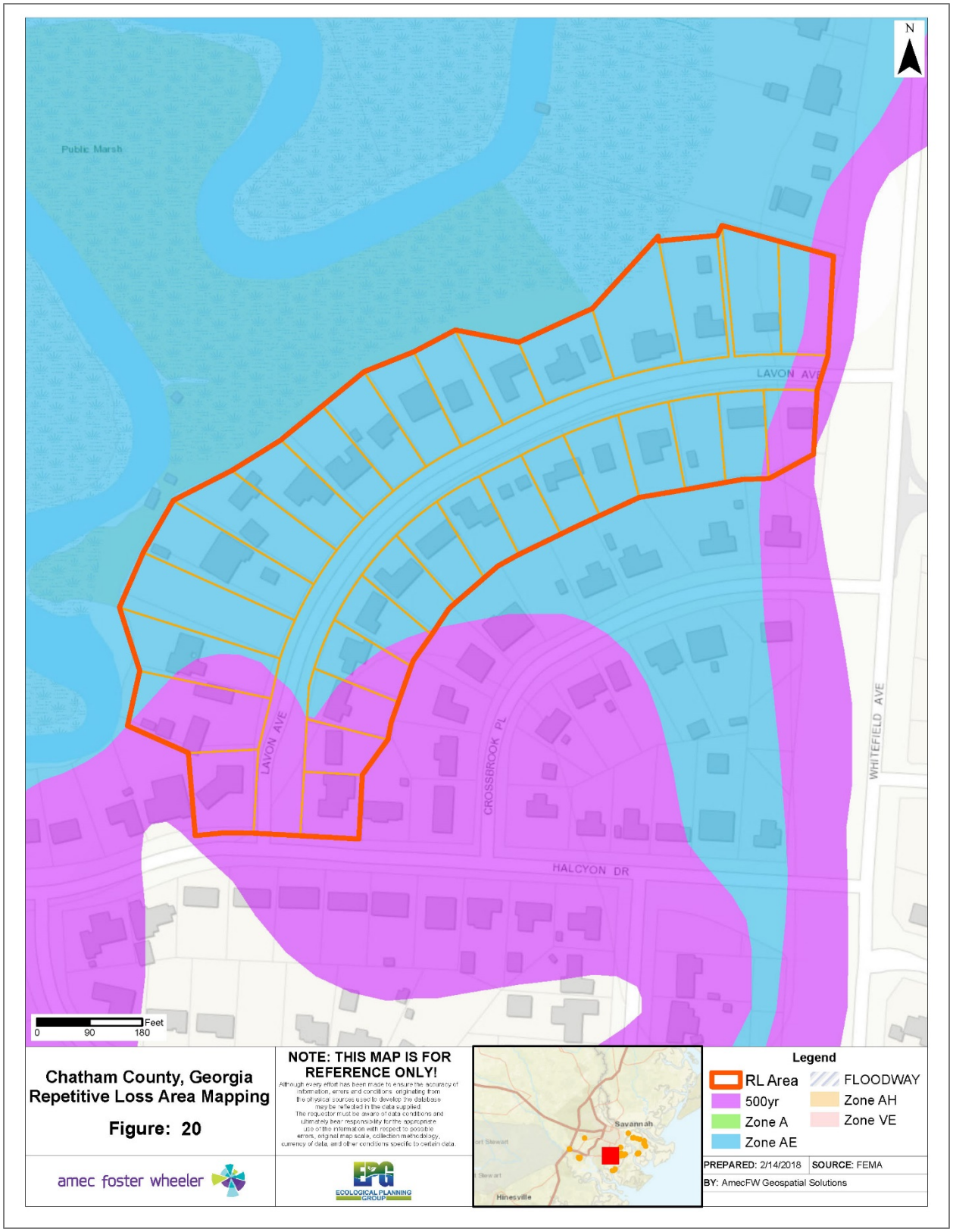


Figure 5.37 – Repetitive Loss Area Mapping, Area 20

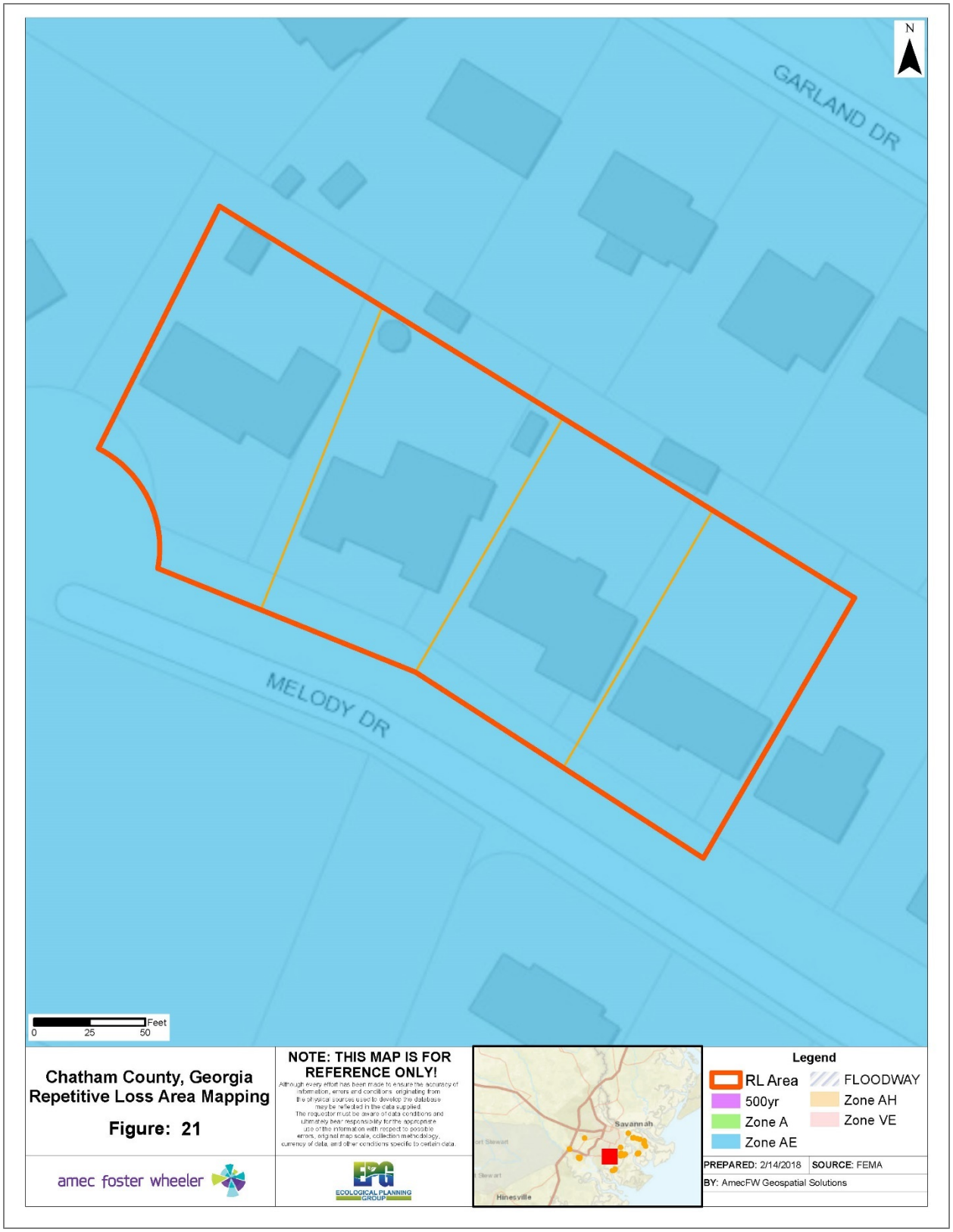


Figure 5.38 – Repetitive Loss Area Mapping, Area 21

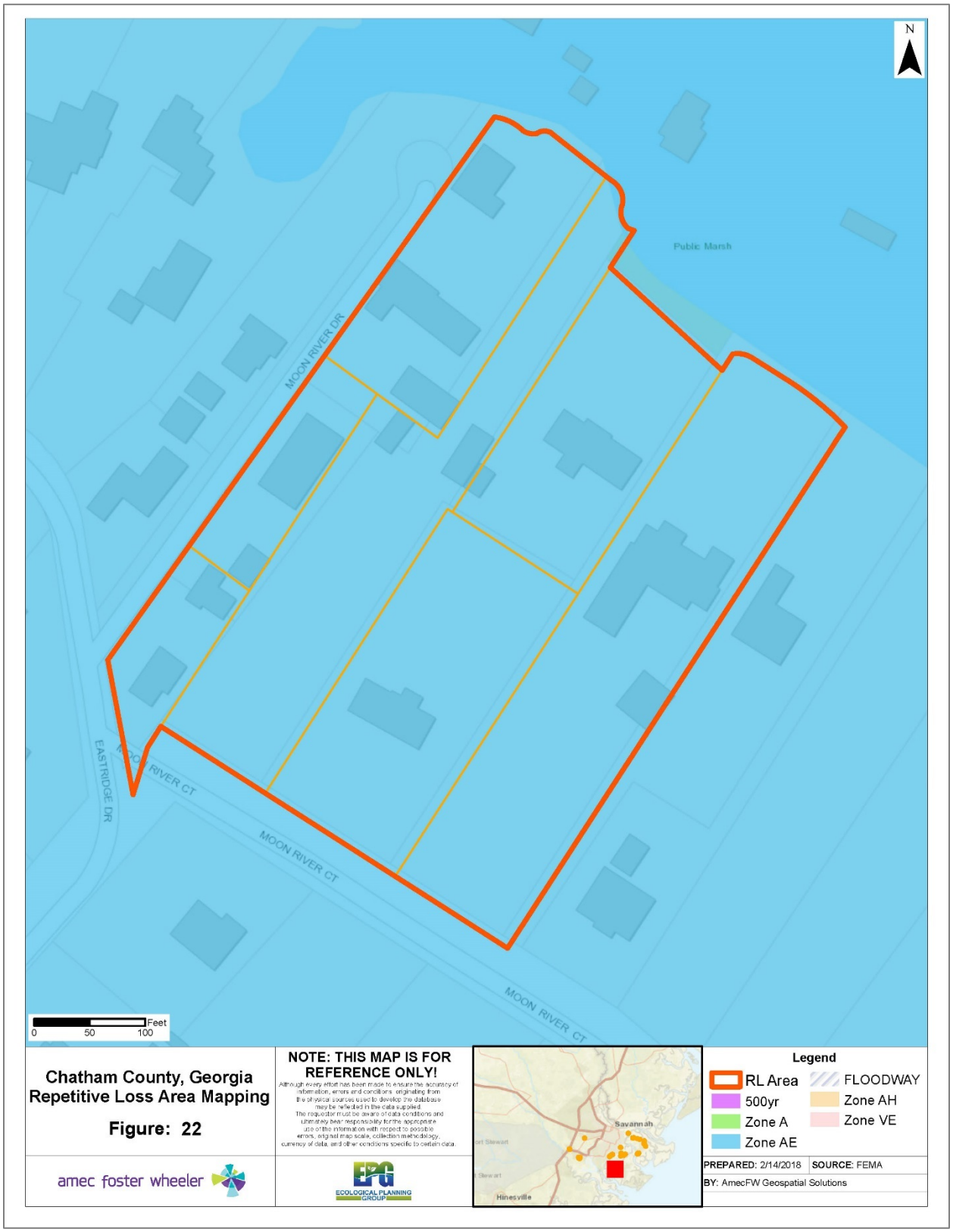


Figure 5.39 – Repetitive Loss Area Mapping, Area 22

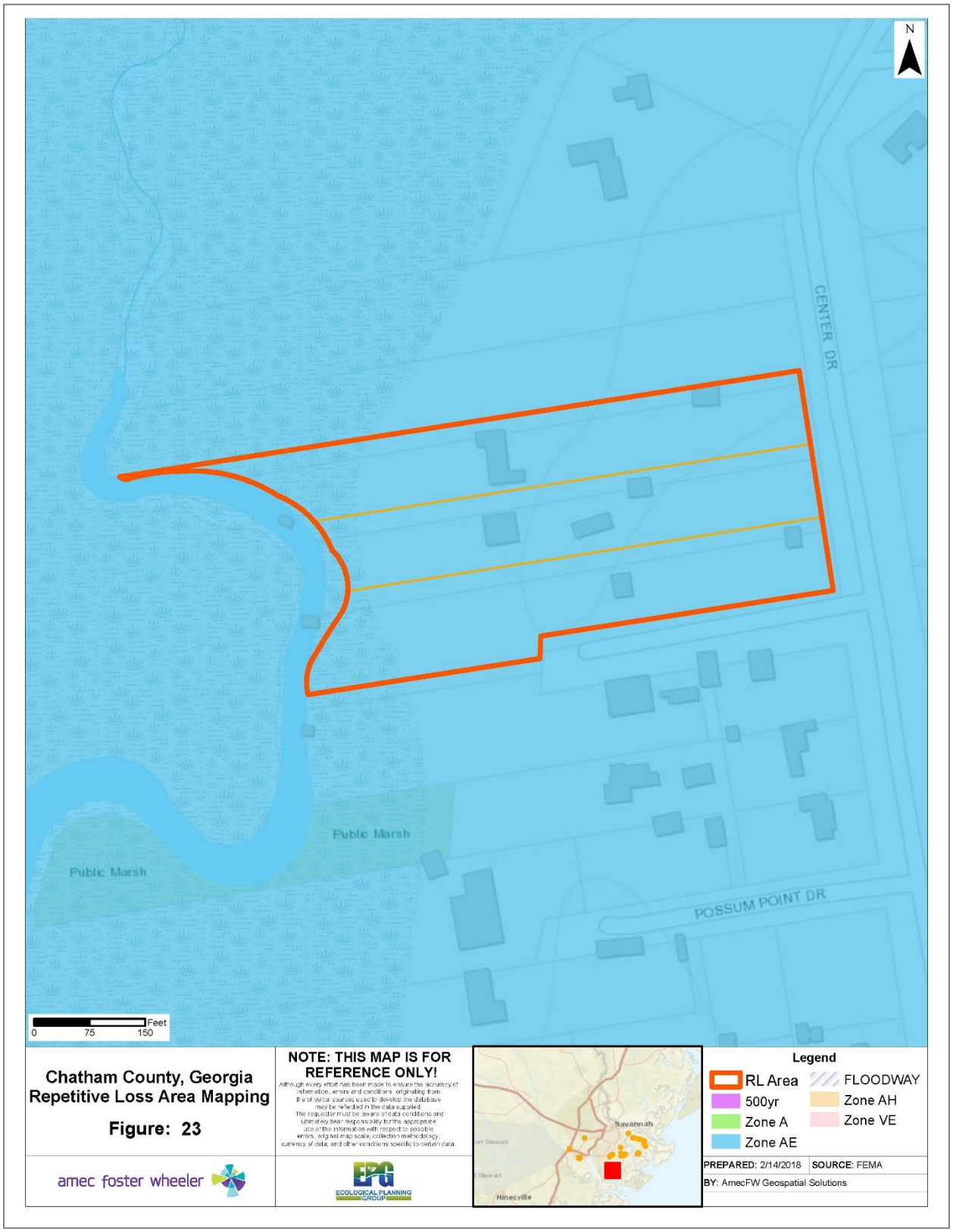


Figure 5.40 – Repetitive Loss Area Mapping, Area 23

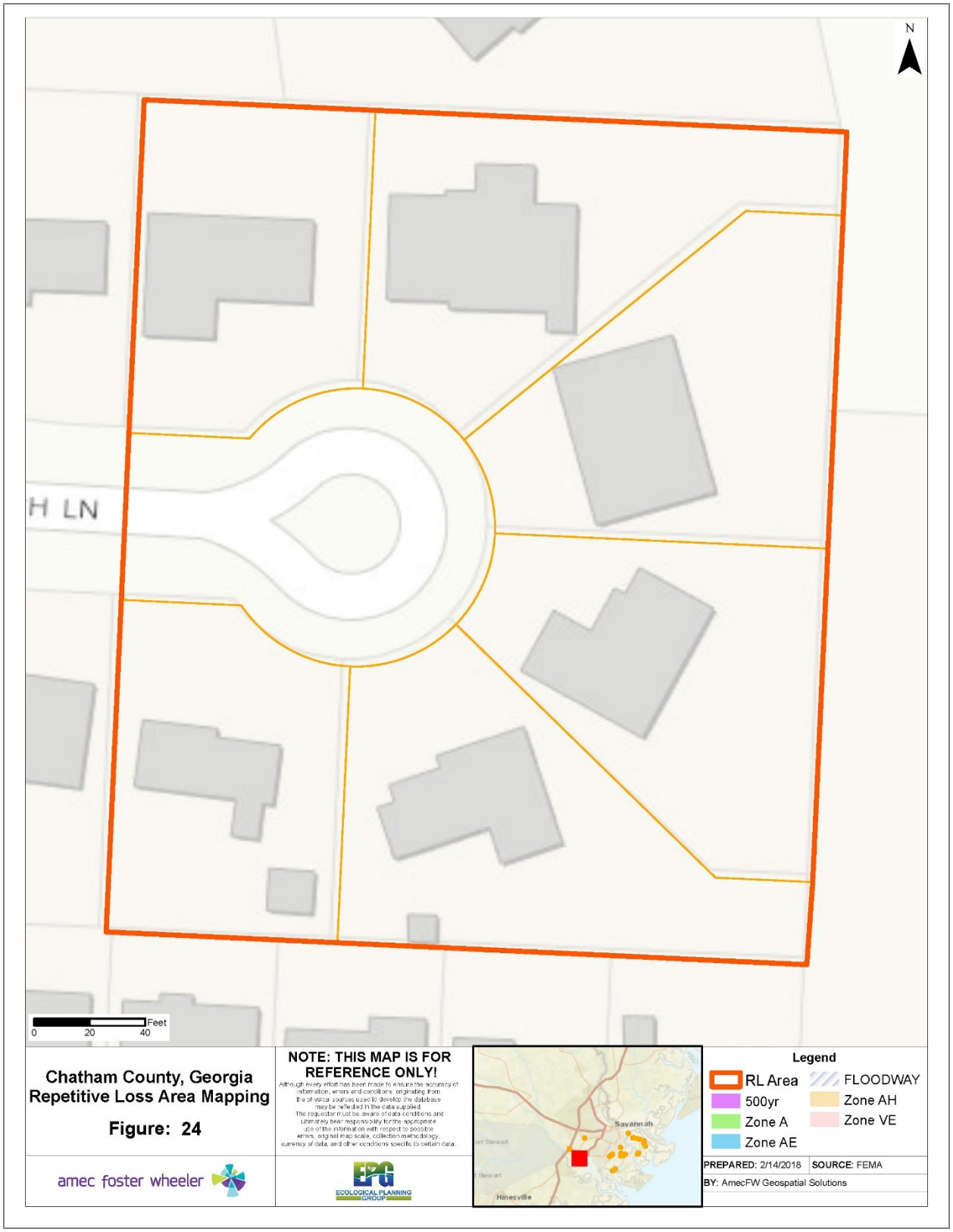


Figure 5.41 – Repetitive Loss Area Mapping, Area 24

Figure 5.42 – Repetitive Loss Area Mapping, Area 25

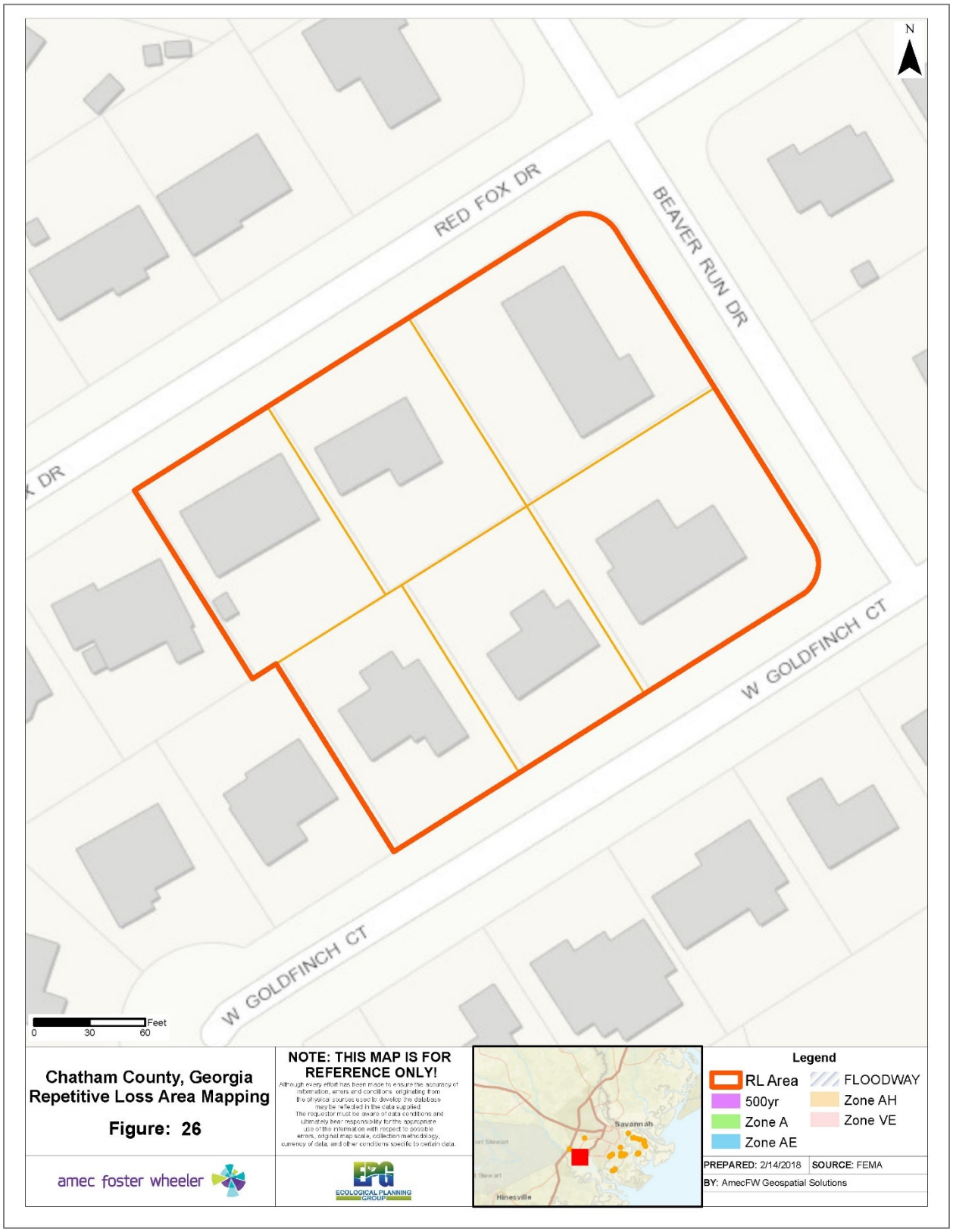


Figure 5.43 – Repetitive Loss Area Mapping, Area 26

Figure 5.44 – Repetitive Loss Area Mapping, Area 27

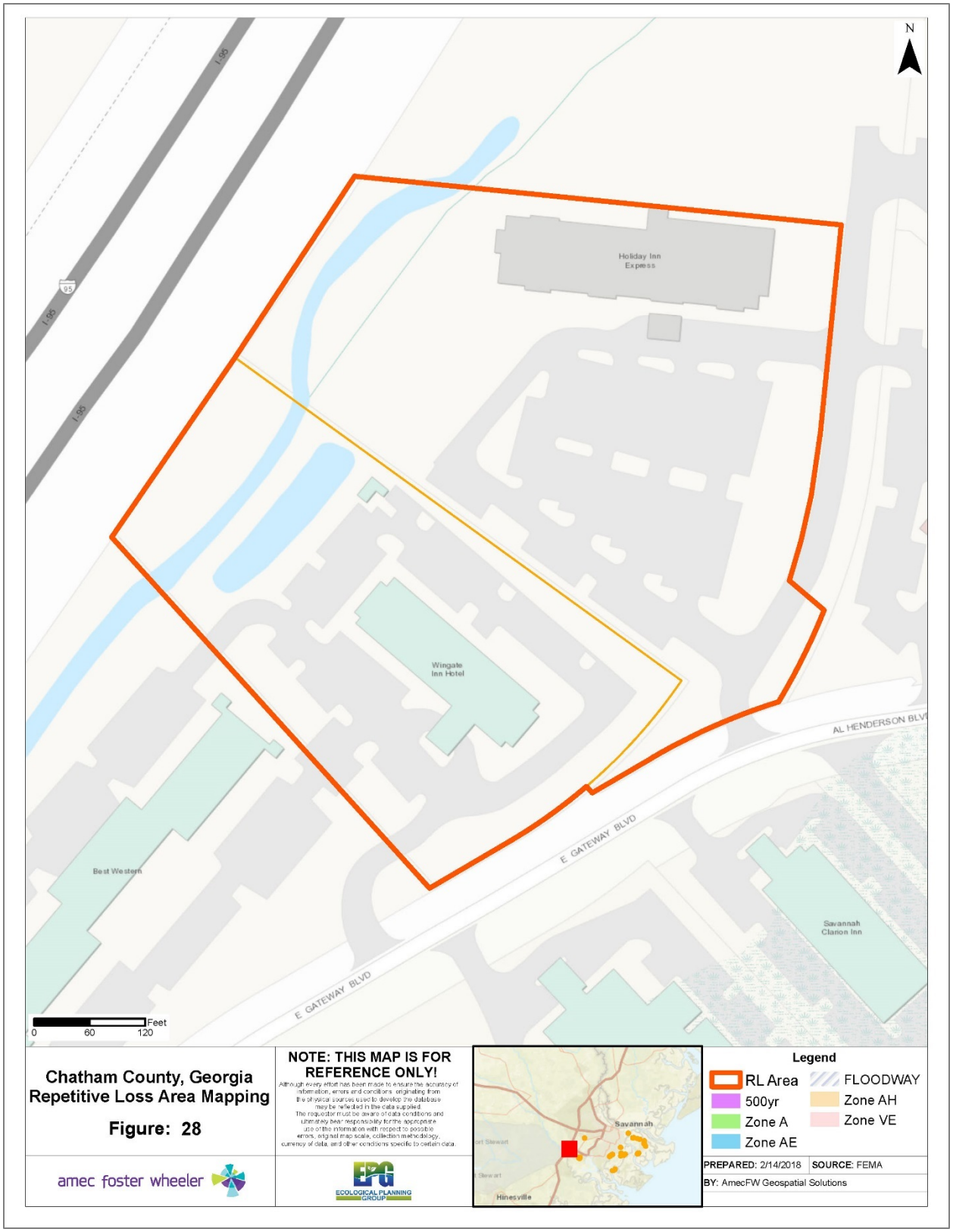


Figure 5.45 – Repetitive Loss Area Mapping, Area 28

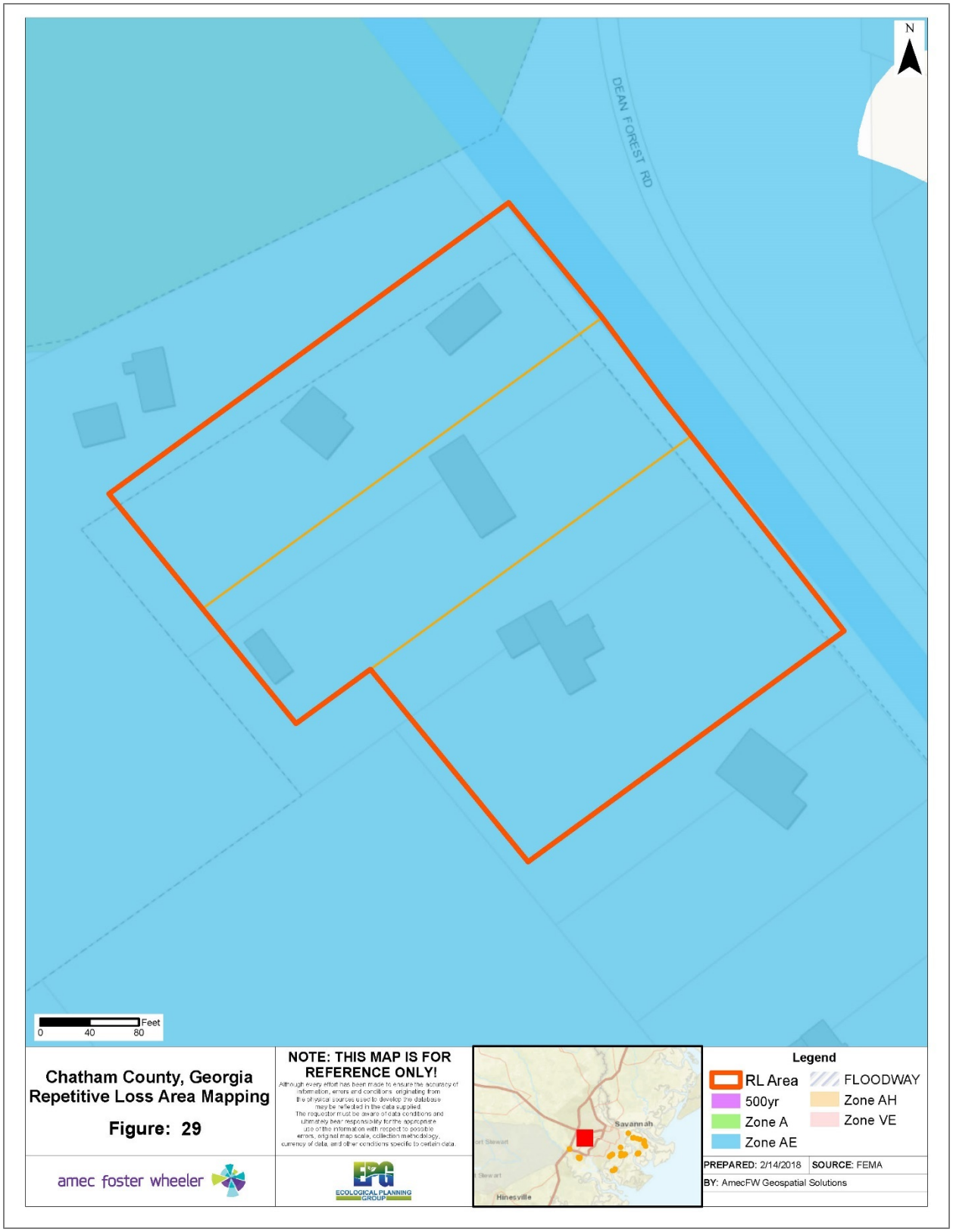


Figure 5.46 – Repetitive Loss Area Mapping, Area 29

5.4 FLOOD: LOCALIZED/STORMWATER FLOODING

Hazard Description

Localized stormwater flooding can occur throughout Chatham County. Localized stormwater flooding occurs when heavy rainfall and an accumulation of runoff overburden the stormwater drainage system. The cause of localized stormwater flooding in Chatham County can be attributed to its generally flat topography, abundance of water features, and the large amount of developed and impervious land, which limits ground absorption and increases surface water runoff.

Localized flooding may be caused by the following issues:

Inadequate Capacity – An undersized/under capacity pipe system can cause water to back-up behind a structure which can lead to areas of ponded water and/or overtopping of banks.

Clogged Inlets – Debris covering the asphalt apron and the top of grate at catch basin inlets may contribute to an inadequate flow of stormwater into the system. Debris within the basin itself may also reduce the efficiency of the system by reducing the carrying capacity.

Blocked Drainage Outfalls – Debris blockage or structural damage at drainage outfalls may prevent the system from discharging runoff, which may lead to a back-up of stormwater within the system.

Improper Grade – Poorly graded asphalt around catch basin inlets may prevent stormwater from entering the catch basin as designed. Areas of settled asphalt may create low spots within the roadway that allow for areas of ponded water.

Location / Spatial Extent

A list of "Hot Spot" flooding locations is maintained by the Chatham County Public Works Department. These hot spots are divided into four areas: Westside, Georgetown, Eastside, and Islands. The identified locations are known to have issues during major rainfall events and are separate from sea level rise flooding.

The areas of localized flooding noted by the Chatham County Public Works Department are listed below in Table 5.18.

Table 5.18 – Areas of Localized Flooding

Area	Location	Street Name or Intersection	Type of Flooding
Eastside	1	Leghorn Street	Heavy rain
Eastside	2	Jacquelyn Drive at LaRoche Avenue	Heavy rain
Eastside	3	Garland Drive	Heavy rain
Eastside	4	Area around Ferguson Avenue	Heavy rain
Eastside	5	Aquatic Center parking lot	Heavy rain
Eastside	6	Marian Circle	Heavy rain
Islands	1	Ashley Road at end of cul-de-sac	Heavy rain
Islands	2	Talbot Road	Heavy rain
Islands	3	Surrey Road	Heavy rain
Islands	4	Montford Road	Heavy rain
Islands	5	Area around 1024 Wilmington Island Road	Heavy rain
Islands	6	Salisbury Circle	Heavy rain
Islands	7	Battery Circle	Heavy rain
Islands	8	Oatland Island Road at Islands Expressway	Heavy rain
Islands	9	Oemler Loop	Heavy rain
Islands	10	Pelican Drive	Heavy rain
Westside	1	Diggs Avenue	Heavy rain

Area	Location	Street Name or Intersection	Type of Flooding
Westside	2	Brandlewood Drive	Heavy rain
Westside	3	Mark Circle	Heavy rain
Westside	4	Lamarville Park Area	Heavy rain
Westside	5	Westlake Apartment Area	Heavy rain
Westside	6	Gamble Rd Lake outfall (Going under Veteran's Parkway)	Heavy rain
Westside	7	Holiday Circle at Larchmont Drive	Heavy rain
Westside	8	Quacco Rd near Regency Trailer Park	Heavy rain
Westside	9	Gulfstream Road near the canal	Heavy rain
Westside	10	Gateway Blvd at Henderson Blvd (lake outfall)	Heavy rain
Westside	11	Henderson Blvd at Brown Thrush Rd	Heavy rain
Westside	12	Osteen Road	Heavy rain
Westside	13	Bluegill Lane	Heavy rain
Georgetown	1	Red Fox Drive	Heavy rain
Georgetown	2	Dovetail Crossing	Heavy rain
Georgetown	3	East Sagebrush Lane	Heavy rain
Georgetown	4	East White Hawthorn	Heavy rain
Georgetown	5	King George Boulevard	Heavy rain

Figure 5.47 on the following page depicts the areas of localized stormwater flooding identified by the FMPC. Figure 5.48 through Figure 5.51 show localized flooding hot spots in greater detail, by area.

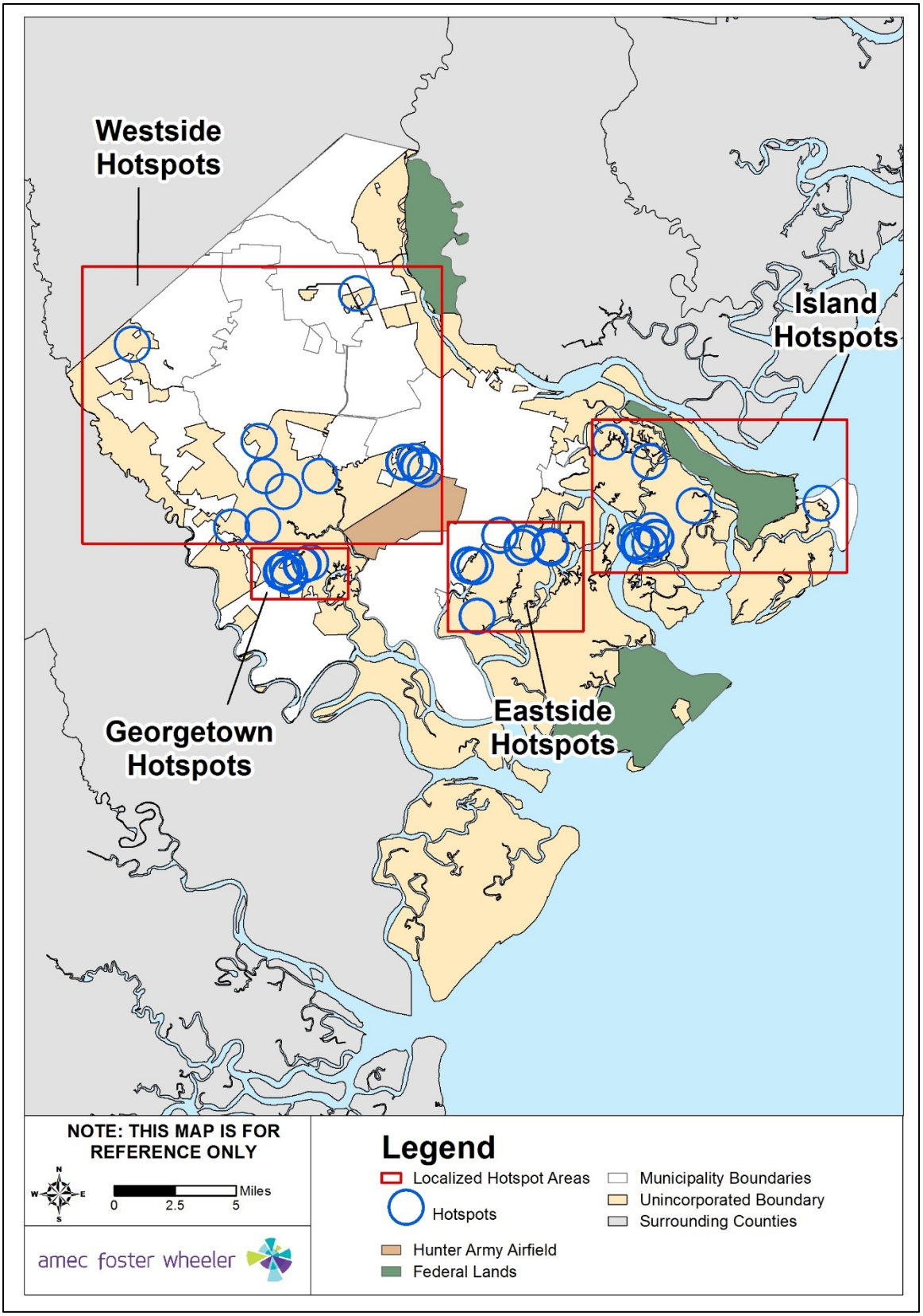
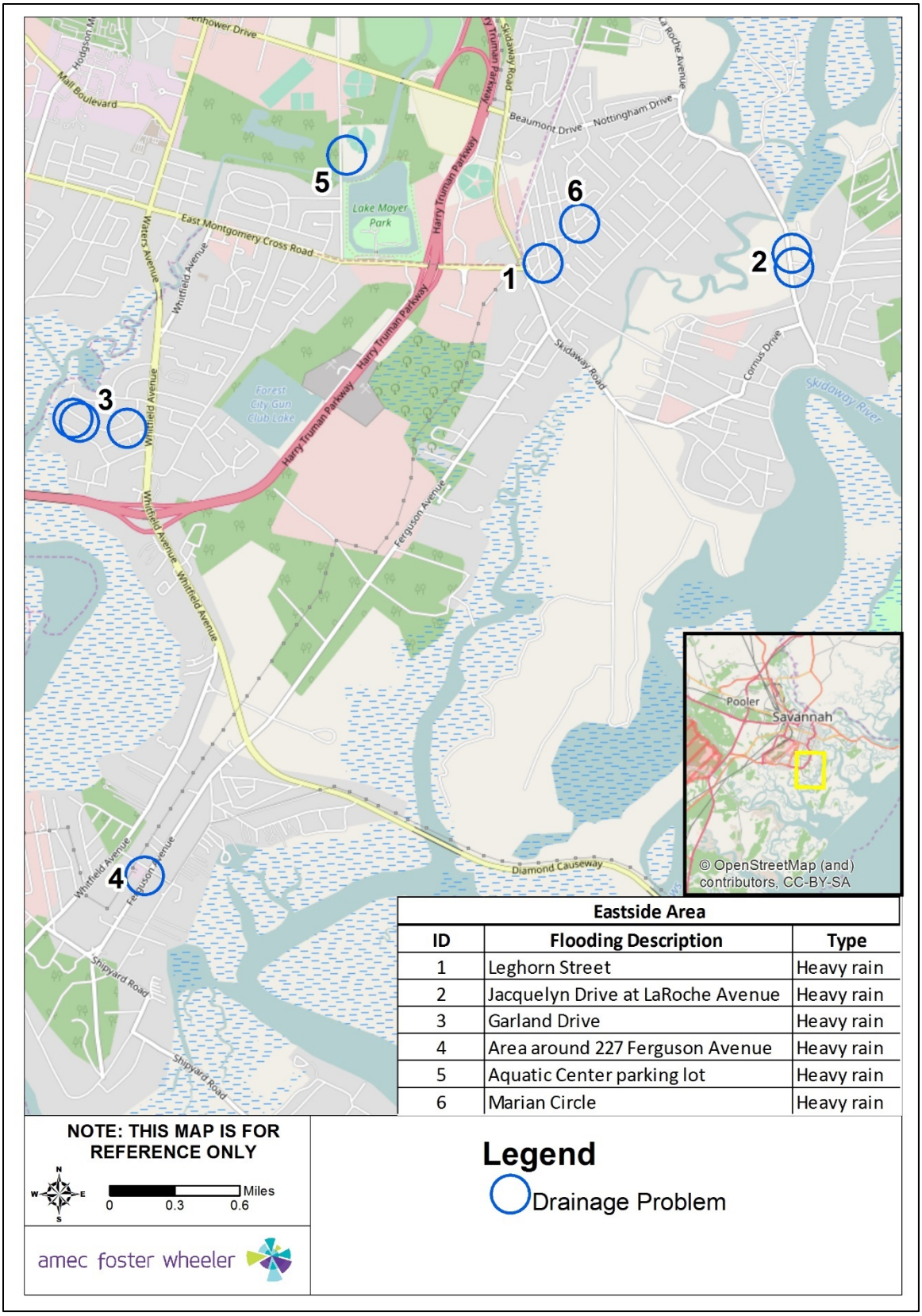


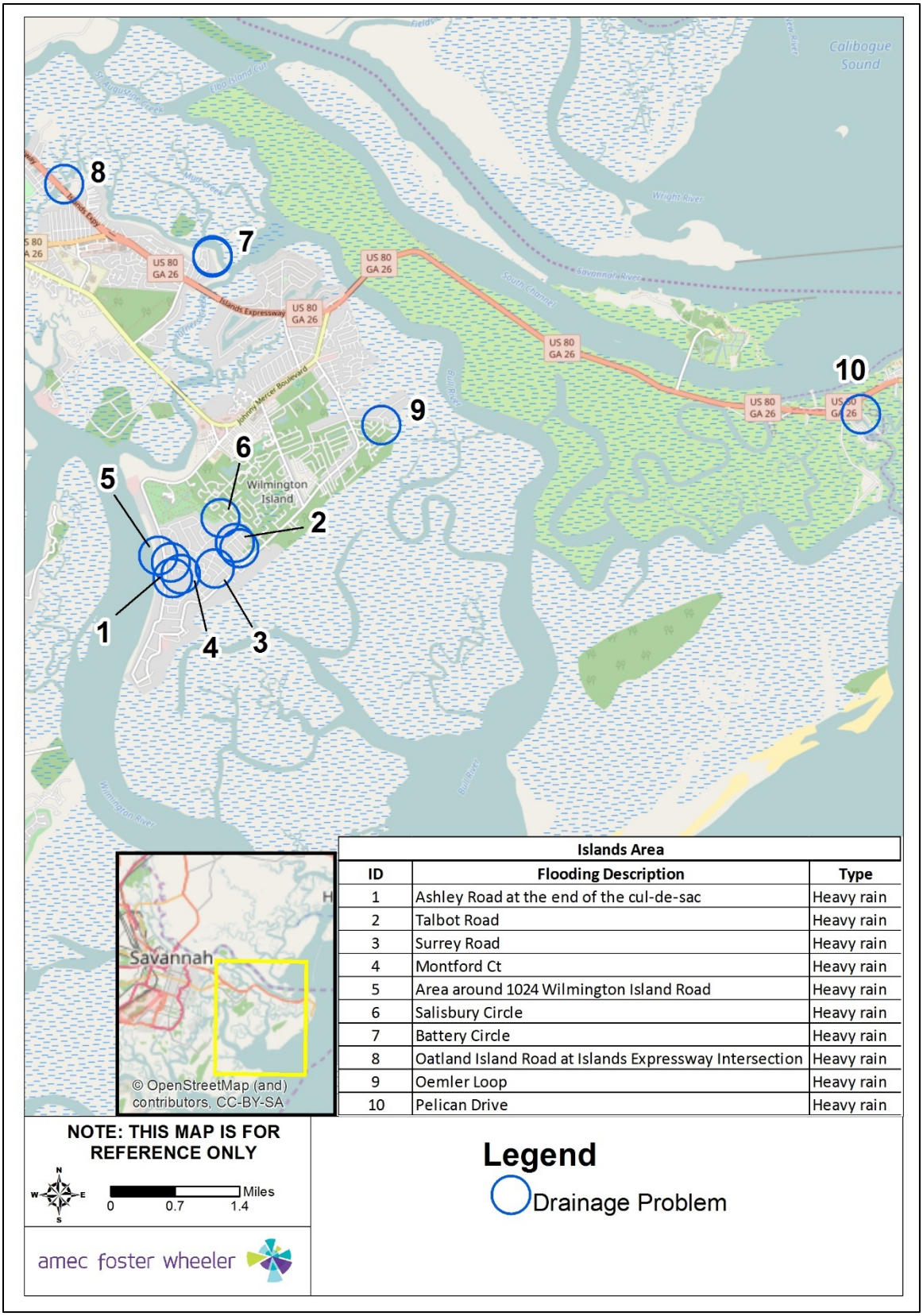
Figure 5.47 – Localized Flooding Locations Index Map



Eastside Area		
ID	Flooding Description	Type
1	Leghorn Street	Heavy rain
2	Jacquelyn Drive at LaRoche Avenue	Heavy rain
3	Garland Drive	Heavy rain
4	Area around 227 Ferguson Avenue	Heavy rain
5	Aquatic Center parking lot	Heavy rain
6	Marian Circle	Heavy rain

Source: Chatham County Public Works Department, 2017

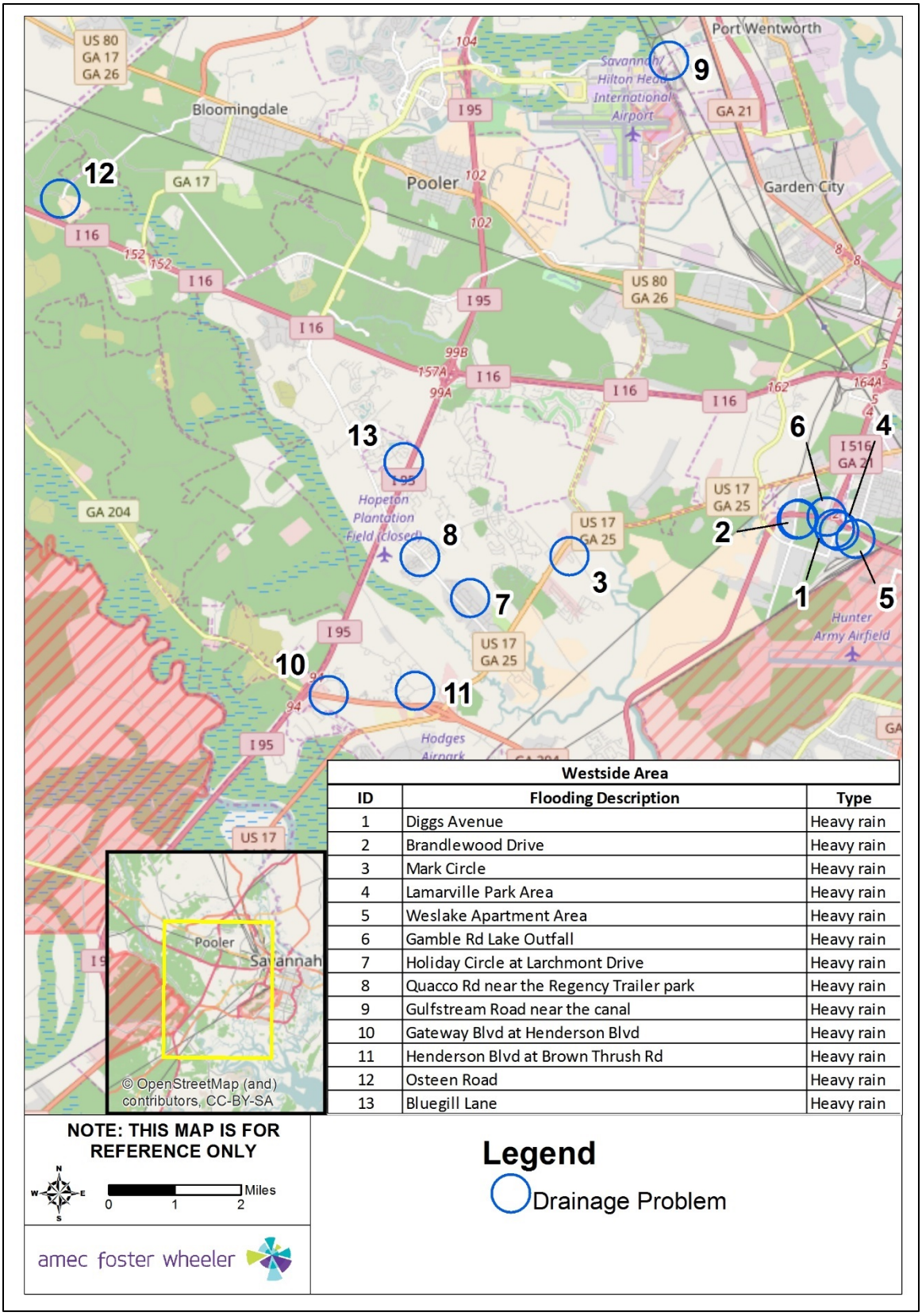
Figure 5.48 – Localized Flooding, Eastside Area



Islands Area		
ID	**Flooding Description**	**Type**
1	Ashley Road at the end of the cul-de-sac	Heavy rain
2	Talbot Road	Heavy rain
3	Surrey Road	Heavy rain
4	Montford Ct	Heavy rain
5	Area around 1024 Wilmington Island Road	Heavy rain
6	Salisbury Circle	Heavy rain
7	Battery Circle	Heavy rain
8	Oatland Island Road at Islands Expressway Intersection	Heavy rain
9	Oemler Loop	Heavy rain
10	Pelican Drive	Heavy rain

Source: Chatham County Public Works Department, 2017

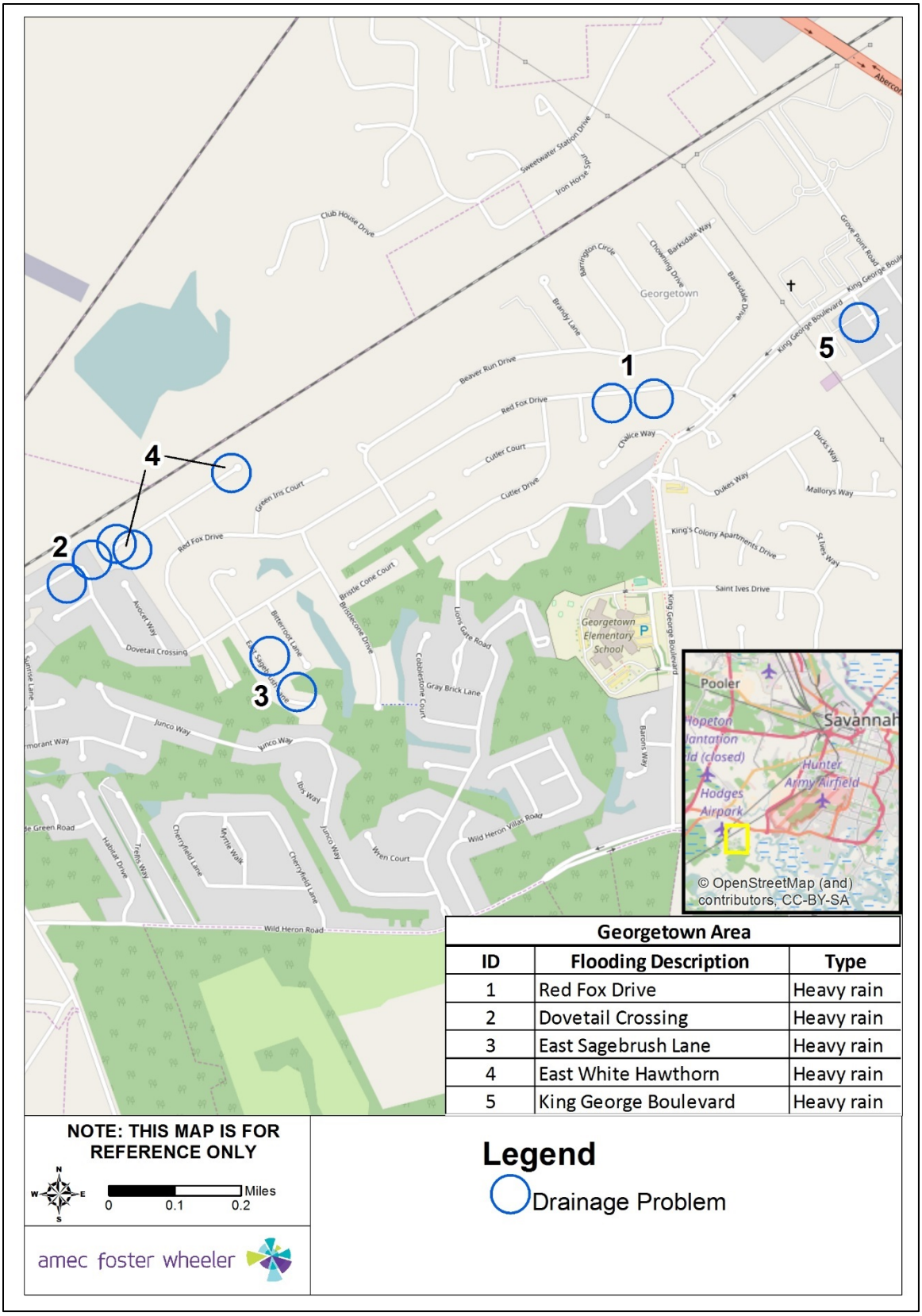
Figure 5.49 – Localized Flooding, Islands Area



Westside Area		
ID	Flooding Description	Type
1	Diggs Avenue	Heavy rain
2	Brandlewood Drive	Heavy rain
3	Mark Circle	Heavy rain
4	Lamarville Park Area	Heavy rain
5	Weslake Apartment Area	Heavy rain
6	Gamble Rd Lake Outfall	Heavy rain
7	Holiday Circle at Larchmont Drive	Heavy rain
8	Quacco Rd near the Regency Trailer park	Heavy rain
9	Gulfstream Road near the canal	Heavy rain
10	Gateway Blvd at Henderson Blvd	Heavy rain
11	Henderson Blvd at Brown Thrush Rd	Heavy rain
12	Osteen Road	Heavy rain
13	Bluegill Lane	Heavy rain

Source: Chatham County Public Works Department, 2017

Figure 5.50 – Localized Flooding, Westside Area



Source: Chatham County Public Works Department, 2017

Figure 5.51 – Localized Flooding, Georgetown Area

Past Occurrences

Table 5.19 shows detail for flash flood events reported by the NCEI since 1996 for Chatham County.

Table 5.19 – NCEI Flash Flooding in Chatham County – January 1996 to March 2017

Location	Date	Event Type	Injuries /Deaths	Property Damage	Crop Damage
SAVANNAH	7/5/1996	Flash Flood	0/2	1,000,000	$0
SAVANNAH	8/7/1996	Flash Flood	0/0	75,000	$0
EAST PORTION	1/23/1998	Flash Flood	0/0	$0	$0
EAST PORTION	6/29/1999	Flash Flood	0/0	7,000,000	$0
SAVANNAH	10/11/2002	Flash Flood	0/0	$0	$0
SAVANNAH	4/7/2003	Flash Flood	0/0	$0	$0
SAVANNAH	4/8/2003	Flash Flood	0/0	$0	$0
SAVANNAH	4/8/2003	Flash Flood	0/0	$0	$0
SAVANNAH	7/24/2003	Flash Flood	0/0	$0	$0
SAVANNAH	8/12/2004	Flash Flood	0/0	$0	$0
SAVANNAH	10/5/2005	Flash Flood	0/0	$0	$0
SAVANNAH	7/6/2006	Flash Flood	0/0	10,000	$0
SAVANNAH	7/30/2007	Flash Flood	0/0	8,000	$0
SAVANNAH	9/1/2007	Flash Flood	0/0	$0	$0
CENTRAL JCT	9/13/2007	Flash Flood	0/0	$0	$0
CENTRAL JCT	9/21/2007	Flash Flood	0/0	$0	$0
SAVANNAH	12/21/2007	Flash Flood	0/0	$11,000	$0
CENTRAL JCT	7/27/2008	Flash Flood	0/0	$0	$0
MEINHARD	10/24/2008	Flash Flood	0/0	$0	$0
SAVANNAH	7/27/2009	Flash Flood	0/0	10,000	$0
CENTRAL JCT	8/3/2009	Flash Flood	0/0	5,000	$0
GARDEN CITY	8/3/2009	Flash Flood	0/0	150,000	$0
SAVANNAH	8/12/2009	Flash Flood	0/0	$0	$0
SAVANNAH	6/27/2010	Flash Flood	0/0	$0	$0
VERNONBURG	8/20/2010	Flash Flood	0/0	$0	$0
CENTRAL JCT	6/29/2011	Flash Flood	0/0	$0	$0
THUNDERBOLT	7/14/2011	Flash Flood	0/0	10,000	$0
SAVANNAH	8/6/2011	Flash Flood	0/0	$0	$0
SAVANNAH	7/12/2013	Flash Flood	0/0	11,000	$0
OLEARY	7/13/2013	Flash Flood	0/0	$30,000	$0
SAVANNAH	7/31/2013	Flash Flood	0/0	$30,000	$0
CENTRAL JCT	8/16/2013	Flash Flood	0/0	20,000	$0
BONA BELLA	6/23/2014	Flash Flood	0/0	15,000	$0
CENTRAL JCT	8/10/2014	Flash Flood	0/0	$0	$0
LIBERTY CITY	7/17/2016	Flash Flood	0/0	$20,000	$0
WILLIAMS	10/7/2016	Flash Flood	0/0	$0	$0
		Total	**0/2**	**$8,405,000**	**$0**

Source: NCEI, July 2017

The following provides details on select flood events recorded in the NCEI database. These scenarios represent the types of flood events that can be expected in the future in the Chatham County.

July 5, 1996 – Eight to ten inches of rain fell in 3-4 hours in and around Savannah. As a result, 50 streets and 100 homes were flooded to various degrees. Numerous businesses had water several inches deep.

There were 31,000 residents without power for several hours. This event also occurred close to high tide. Some streets had water up to headlights on cars while some homes had water almost knee deep.

June 29, 1999 – Slow moving showers and thunderstorms developed repeatedly across Chatham County and Effingham County during the day. Twenty-four-hour rainfall amounts ranged from about 7 inches to over 13 inches. As a result of the flooding, over 500 homes and businesses were damaged to varying degrees and almost 600 automobiles were damaged. Water was as deep as 6 ft in some places. Numerous roads were washed out and/or closed during the flooding. Estimated dollar damage for public property was 4.5 million dollars and at least another 2.5 million dollars for private property.

October 11, 2002 – Tropical Storm Kyle dumped 3 to 5 inches of rain in the Savannah area within a 12-hour period. This very heavy rainfall caused flooding of roads, low lying areas and places with poor drainage. Numerous cars stalled and roads were closed as the flooding began to endanger lives.

July 24, 2003 – Thunderstorms dumped an estimated 4 to 6 inches of rain around high tide causing flooding in downtown Savannah. Numerous streets and underpasses were closed due to flooding. Four people were rescued from their cars after driving into water that caused cars to stall.

July 30, 2007 – Numerous road closures were reported in Downtown Savannah as a result of heavy rain from showers and thunderstorms across the region. High water was reported entering some apartments. Cars were floating down the roadway at 65th and Abercorn Street.

August 3, 2009 – Showers and thunderstorms brought heavy rainfall to southeast Georgia. The Chatham County Emergency Management Agency reported flooding of the following roadways or intersections in Savannah, Georgia, East Broad and Gwinnett, the 500 Block of River, 37th Street and Burroughs, Gwinnett and West Boundary, Legrand and 33rd Street, Drayton and 35th-36th Streets, Abercorn and Duffy, East Broad and Anderson, the 700 Block of East Henry, Bay and East Broad, Randolph and General McIntosh, President and General McIntosh, Martin Luther King Jr. and Hall, the 800 Block of Anderson, and East Broad and Henry.

June 23, 2014 – A line of stationary thunderstorms produced between 4-10 inches of rain across Chatham County, which resulted in flash flooding. KSAV observed the wettest June day on record since observations began in 1871. A trained spotter measured 4.75 inches of rainfall in under two hours. The Savannah Airport ASOS measured 6.65 inches of rainfall for the day. Flood waters also washed out a section of the CSX rail line near Highway 307 and Gulf Stream Road. Total costs were generally estimated to be around 15.0K.

Probability of Future Occurrence

Highly Likely – Given the 36 flash flood events recorded in NCEI over a 20-year period, there is a 100 percent chance of occurrence within the next year. Precipitation resulting from heavy rainstorms, including tropical storms and hurricanes, makes it highly likely that unmitigated properties will continue to experience localized flooding.

Vulnerability

Probability	Impact	Spatial Extent	Warning Time	Duration
Highly Likely	Minor	Small	6 to 12 hours	< 24 hours

Future Development

The risk of localized flooding to future development can be minimized by accurate recordkeeping of repetitive localized storm activity and by identifying and evaluating regional drainage issues. Mitigating the root causes of localized flooding or choosing not to develop in areas that often are subject to localized

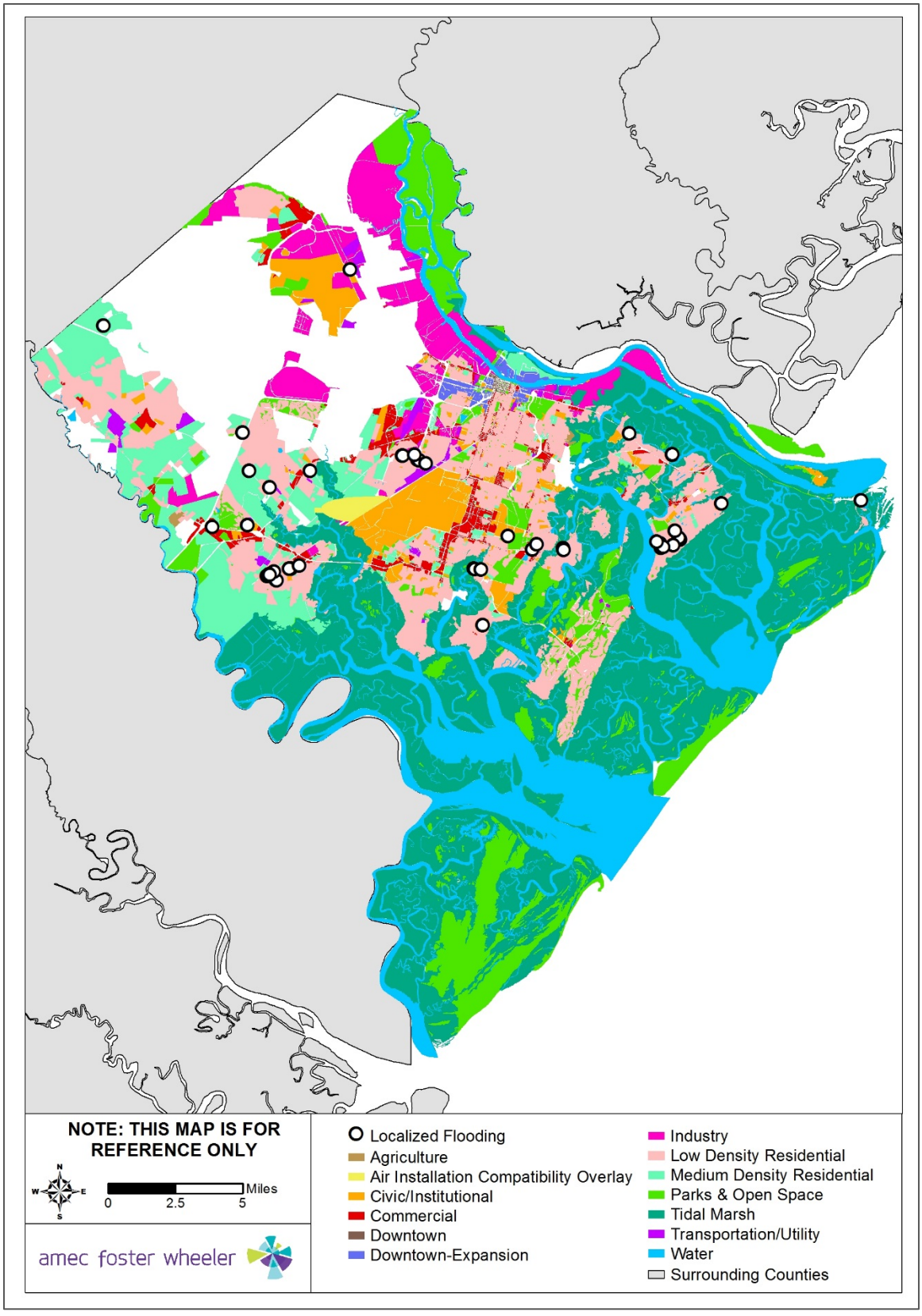
flooding will reduce future risk of losses due to this hazard. Figure 5.52 shows localized stormwater flooding in relation to future land use for Chatham County and the City of Savannah.

An analysis of future land use along with current known flooding locations indicates that most localized flooding occurs in areas slated for low density residential development near tidal marshes. Additionally, an increase in future flooding can likely be expected in and around the Westside and Georgetown hotspots in West Chatham County. As most of the developable land in the Islands and Southeast Chatham is built out, development pressure has shifted to West Chatham County, reflected in the planned low and medium density residential land uses in areas currently under agricultural and forestry use.

Evaluated on a watershed level, impervious surface and thus stormwater-related flooding is likely to increase in the Ogeechee Coastal and Lower Ogeechee basins, especially around areas of rapid development. Based on the land use and development mapped for these areas, not only will more property be exposed due to new construction, but the associated increase in impervious surface and reduction in flood storage areas will increase the vulnerability of existing property within these watersheds, particularly in West Chatham County and downstream areas.

Property at Risk

Localized flooding occurs at various times throughout the year with several areas of primary concern to the County. Localized flooding and ponding affect streets and property.



Source: Chatham County Public Works; Metropolitan Planning Commission; NFIP Repetitive Loss Data, 11/30/2016

Figure 5.52 – Localized Flooding Locations in Relation to Future Land Use

5.5 HURRICANE AND TROPICAL STORM

Hazard Description

A hurricane is a type of tropical cyclone or severe tropical storm that forms in the southern Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and in the eastern Pacific Ocean. All Atlantic and Gulf of Mexico coastal areas are subject to hurricanes. The Atlantic hurricane season lasts from June to November, with the peak season from mid-August to late October.

While hurricanes pose the greatest threat to life and property, tropical storms and depressions also can be devastating. A tropical disturbance can grow to a more intense stage through an increase in sustained wind speeds. The progression of a tropical disturbance is described below.

- **Tropical Depression:** A tropical cyclone with maximum sustained winds of 38 mph (33 knots) or less.
- **Tropical Storm:** A tropical cyclone with maximum sustained winds of 39 to 73 mph (34 to 63 knots).
- **Hurricane:** A tropical cyclone with maximum sustained winds of 74 mph (64 knots) or higher. In the western North Pacific, hurricanes are called typhoons; similar storms in the Indian Ocean and South Pacific Ocean are called cyclones.
- **Major Hurricane:** A tropical cyclone with maximum sustained winds of 111 mph (96 knots) or higher, corresponding to a Category 3, 4 or 5 on the Saffir-Simpson Hurricane Wind Scale.

The Saffir-Simpson Hurricane Wind Scale classifies hurricanes by intensity into one of five categories as shown in Table 5.9. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures.

Table 5.20 – Saffir-Simpson Hurricane Wind Scale, 2012

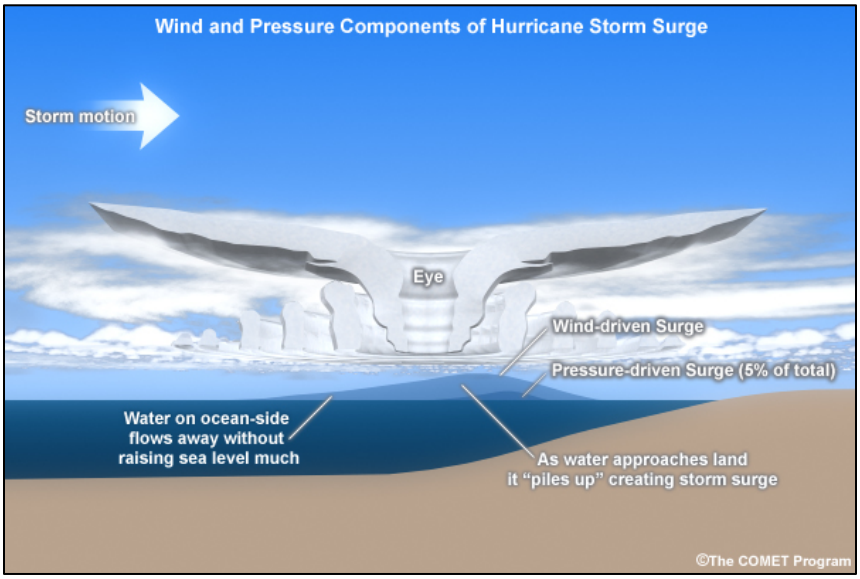
Category	Wind Speed (mph)	Potential Damage
1	74-95	**Very dangerous winds will produce some damage**: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111-129	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130-156	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	$\geq$ 157	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center/NOAA

Storm Surge

The greatest potential for loss of life related to a hurricane is from the storm surge. Storm surge is water that is pushed toward the shore by the force of the winds swirling around the storm as shown in Figure 5.53. This advancing surge combines with the normal tides to create the hurricane storm tide, which can increase the mean water level to heights impacting roads, homes and other critical infrastructure. In addition, wind driven waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with the normal high tides.

The maximum potential storm surge for a location depends on several different factors. Storm surge is a very complex phenomenon because it is sensitive to the slightest changes in storm intensity, forward speed, size (radius of maximum winds-RMW), angle of approach to the coast, central pressure (minimal contribution in comparison to the wind), and the shape and characteristics of coastal features such as bays and estuaries. Other factors which can impact storm surge are the width and slope of the continental shelf. A shallow slope, as is found off the coast of Chatham County, will produce a greater storm surge than a steep shelf.



Source: NOAA/The COMET Program

Figure 5.53 – Components of Hurricane Storm Surge

Location / Spatial Extent

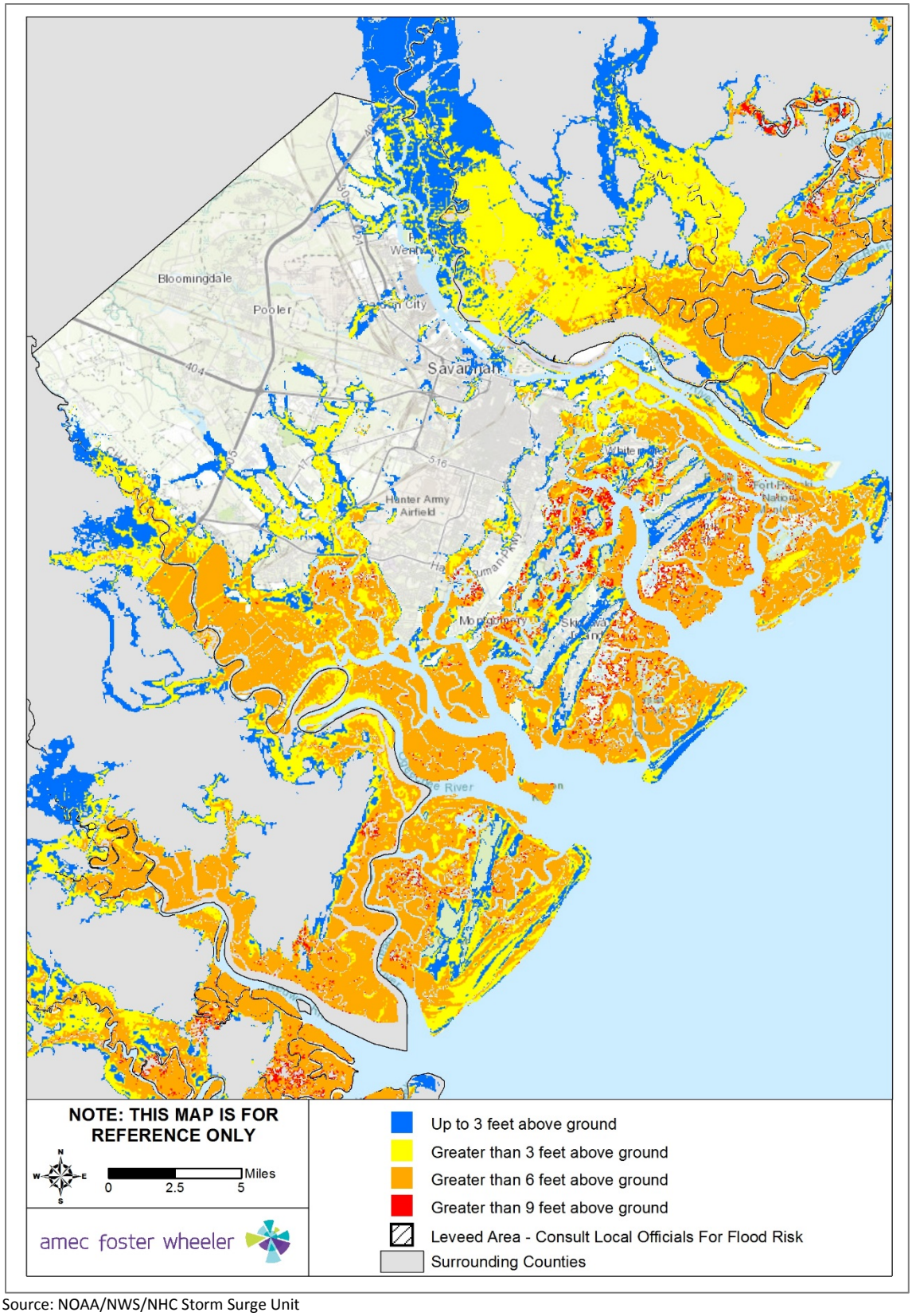
All of the Chatham County planning area is considered to be at risk to hurricanes and tropical storms. While hurricane winds and rains can extend hundreds of miles inland, storm surge is generally limited to within a few miles from the coast. All of Chatham County is vulnerable to hurricane and tropical storm surge, but to varying degrees, with areas closer to the coast and water bodies that drain into the coast (namely the Savannah and Ogeechee Rivers and their tributaries) facing greater risk than areas further inland.

Storm Surge Mapping

The Sea, Lake and Overland Surges from Hurricanes (SLOSH) model is a computerized numerical model developed by the National Weather Service to estimate storm surge heights resulting from historical, hypothetical, or predicted hurricanes by taking into account the atmospheric pressure, size, forward speed, and track data. These parameters are used to create a model of the wind field which drives the storm surge. The SLOSH model consists of a set of physics equations which are applied to a specific locale's shoreline, incorporating the unique bay and river configurations, water depths, bridges, roads, levees and

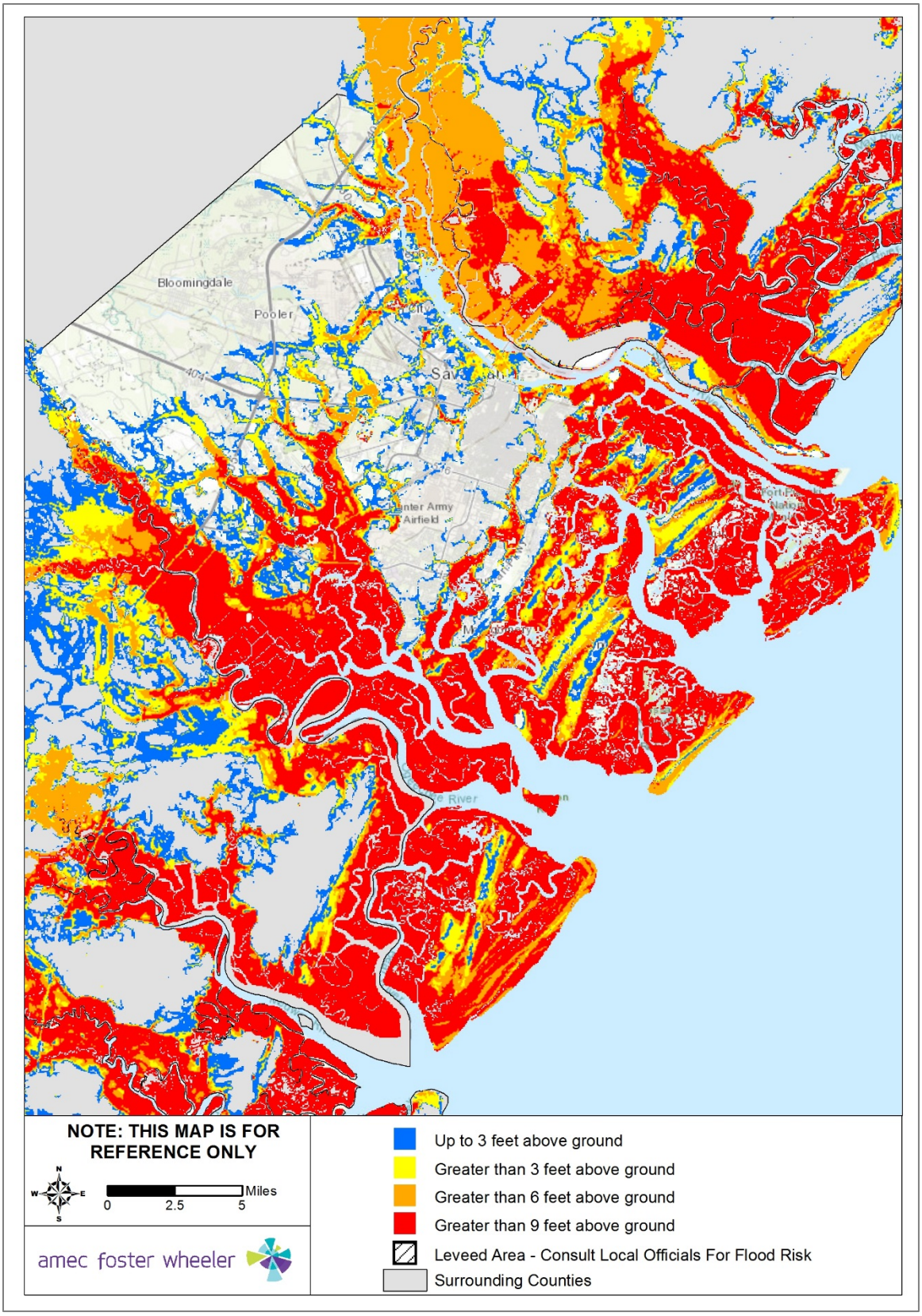
other physical features. The model creates outputs for all different storm simulations from all points of the compass. Each direction has a MEOW (maximum envelope of water) for each category of storm (1-5), and all directions combined result in a MOMs (maximum of maximums) set of data.

Anticipated SLOSH model surge elevations for Category 1 – Category 5 hurricanes are shown for Chatham County in Figure 5.54 through Figure 5.58 on the following pages. Given Chatham County's coastal location and low elevation, it is extremely vulnerable to storm surge flooding. Even a Category 1 storm surge has the potential to cause significant damage to the County.



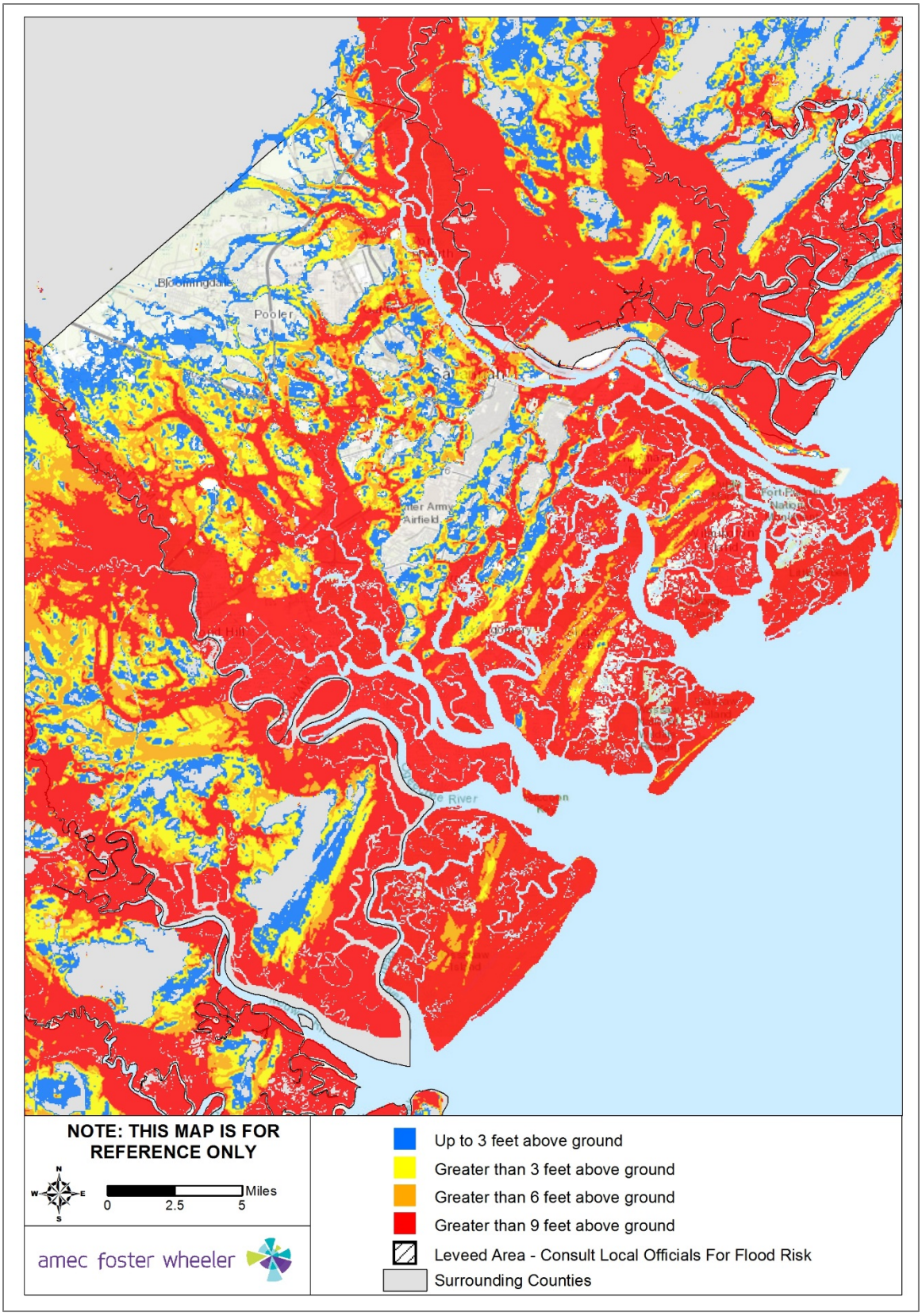
Source: NOAA/NWS/NHC Storm Surge Unit

Figure 5.54 – SLOSH Storm Surge Model for a Category 1 Storm



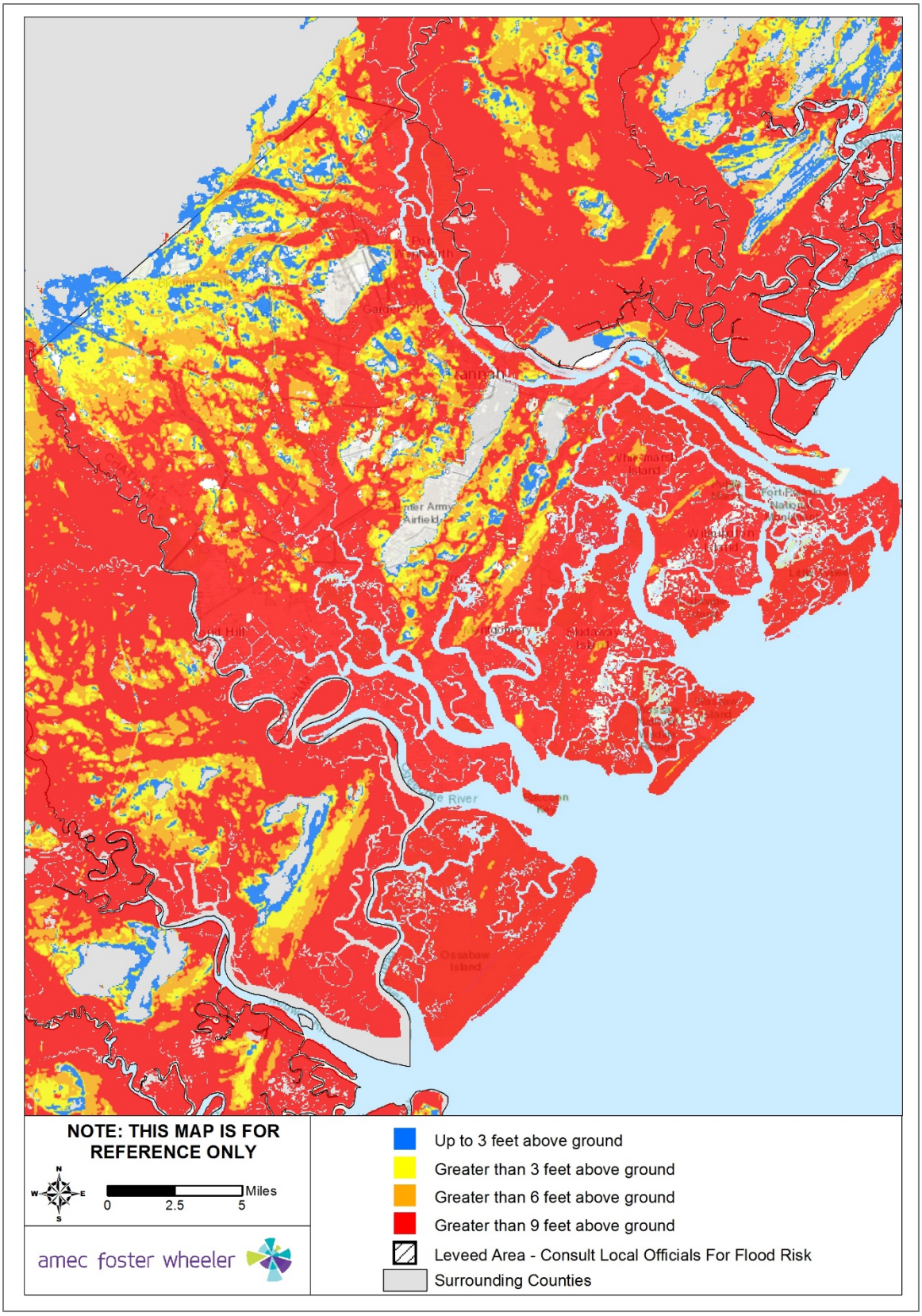
Source: NOAA/NWS/NHC Storm Surge Unit

Figure 5.55 – SLOSH Storm Surge Model for a Category 2 Storm



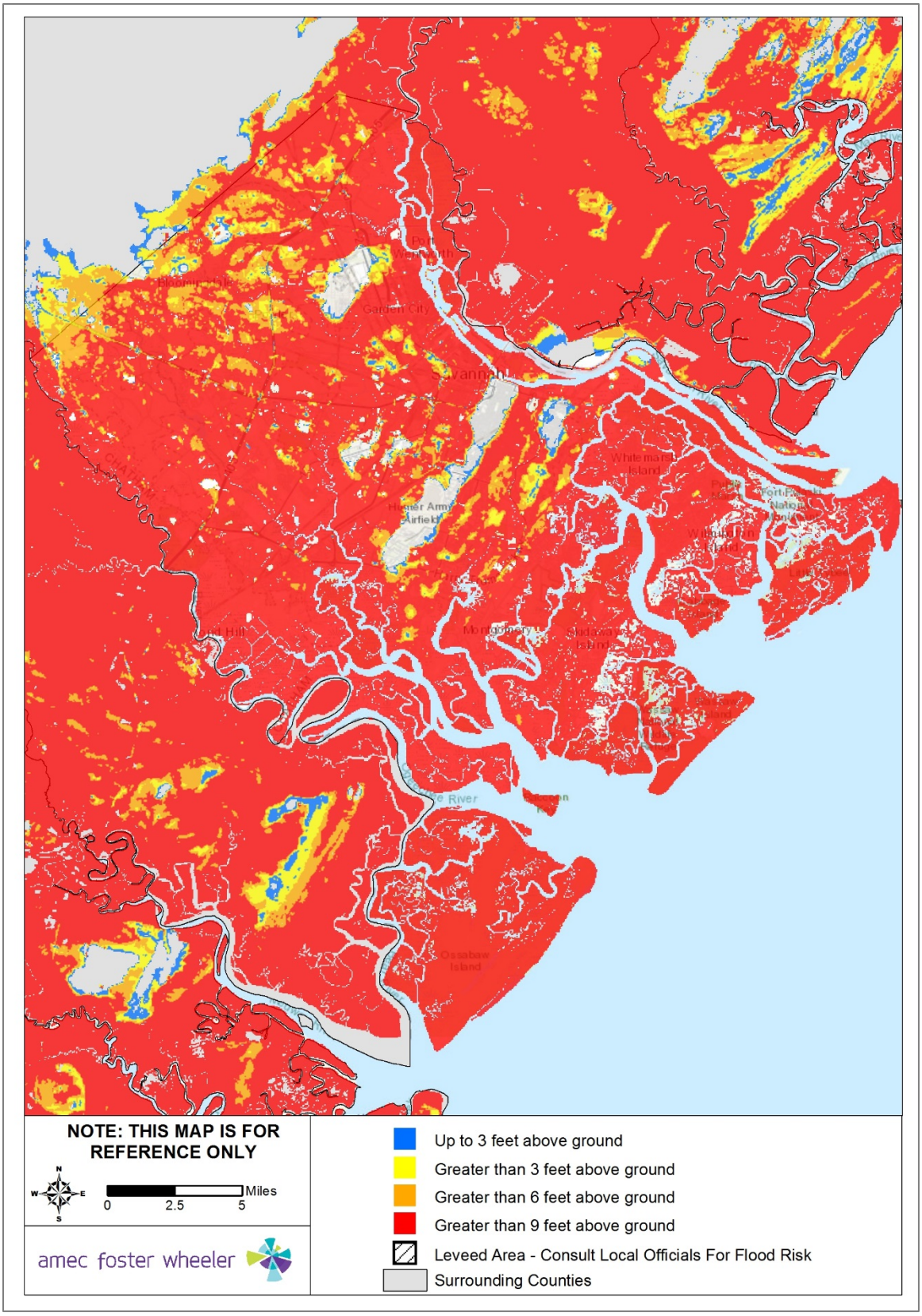
Source: NOAA/NWS/NHC Storm Surge Unit

Figure 5.56 – SLOSH Storm Surge Model for a Category 3 Storm



Source: NOAA/NWS/NHC Storm Surge Unit

Figure 5.57 – SLOSH Storm Surge Model for a Category 4 Storm



Source: NOAA/NWS/NHC Storm Surge Unit

Figure 5.58 – SLOSH Storm Surge Model for a Category 5 Storm

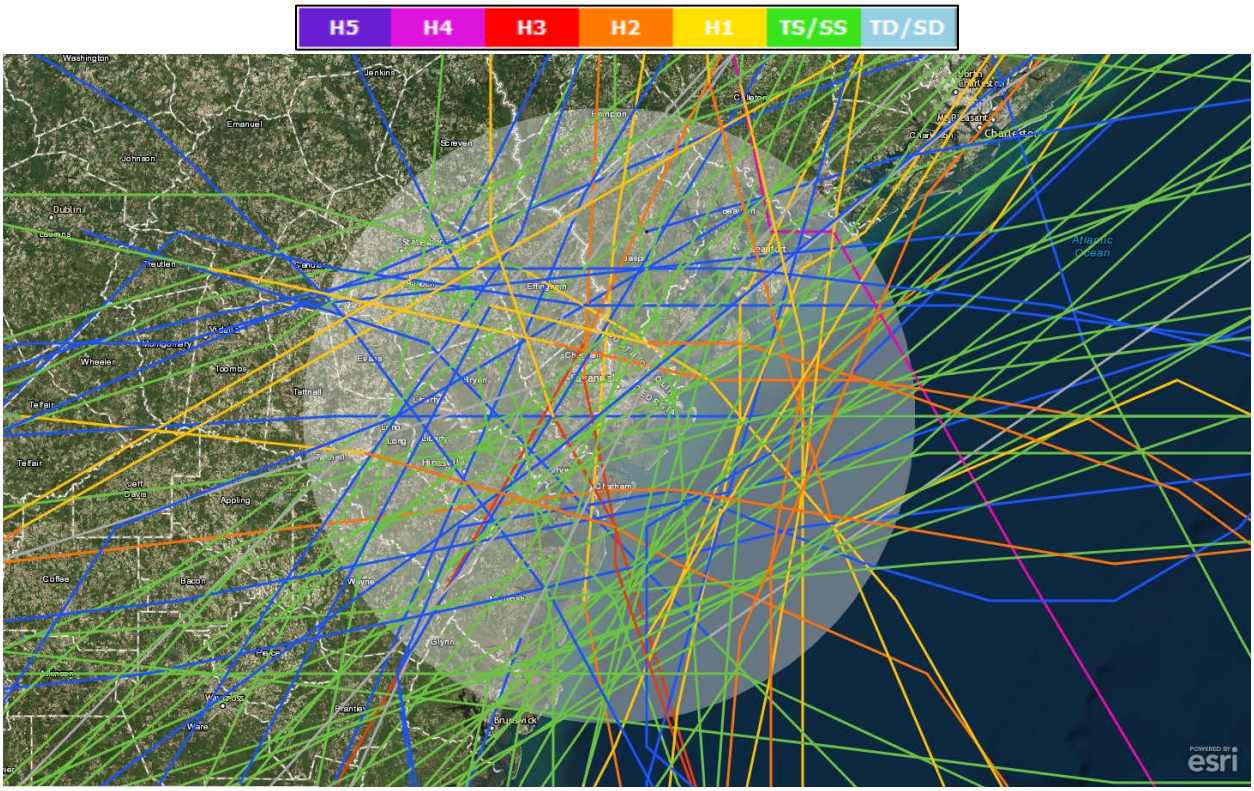
Past Occurrences

Chatham County is vulnerable to flood damage from hurricane rains and storm surge. Based on a search of the NOAA's National Hurricane Center Historical Hurricane Tracks for all hurricanes that have passed within 50 nautical miles of the County, the County has been exposed to 83 hurricanes and tropical storms including 3 tropical depressions since 1851. Type and frequency are as follows in Table 5.21. A listing of all hurricanes and tropical storms that passed within 50 nautical miles of Chatham County since 1851 is provided on the following pages in Table 5.22.

Table 5.21 – Hurricane Type & Frequency

Storm Intensity	Number of Occurrences	Rate of Occurrence
Tropical Storm/Depression	34	1 in 4.9 years
CAT I Hurricane	18	1 in 9.2 years
CAT II Hurricane	8	1 in 20.8 years
CAT III Hurricane	13	1 in 12.8 years
CAT IV Hurricane	7	1 in 23.7 years
CAT V Hurricane	3	1 in 55.3 years
TOTAL	83	1 in 2 years

Figure 5.59 on the following page illustrates past hurricane strike data for land falling major hurricanes over Chatham County as provided by the National Hurricane Center.



Source: NOAA/National Hurricane Center (http://coast.noaa.gov/hurricanes/#)

Figure 5.59 – Historical Hurricane Tracks (1851-2016)

Table 5.22 – Historical Hurricane Tracks Near Chatham County, GA

Storm Name	Max Saffir-Simpson	Date
Unnamed 1854	H3	09/07/1854 – 09/12/1854
Unnamed 1860	H3	08/08/1860 – 08/16/1860
Unnamed 1868	TS	10/01/1868 – 10/07/1868
Unnamed 1871	H3	08/14/1871 – 08/23/1871
Unnamed 1871	H3	08/17/1871 – 08/30/1871
Unnamed 1871	H1	09/30/1871 – 10/07/1871
Unnamed 1873	H1	09/18/1873 – 09/20/1873
Unnamed 1874	H1	09/25/1874 – 10/01/1874
Unnamed 1878	H2	09/01/1878 – 09/13/1878
Unnamed 1878	H1	10/09/1878 – 10/15/1878
Unnamed 1880	H1	09/06/1880 – 09/11/1880
Unnamed 1881	H2	08/21/1881 – 08/29/1881
Unnamed 1882	H4	10/05/1882 – 10/15/1882
Unnamed 1884	H1	09/10/1884 – 09/20/1884
Unnamed 1885	H2	08/21/1885 – 08/28/1885
Unnamed 1885	TS	08/29/1885 – 08/31/1885
Unnamed 1888	TS	09/06/1888 – 09/13/1888
Unnamed 1893	H1	06/12/1893 – 06/20/1893
Unnamed 1893	H3	08/15/1893 – 09/02/1893
Unnamed 1894	H3	09/18/1894 – 10/01/1984
Unnamed 1894	H3	10/01/1894 – 10/12/1894
Unnamed 1896	H3	09/22/1896 – 09/30/1896
Unnamed 1898	H1	08/30/1898 – 09/01/1898
Unnamed 1904	TS	10/31/1904 – 11/06/1904
Unnamed 1906	H3	10/08/1906 – 10/23/1906
Unnamed 1907	TS	06/24/1907 – 06/30/1907
Unnamed 1907	TS	09/27/1907 – 09/30/1907
Unnamed 1909	TS	06/26/1909 – 07/04/1909
Unnamed 1910	H4	10/09/1910 – 10/23/1910
Unnamed 1911	TS	08/04/1911 – 08/12/1911
Unnamed 1911	H2	08/23/1911 – 08/31/1911
Unnamed 1912	TS	09/02/1912 – 09/06/1912
Unnamed 1912	TS	07/12/1912 – 07/17/1912
Unnamed 1916	TS	10/02/1916 – 10/05/1916
Unnamed 1916	TS	05/13/1916 – 05/18/1916
Unnamed 1923	TS	06/22/1923 – 06/29/1923
Unnamed 1924	H1	09/13/1924 – 09/19/1924
Unnamed 1924	TS	09/27/1924 – 10/01/1924
Unnamed 1928	H5	09/06/1928 – 09/21/1928
Unnamed 1932	TS	09/09/1932 – 09/18/1932
Unnamed 1940	H2	08/05/1940 – 08/14/1940
Unnamed 1941	H3	10/03/1941 – 10/13/1941
Unnamed 1944	H4	10/12/1944 – 10/24/1944
Unnamed 1945	H4	09/12/1945 – 09/20/1945
Unnamed 1946	H2	10/05/1946 – 10/14/1946
Unnamed 1947	TS	09/20/1947 – 09/26/1947
Unnamed 1947	H2	10/08/1947 – 10/16/1947
Love 1950	H1	10/18/1950 – 10/16/1950

Storm Name	Max Saffir-Simpson	Date
Able 1952	H2	08/18/1952 – 09/03/1952
Unnamed 1953	TS	08/29/1953 – 09/01/1953
Florence 1953	H3	09/23/1953 – 09/27/1953
Unnamed 1954	TS	07/10/1954 – 07/14/1954
Unnamed 1957	TS	06/08/1957 – 06/15/1957
Gracie 1959	H4	09/20/1959 – 10/02/1959
Brenda 1960	TS	07/271960 – 08/07/1960
Cleo 1964	H4	08/20/1964 – 09/05/1964
Dora 1964	H4	08/28/1964 – 09/16/1964
Alma 1966	H3	06/04/1966 – 06/14/1966
Alma 1970	H1	05/17/1970 – 05/27/1970
Unnamed 1971	TD	09/08/1971 – 09/11/1971
Dawn 1972	H1	09/05/1972 – 09/14/1972
Unnamed 1976	TS	05/21/1976 – 05/25/1976
Unnamed 1976	TS	09/13/1976 – 09/17/1976
David 1979	H5	08/25/1979 – 09/08/1979
Unnamed 1981	TD	07/02/1981 – 07/04/1981
Bob 1985	H1	07/21/1985 – 07/26/1985
Isabel 1985	TS	10/07/1985 – 10/15/1985
Kate 1985	H3	11/15/1985 – 11/23/1985
Charley 1986	H1	08/13/1986 – 08/30/1986
Chris 1988	TS	08/21/1988 – 08/30/1988
Gordon 1994	H1	11/08/1994 – 11/21/1994
Josephine 1996	TS	10/04/1996 – 10/16/1996
Gordon 2000	H1	09/17/2000 – 09/21/2000
Kyle 2002	H1	09/20/2002 – 10/12/2002
Unnamed 2003	TD	07/25/2003 – 07/27/2003
Bonnie 2004	TS	08/03/2004 – 08/14/2004
Barry 2007	TS	05/31/2007 – 06/05/2007
Beryl 2012	TS	05/25/2012 – 06/02/2015
Andrea 2013	TS	06/05/2013 – 06/08/2013
Colin 2016	TS	06/05/2016 – 06/08/2016
Hermine 2016	H1	08/28/2016 – 09/08/2016
Julia 2016	TS	09/13/2016 – 09/21/2016
Matthew 2016	H5	09/28/2016 – 10/10/2016

Source: NOAA Historical Hurricane Tracks, 2017

The following is a description of past occurrences of hurricanes and tropical storms recorded by NCEI and the 2014 Flood Insurance Study (FIS) report:

August 21 - 29, 1881 – This storm reached hurricane intensity northeast of Puerto Rico on August 22. The lowest barometric pressure reading was 29.08 inches. The storm center entered the coast south of Savannah on August 27. Damage in Savannah was estimated at $1.5 million. Approximately 335 people were killed in and near the city. Nearly 100 vessels were wrecked along the Atlantic coast. Damage was very heavy on Tybee Island and other coastal islands near Savannah. The highest tide observed was estimated to reach an elevation of 15.6 feet NAVD at Savannah Beach, approximating a flood of at least 1-percent-annual-chance magnitude.

August 15 - September 2, 1893 – This major hurricane, which originated near the Cape Verde Islands, reached the Georgia coast on August 27. It was accompanied by a tremendous storm wave that submerged the islands along the Georgia and South Carolina coasts. Between 2,000 and 2,500 people

lost their lives on the coastal islands and in the lowland between Tybee Island and Charleston. Property damage along the Atlantic coast was estimated at $10 million. Nearly every building on Tybee Island was damaged and the railroad to the island was wrecked. The highest tide known to have occurred in the county was estimated to have a range of 16.1 to 18.6 feet NAVD at Savannah Beach.

August 30 - September 1, 1898 – This hurricane entered the Georgia-South Carolina coast on August 30. Its center passed over Tybee Island. Winds on Tybee Island were estimated at 100 mph. The storm surges were not high enough to cause extensive damage; however, the hurricane was accompanied by very heavy rain, and the countryside was flooded for 100 miles around Savannah. Most roads and railroads were impassable because of high water.

August 5 - 15, 1940 – This was the first hurricane to affect Georgia since August 1911. Its center entered the South Carolina coast to the north of Savannah on August 11. The wind at Savannah reached 73 mph, and damage in the Savannah area was estimated at $850,000. The highest tide observed at Beaufort, South Carolina, was estimated to be 11.5 feet NAVD. High tides of 6.5 and 5.5 feet NAVD were recorded at Fort Pulaski, Georgia, and at Fort Jackson, Savannah Harbor, Georgia, respectively.

September 20 - October 2, 1959 – Hurricane Gracie moved inland on September 29. Its center passed over the South Carolina coast near Beaufort. Wind gusts of hurricane force were felt in the Savannah area, and damage was inflicted over the upper Georgia coastal area. The total damage inflicted by the storm was estimated at $14 million with damage in Georgia estimated at more than $500,000. Highwater marks, which were reported near Edisto Beach, South Carolina, ranged from 6.4 to 11.0 feet NAVD.

July 7, 1996 – Hurricane Watch for Bertha and later a Warning for the Georgia Coast caused about 20,000 people to evacuate, primarily Chatham County. Bertha was far enough offshore that it did not cause significant damage. Estimated loss revenue and down time for local plants and factories was $2,000,000.

October 10, 2005 – Tropical Storm Tammy moved ashore in northeast Florida but the strongest effects were felt well north of the actual center. Tropical Storm force wind gusts as high as 50 mph affected the Georgia coast for many hours. Numerous trees were blown down, a few of which fell on houses and cars. Coastal flooding and high surf also occurred due to Tammy. Significant beach erosion occurred at Tybee Island.

August 21, 2008 – Tropical Storm Fay moved eastward into northeast Florida, resulting in Tropical Storm force conditions across southeast Georgia. Law Enforcement reported power lines blown down near the intersection of Johnny Mercer and Pennwaller roads. Traffic lights were also reported down at the intersection of Dereene and Montgomery roads. Several roads were flooded, including portions of Abercorne Street, 40th Street, Bull Street and Montgomery Street.

May 27, 2012 – Beryl developed as a Subtropical Storm over the Atlantic Ocean well east of the North Coastal Georgia area. The cyclone eventually became a Tropical Storm and slowly moved to the southwest and finally made landfall along the northeast Florida coast. The system then weakened to a Tropical Depression and meandered about before slowly moving back to the northeast across coastal portions of Georgia and South Carolina. The system produced tropical storm force winds, rip currents, and areas of heavy rainfall across the region.

October 7, 2016 – Across southeast Georgia and southeast South Carolina, the main impacts from Matthew included heavy rain, wind damage in the form of scattered to widespread trees and power lines blown down and storm surge, specifically along coastal locations from Tybee Island, GA north to Edisto Beach, SC. Storm total rainfall amounts generally ranged from 4.5 to 7 inches across western areas of Southeast Georgia and extreme western locations of Southeast South Carolina to 8 to 17 inches closer to

the coast, highest in coastal counties of Southeast Georgia and the lower Southeast South Carolina coast. A peak storm total rainfall of 17.49 inches was recorded at Hunter Army Airfield in Georgia. Daily record rainfall totals of were also set on October 7th and October 8th at the Savannah International Airport (KSAV), 4.36 inches and 3.84 inches, respectively. Heavy rains also led to several instances of flash flooding with damage to roads and homes. The most extensive damage came with storm surge during Matthew. The entire Southeast Georgia and Southeast South Carolina coast was impacted by storm surge generally ranging between 2 to 5 feet with some locations as high as 6 to 8 feet. A peak surge of 7.69 feet occurred at the Fort Pulaski tide gauge at 248 AM October 8th. Damage from surge was most notable on the northern ends of Tybee Island in Georgia.

Table 5.23 shows hurricane, tropical storm, and storm surge data reported by NCEI since 1996 for Chatham County. Duplicate records have been condensed where possible into one line per event.

Table 5.23 – NCEI Hurricane/Tropical Storm Data for Chatham County

Date	Event Type	Deaths/ Injuries	Property Damage	Crop Damage
7/11/1996	Hurricane	0/0	$0	$0
9/15/1999	Hurricane	0/0	$0	$0
7/10/2005	Hurricane	0/0	$0	$0
8/29/2005	Hurricane	0/0	$0	$0
9/14/2002	Tropical Storm	0/0	$0	$0
7/1/2003	Tropical Storm	0/0	$0	$0
9/6/2004	Tropical Storm	0/0	$0	$0
9/16/2004	Tropical Storm	0/0	$0	$0
9/26/2004	Tropical Storm	0/0	$0	$0
9/27/2004	Tropical Storm	0/0	$0	$0
6/12/2005	Tropical Storm	0/0	$0	$0
7/6/2005	Tropical Storm	0/0	$0	$0
10/5/2005	Tropical Storm	0/0	$0	$0
6/12/2006	Tropical Storm	0/0	$0	$0
8/30/2006	Tropical Storm	0/0	$0	$0
8/21/2008	Tropical Storm	0/0	$3000	$0
8/22/2008	Tropical Storm	0/0	$1500	$0
11/10/2009	Tropical Storm	0/0	$0	$0
9/4/2011	Tropical Storm	0/0	$0	$0
5/27/2012	Tropical Storm	0/0	$2500	$0
6/6/2013	Tropical Storm	0/0	$7500	$0
9/2/2016	Tropical Storm	0/0	$0	$0
10/7/2016	Tropical Storm	0/0	$0	$0
9/2/2016	Storm Surge/Tide	0/0	$0	$0
10/7/2016	Storm Surge/Tide	0/0	$0	$0
Total		**0/0**	**$14,500**	**$0**

Source: NCEI, November 2016

Probability of Future Occurrence

Likely – Given the 25 hurricane, tropical storm, and storm surge occurrences recorded by NCEI over a period of 20 years (1996-2016), and the 83 historical hurricane tracks recorded by NOAA and the National Hurricane Center, hurricane-related flooding in Chatham County is likely in the future. A hurricane or tropical storm affects Chatham County on average once every 2 years.

Climate Change and Hurricane and Tropical Storms

One of the primary factors contributing to the origin and growth of tropical storm and hurricanes systems is water temperature. Sea surface temperature may increase significantly in the main hurricane development region of the North Atlantic during the next century as well as in the Gulf of Mexico. According to the 2014 National Climate Assessment, studies suggest that there will be an increase in the number of Category 4 and 5 storms as well as an increase in rainfall rates from these storms.

Vulnerability

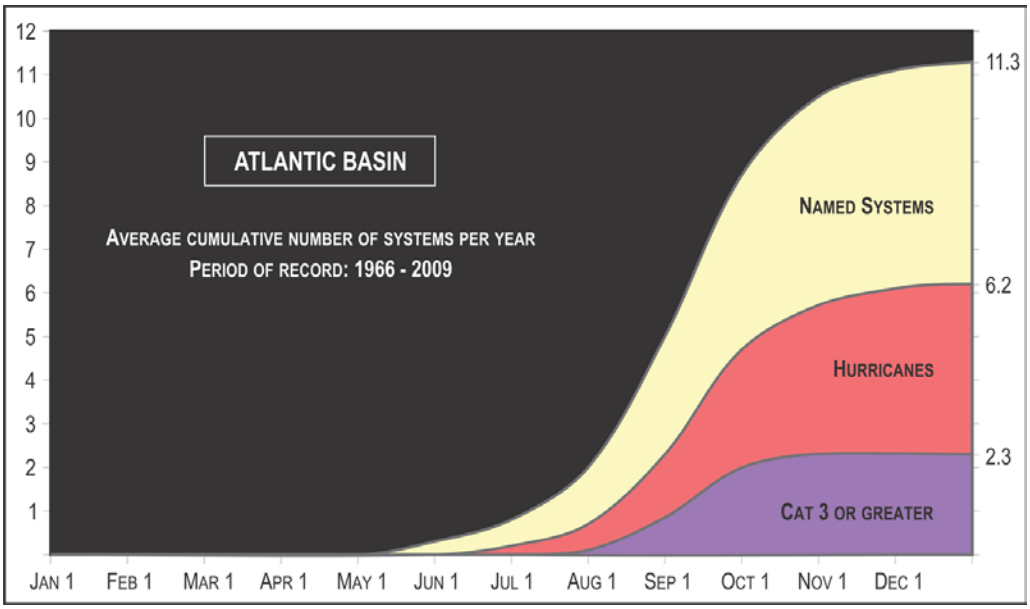
Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Critical	Large	> 24 hours	< 1 week

The heavy rains associated with tropical weather systems are not only responsible for major flooding in areas where the storm initially strikes, but can also affect areas hundreds of miles inland. Torrential rains from hurricanes and tropical storms can produce extensive urban and riverine flooding, especially if the storm systems are large and slow moving. Winds from these storms located offshore can drive ocean water up the mouth of a river or canal, compounding the severity of inland overbank flooding.

In addition to the combined destructive forces of wind, rain, and lightning, hurricanes can cause a surge in the ocean, which can raise the sea level as high as 25 feet or more in the strongest hurricanes. As a hurricane approaches the coast, its winds drive water toward the shore. Once the edge of the storm reaches the shallow waters of the continental shelf, the water begins to pile up. Winds of hurricane strength eventually force the water onto the shore. At first, the water level climbs slowly, but as the eye of the storm approaches, water rises rapidly. Furthermore, storm surge can also cause extensive damage on the backside of a hurricane as storm surge waters are sucked back out to sea.

Natural resources, particularly beaches, are devastated by hurricanes. The erosion of the coastline is considerable due to the impact of wind, waves, and debris in a hurricane event. Storm surge and subsequent erosion of the shoreline often leads to the loss of property

The Atlantic basin hurricane season runs from June 1st to November 30th. The Atlantic basin includes the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. Figure 5.60 shows the progress of a typical hurricane season in terms of the total number of tropical systems and hurricanes produced throughout the year in the Atlantic basin. The curves represent the average cumulative production of all named tropical systems, all hurricanes, and those hurricanes which were Category 3 or stronger in those basins.



Source: NOAA/National Hurricane Center

Figure 5.60 – Average Number of Tropical Storms per Year (Atlantic Basin)

Properties at Risk

Table 5.24 through 6.20 provide a summary of assets at risk to hurricane surge based on each hurricane category. The buildings vulnerable to each hurricane category are mapped in Figure 5.61 through Figure 5.65 on the following pages. Building are shown as at risk to hurricane storm surge if they fall within any portion of the SLOSH model storm surge extent, regardless of flood depth. Therefore, some structures are more vulnerable than others depending on the actual depth of flooding that could occur at each location.

The estimate of assets at risk for each hurricane category is based on the total of improved and contents value. These values are not damage estimates, but rather reflect the total building and contents value for all structures that could be exposed to any depth of hurricane storm surge flooding for each category of storm based on NOAA SLOSH models.

Note: Due to data limitations, 17 structures located on Ossabaw Island were not included in this analysis. However, NOAA SLOSH models indicate that all of Ossabaw Island would be inundated by a Category 2 hurricane storm surge.

Table 5.24 – Properties at Risk to Category 1 Storm Surge

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value (Building and Contents)
Agricultural	50	$10,586,733	$10,586,733	$21,173,466
Commercial	113	$24,831,126	$24,831,126	$49,662,252
Education	46	$38,535,639	$38,535,639	$77,071,278
Government	0	$0	$0	$0
Industrial	216	$49,873,928	$74,810,892	$124,684,820
Religious	0	$0	$0	$0
Residential	3,423	$877,350,177	$438,675,088	$1,316,025,265
Total	**3,848**	**$1,001,177,603**	**$587,439,479**	**$1,588,617,082**

Source: Chatham County building data, NOAA SLOSH model

Table 5.25 – Properties at Risk to Category 2 Storm Surge

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value (Building and Contents)
Agricultural	112	$28,486,882	$28,486,882	$56,973,764
Commercial	923	$187,622,321	$187,622,321	$375,244,642
Education	74	$48,851,755	$48,851,755	$97,703,510
Government	0	$0	$0	$0
Industrial	893	$293,958,703	$440,938,055	$734,896,758
Religious	0	$0	$0	$0
Residential	15,313	$3,394,784,750	$1,697,392,375	$5,092,177,125
Total	**17,315**	**$3,953,704,411**	**$2,403,291,388**	**$6,356,995,799**

Source: Chatham County building data, NOAA SLOSH model

Table 5.26 – Properties at Risk to Category 3 Storm Surge

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value (Building and Contents)
Agricultural	170	$36,666,582	$36,666,582	$73,333,164
Commercial	3,226	$824,586,879	$824,586,879	$1,649,173,758
Education	76	$49,573,520	$49,573,520	$99,147,040
Government	4	$0	$0	$0
Industrial	1,573	$539,260,002	$808,890,003	$1,348,150,005
Religious	15	$39,473,966	$39,473,966	$78,947,932
Residential	26,462	$4,699,351,772	$2,349,675,886	$7,049,027,658
Total	**31,526**	**$6,188,912,721**	**$4,108,866,836**	**$10,297,779,557**

Source: Chatham County building data, NOAA SLOSH model

Table 5.27 – Properties at Risk to Category 4 Storm Surge

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value (Building and Contents)
Agricultural	172	$37,867,482	$37,867,482	$75,734,964
Commercial	3,541	$940,064,885	$940,064,885	$1,880,129,770
Education	82	$49,968,695	$49,968,695	$99,937,390
Government	4	$0	$0	$0
Industrial	2,070	$825,001,560	$1,237,502,340	$2,072,062,685
Religious	18	$41,041,700	$41,041,700	$82,083,400
Residential	29,816	$5,056,792,044	$2,528,396,022	$7,585,188,066
Total	**35,703**	**$7,099,400,368**	**$4,922,109,763**	**$11,785,577,490**

Source: Chatham County building data, NOAA SLOSH model

Table 5.28 – Properties at Risk to Category 5 Storm Surge

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value (Building and Contents)
Agricultural	172	$37,867,482	$37,867,482	$75,734,964
Commercial	3,607	$958,159,408	$958,159,408	$1,916,318,816
Education	84	$50,100,420	$50,100,420	$100,200,840
Government	4	$0	$0	$0
Industrial	2,117	$828,825,074	$1,243,237,611	$2,072,062,685
Religious	18	$41,041,700	$41,041,700	$82,083,400
Residential	30,559	$5,183,406,284	$2,591,703,142	$7,775,109,426
Total	**36,561**	**$7,099,400,368**	**$4,922,109,763**	**$12,021,510,131**

Source: Chatham County building data, NOAA SLOSH model

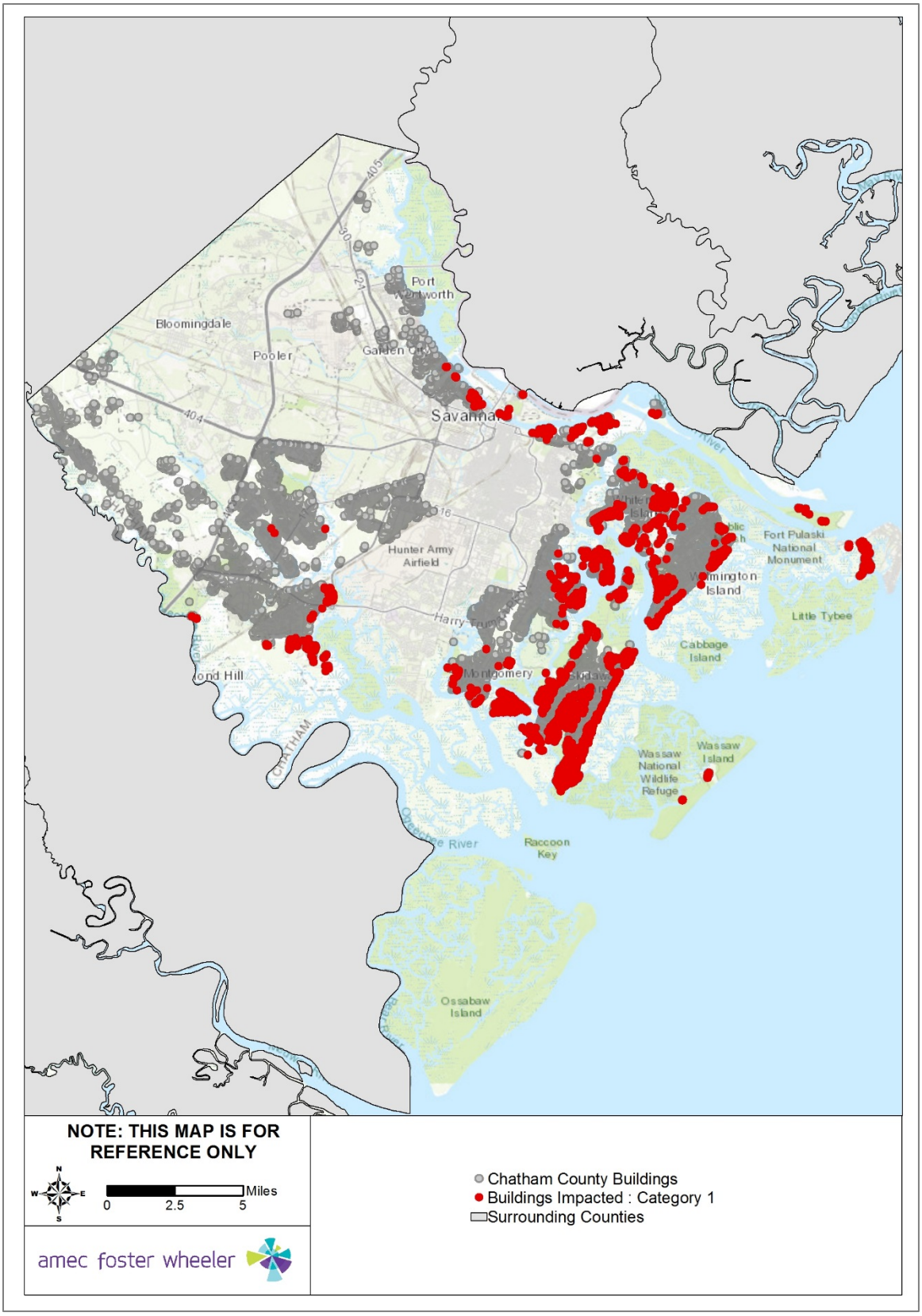


Figure 5.61 – Buildings Vulnerable to Modeled Category 1 Storm Surge

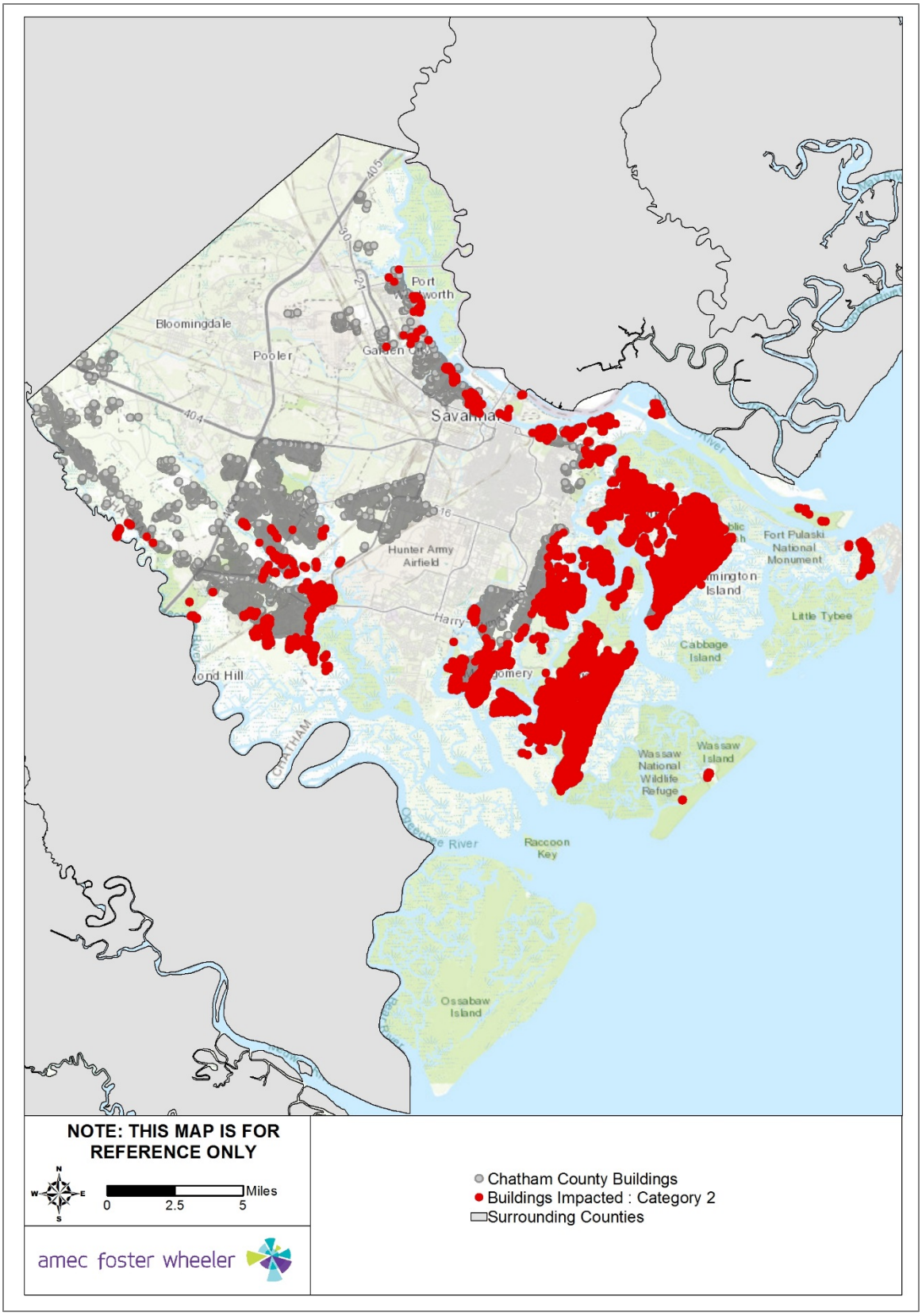


Figure 5.62 – Buildings Vulnerable to Modeled Category 2 Storm Surge

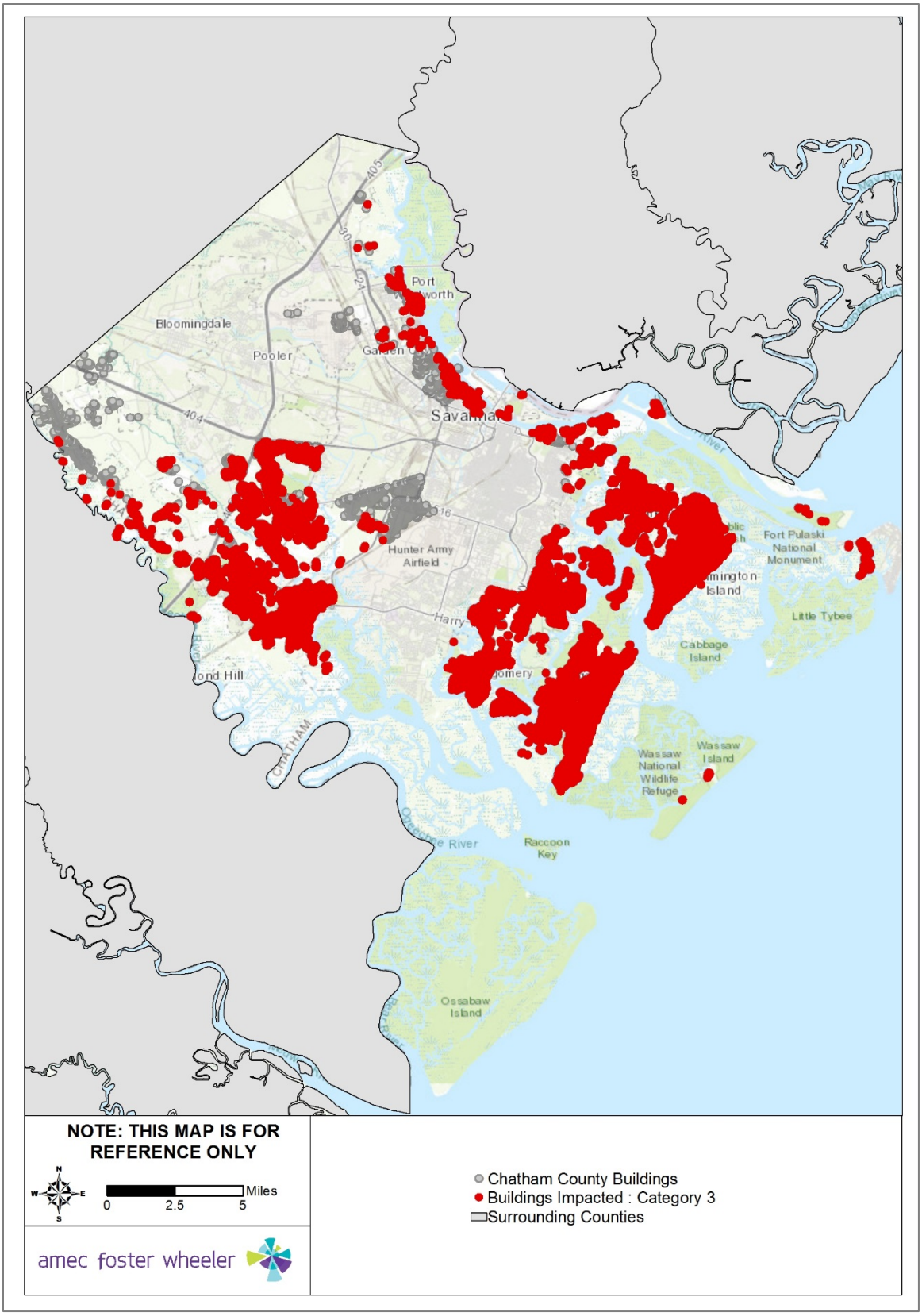


Figure 5.63 – Buildings Vulnerable to Modeled Category 3 Storm Surge

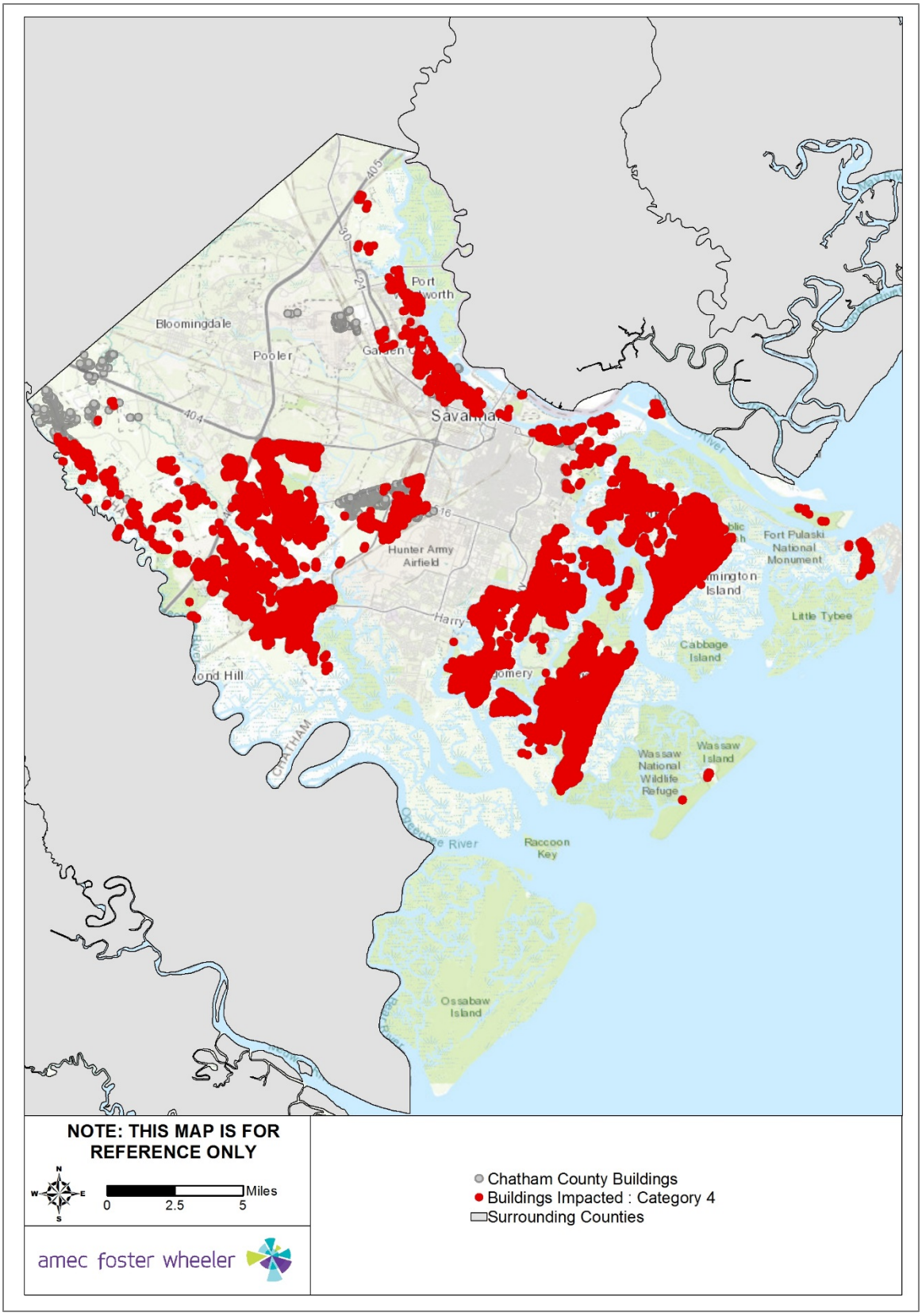


Figure 5.64 – Buildings Vulnerable to Modeled Category 4 Storm Surge

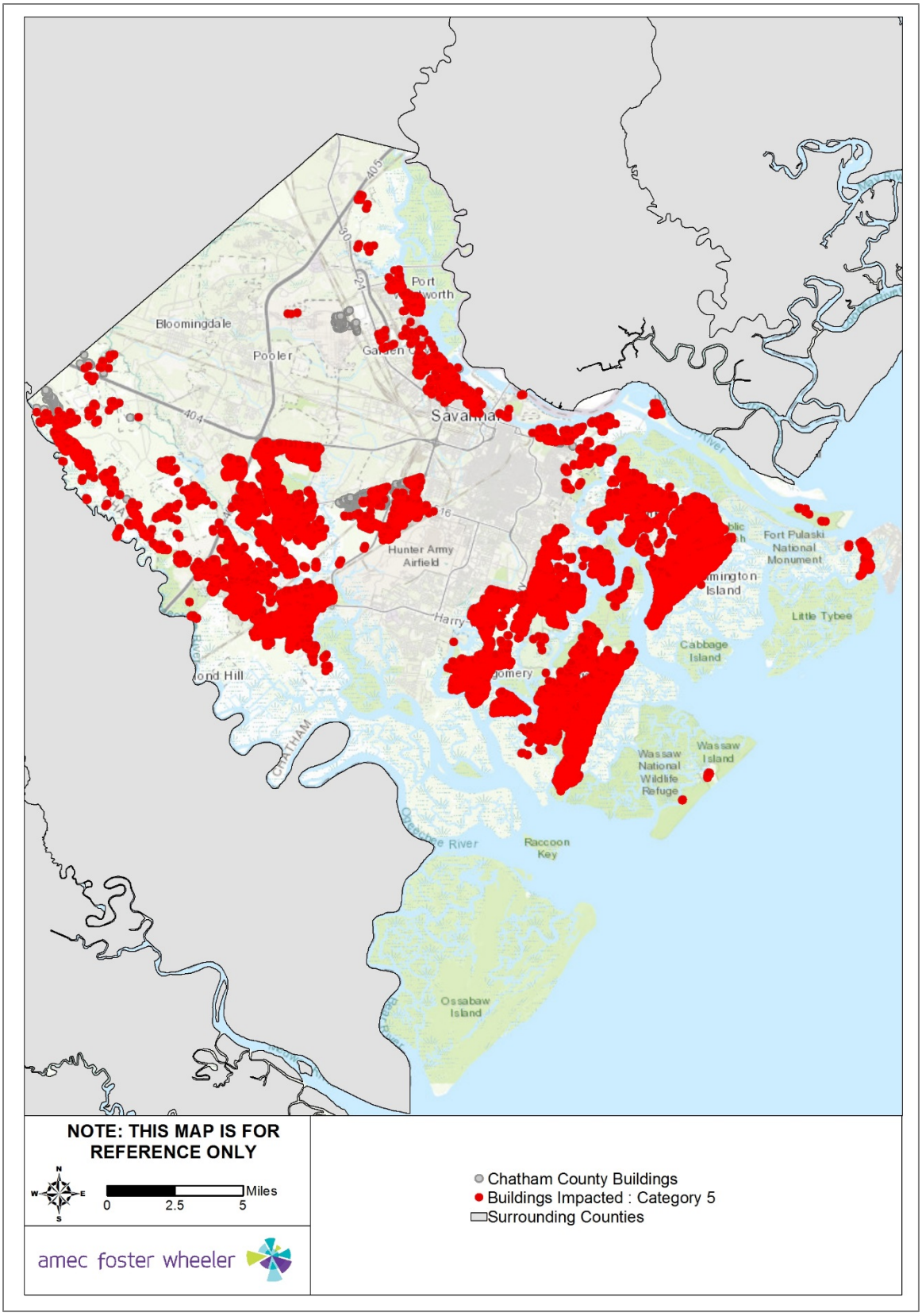


Figure 5.65 – Buildings Vulnerable to Modeled Category 5 Storm Surge

5.6 COASTAL/STREAM BANK EROSION

Hazard Description

Coastal Erosion

Coastal erosion is a process whereby large storms, flooding, strong wave action, sea level rise, and human activities, such as inappropriate land use, alterations, and shore protection structures, wear away the beaches and bluffs along the coast. Erosion undermines and often destroys homes, businesses, and public infrastructure and can have long-term economic and social consequences. According to NOAA, coastal erosion is responsible for approximately $500 million per year in coastal property loss in the United States, including damage to structures and loss of land. To mitigate coastal erosion, the federal government spends an average of $150 million every year on beach nourishment and other shoreline erosion control measures.

Coastal erosion has both natural causes and causes related to human activities. Gradual coastal erosion/replenishment results naturally from the impacts of tidal longshore currents. Severe coastal erosion can occur over a very short period of time when the state is impacted by hurricanes, tropical storms and other weather systems. Sand is continually removed by longshore currents in some areas but it is also continually replaced by sand carried in by the same type of currents. Structures such as piers or sea walls, jetties, and navigational inlets may interrupt the movement of sand. Sand can become "trapped" in one place by these types of structures. The currents will, of course, continue to flow, though depleted of sand trapped elsewhere. With significant amounts of sand trapped in the system, the continuing motion of currents (now deficient in sand) results in erosion. In this way, human construction activities that result in the unnatural trapping of sand have the potential to result in significant coastal erosion.

Erosion rates and potential impacts are highly localized. Severe storms can remove wide beaches, along with substantial dunes, in a single event. In undeveloped areas, these high recession rates are not likely to cause significant concern, but in some heavily populated locations, one or two feet of erosion may be considered catastrophic (NOAA, 2014).

Stream Bank Erosion

Stream banks erode by a combination of direct stream processes, like down cutting and lateral erosion, and indirect processes, like mass-wasting accompanied by transportation. When the channel bends, water on the outside of the bend (the cut-bank) flows faster and water on the inside of the bend (the point) flows slower as shown in Figure 5.66. This distribution of velocity results in erosion occurring on the outside of the bend and deposition occurring on the inside of the bend.

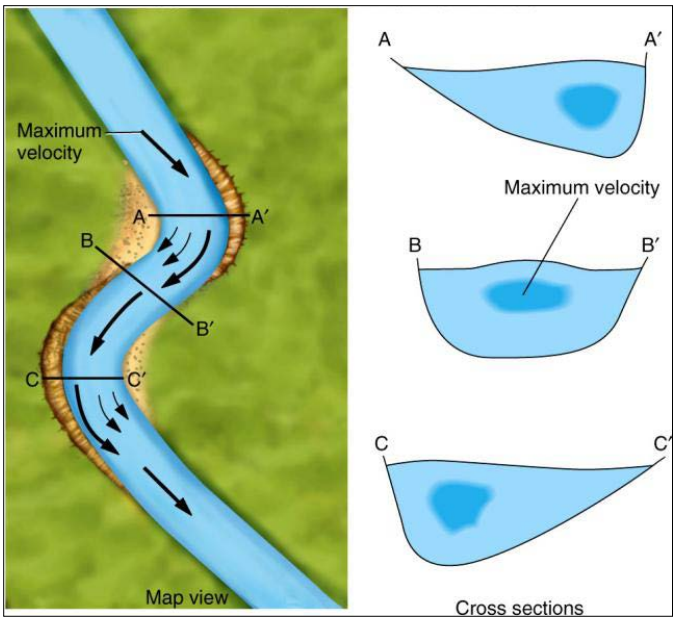


Figure 5.66 – Stream Meanders

Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse, and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or forbs, the internal strength is weakened, causing acceleration of mass wasting processes. Stream bank aggradation or degradation is often a response to stream channel instability. Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization. Numerous studies have demonstrated that stream bank erosion contributes a large portion of the annual sediment yield.

Determining the cause of accelerated streambank erosion is the first step in solving the problem. When a stream is straightened or widened, streambank erosion increases. Accelerated streambank erosion is part of the process as the stream seeks to re-establish a stable size and pattern. Damaging or removing streamside vegetation to the point where it no longer provides for bank stability can cause a dramatic increase in bank erosion. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion. Addressing the problem of streambank erosion requires an understanding of both stream dynamics and the management of streamside vegetation.

Past Occurrences

The Chatham County Hazard Mitigation Plan notes that soils along the coast, which are primarily fine-grained sands, have a high erosion hazard. Erosion in the County is typically caused by coastal tides, ocean currents, and storm events. Areas near the coast, like Tybee Island, where natural erosion processes are limited by development are most susceptible to erosion.

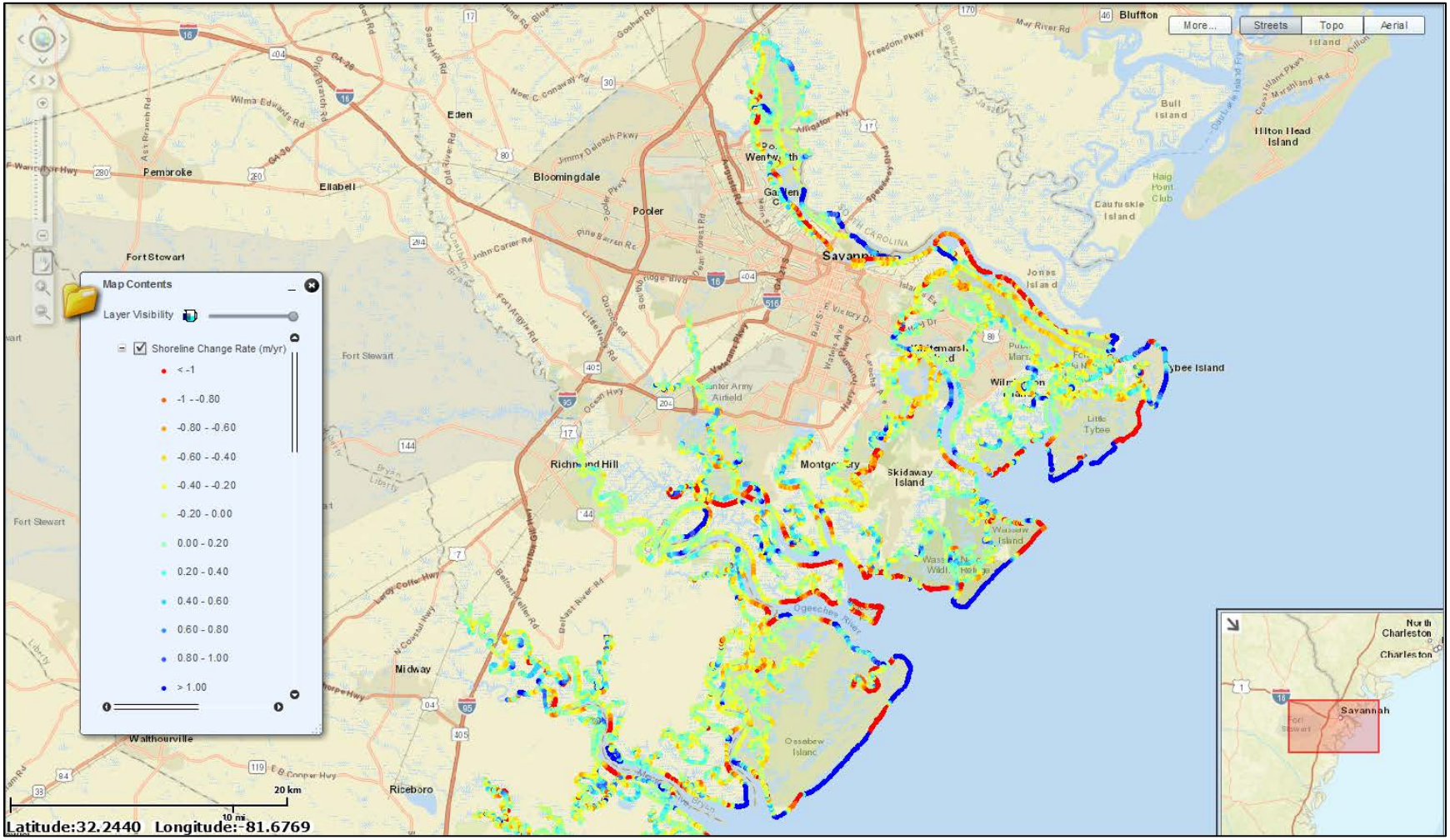
Erosion is generally an ongoing process rather than an episodic hazard, and its impacts are easier to see and understand over time.

The Georgia Coastal Hazards Portal shows long-term shoreline change rates along the Georgia coast. Shoreline change rates in Chatham County from 1930 to 2000 are shown in Figure 5.67 on the following page. The Chatham County coast has experienced erosion along portions of the coast and accretion in others. The Georgia Coastal Hazard Portal also provides locations for erosional hotspots in Georgia, based on research from the Applied Coastal Research Laboratory at Georgia Southern University, shown in Figure 5.68.

Though shoreline erosion is typically an ongoing process, it can intensify during storm events, particularly with hurricane storm tides. The following instances of major erosion are noted in flood-related events recorded by NCEI for Chatham County:

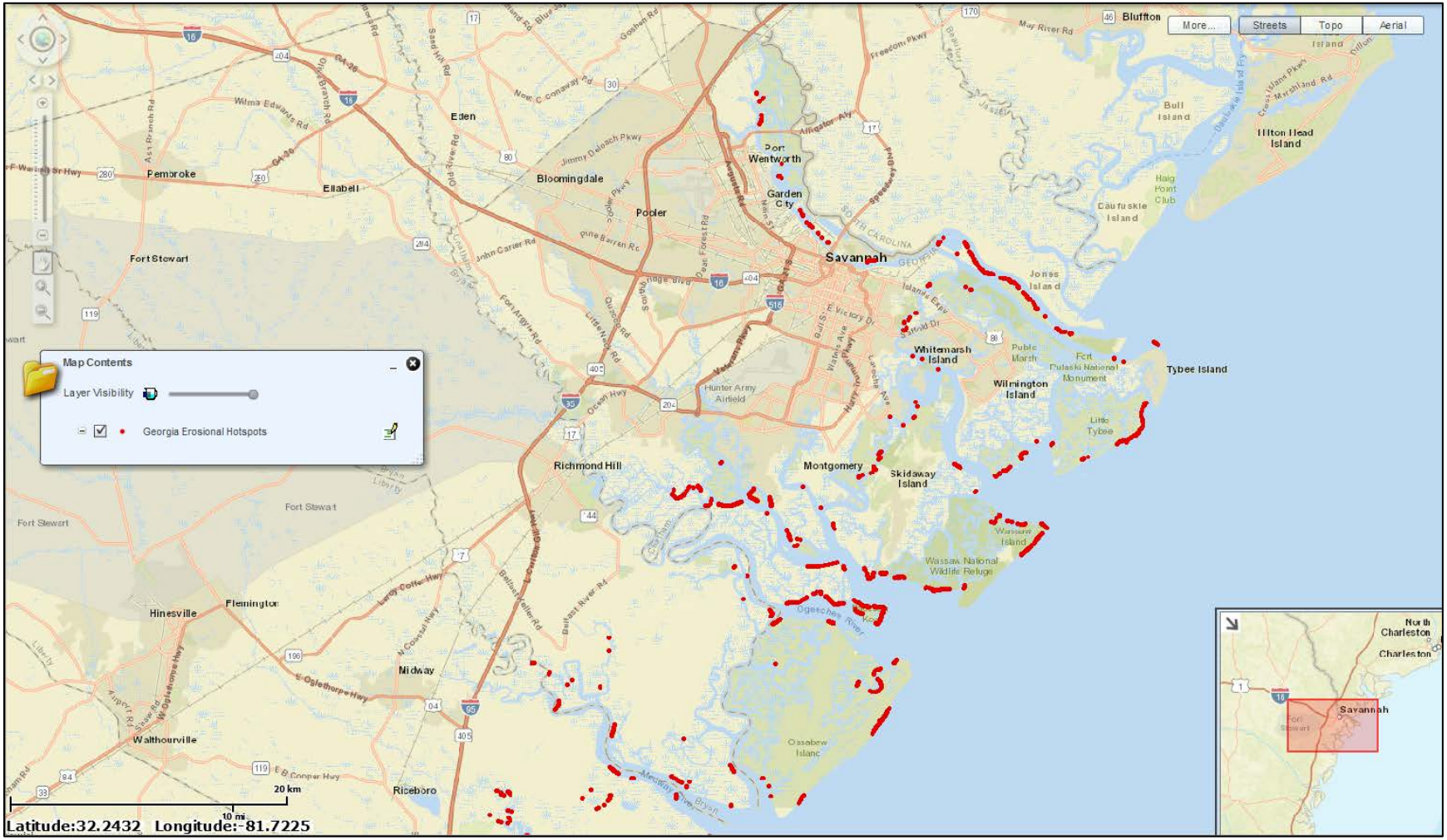
October 10, 2005 – Tropical Storm Tammy moved ashore in northeast Florida but the strongest effects were felt well north of the actual center. Tropical Storm force wind gusts as high as 50 mph affected the Georgia coast for many hours. Numerous trees were blown down, a few of which fell on houses and cars. Coastal flooding and high surf also occurred due to Tammy. Significant beach erosion occurred at Tybee Island.

September 30, 2017 – Severe Beach Erosion took place along area beaches as High Astronomical Tides combined with strong Northeast winds across the coastal waters. Severe Beach Erosion was reported at Tybee Island. Lifeguard towers were undermined or destroyed. Several homes were damaged due to high surf and coastal flooding. The beach was completely washed away in several areas.



Source: Georgia Coastal Hazards Portal, 2017

Figure 5.67 – Short-Term Shoreline Change Rates



Source: Georgia Coastal Hazards Portal, 2017

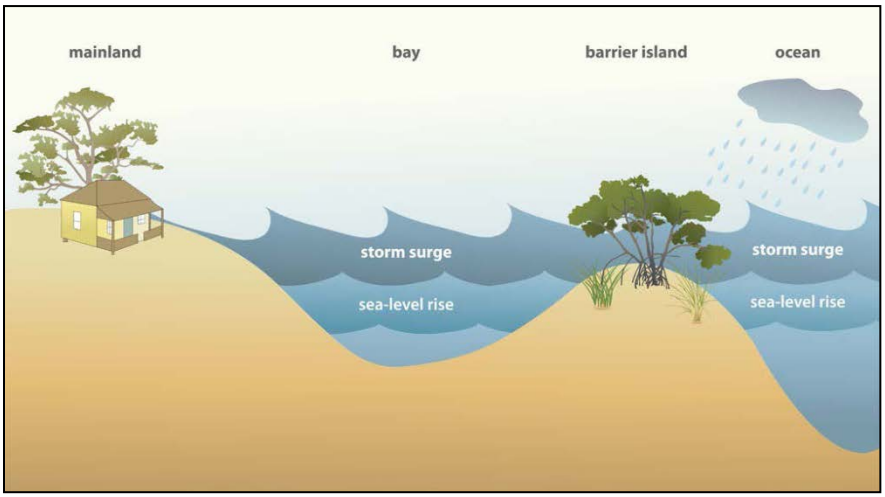
Figure 5.68 – Long-Term Shoreline Change Rates

Probability of Future Occurrence

Likely – Erosion is a natural, dynamic, and continuous process that can be expected to occur in the future. Erosion of coastal and estuarine shorelines is an ongoing and natural process along the Chatham County coast. Erosion rates are extremely variable, but given Chatham County's coastal setting, soils, and topography, as well as the likelihood of hurricane and tropical storm events that may exacerbate erosion, the probability of occurrence for coastal/estuarine erosion is "likely."

Climate Change and Erosion

Sea-level rise will raise all tide levels, from low tide to storm surge (see Figure 5.69). Wave action at higher tide levels may increase erosion of sandy beaches. The combined effects of wind and waves could damage dunes, leaving the beachfront more vulnerable (UF/IFAS Extension, 2013).



Source: Jane Hawkey, IAN Image Library (ian.umces.edu/imagelibrary/)

Figure 5.69 – Sea Level Rise and Coastal Erosion of Dunes

Vulnerability

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Minor	Small	> 24 hours	> 1 week

Given past erosion rates and locations mapped by the Georgia Coastal Hazards Portal, it can be reasonably assumed that coastal erosion will continue to affect Chatham County's shorelines. Properties most at risk to erosion are those located in and along the tidal marshes and islands in southeastern Chatham County. Properties built directly on coastlines face a higher level of risk for erosion-related damage. However, if a streambank collapses and blocks the normal streamflow, this may cause properties further upstream to experience flooding as a result of the poor drainage downstream.

5.7 CONSEQUENCE ANALYSIS

5.7.1 Life and Safety

Flood waters may prevent access to areas in need of response or to the critical facilities themselves which may prolong response time. The public must understand that they should never drive through flooded streets. The Centers for Disease Control and Prevention report that over half of flood-related drownings occur when a vehicle is driven into flood water, and the next highest percentage of deaths is due to people walking into or near flood waters. The National Weather Service warns that just 6 inches of fast-moving flood water can knock down an adult, 12 inches can carry away a small car, and 2 feet can carry away most vehicles. When someone drives through floodwaters, they put their life and the lives of first responders at risk. First responders are at risk when attempting to rescue people from floodwaters. They are subject to the same health hazards as the public and are more likely to be exposed to these hazards during their response efforts.

Residential, commercial, and public buildings, as well as critical infrastructure such as transportation, water, energy, and communication systems may be damaged or destroyed by flood waters. Floods can severely disrupt normal operations, especially when there is a loss of power. This can affect the operations of critical facilities, which affects response times. Loss of power also puts the public at risk. Downed power lines pose a serious hazard and should always be treated as if they are still energized. When a building loses power during a flood, electricity should be turned off and not used until the wiring can be inspected, to avoid risk of electrocution or fire. Ocean water and salt spray can be particularly damaging to electrical equipment due to the corrosive and conductive nature of the salt water residue. Damage to electrical equipment can also result from exposure to flood waters contaminated with chemicals, sewage, oil, and other debris.

5.7.2 Public Health

Certain health hazards are common to flood events. While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where farm animals are kept or their wastes are stored can contribute polluted waters to the receiving streams.

Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as e.coli and other disease causing agents. Residents with private wells will need to have their water quality tested to ensure it is safe for use.

The second type of health problem arises after most of the water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. Flooding can also cause extensive mold growth in building walls and floors, which also poses a respiratory health hazard.

If the County's water systems lose pressure, a boil order may be issued to protect people and animals from contaminated water.

The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and personal belongings destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

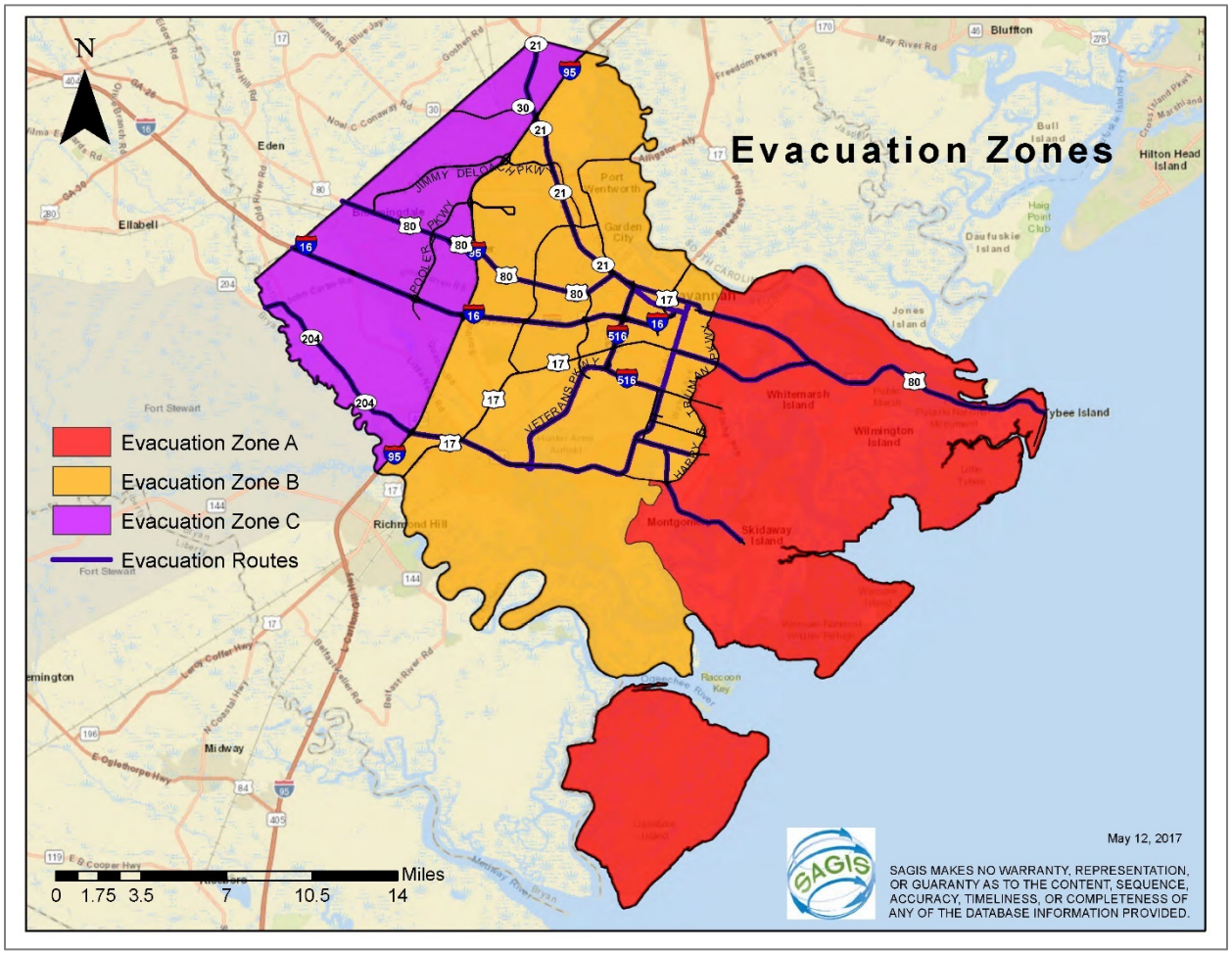
Another health risk from flooding comes from animals, such as snakes and rodents, that make their way through floodwaters and come into contact with people. Animals can pose a risk of physical attack and/or spread of disease.

Debris also poses a risk both during and after a flood. During a flood, debris carried by floodwaters can cause physical injury from impact. During the recovery process, people may often need to clear debris out of their properties, but may encounter dangers such as sharp materials or rusty nails that pose a risk of tetanus. People must be aware of these dangers prior to a flood so that they understand the risks and take necessary precautions before, during, and after a flood.

5.7.3 Warning and Evacuation

Hurricane storm surge models, shown in Section 5.5 Hurricane/Tropical Storm indicate areas likely to experience flooding and require evacuation in the event of a hurricane. Based on these models, a category 1 or category 2 storm would require minimal evacuation. A category 3 storm or stronger is likely to require more substantial evacuation or sheltering of County residents and visitors due to storm surge flooding.

It should be noted that these models do not predict storm surge, and actual storm surge heights may exceed the estimates shown. Additionally, these storm surge models do not incorporate other hurricane impacts that may exacerbate flooding and necessitate evacuation, including hurricane strength winds and rain. Therefore, these models should be interpreted as a minimum impact scenario. Actual evacuation advisories are issued by emergency management in the event of a storm.



Source: Chatham County Emergency Management

Figure 5.70 – Chatham County Evacuation Zones

5.8 ASSESSMENT OF AREAS LIKELY TO FLOOD

The following targeted areas are identified by the FMPC as areas likely to flood in the future.

Identified Area #1: 100-year SFHAs

According to the Effective DFIRM, approximately 76% of Chatham County's unincorporated areas fall within the 100-year floodplain in the effective FIRMs. Changes in the floodplain and development within the watershed could increase base flood elevation in SFHAs and expand SFHA boundaries if these changes

and development bring an increase in impervious surface or infringe upon natural floodplains and drainage features. Given that the population is projected to increase by 45% by 2050, development and changes in the floodplain are likely.

Identified Area #2: Areas of Localized Stormwater Flooding

Due to the low elevation and flat topography, frequent tidal flooding, and heavy precipitation resulting from thunderstorms, tropical storms, and hurricanes, it is highly likely that unmitigated properties will continue to experience localized flooding. An increase in impervious area due to future development could exacerbate localizing flooding issues, particularly if growth expands into currently undeveloped areas, unless measures are taken to limit the volume of runoff allowed post-development. Furthermore, the intensity of individual rainfall events is likely to increase in the future due to climate change which may further overwhelm stormwater drainage systems and increase flooding. Tidal impacts on stormwater systems must also be considered. As sea level rise continues, the capacity of stormwater infrastructure may decline.

Identified Area #3: Repetitive Loss Areas

Repetitive loss properties have a greater need for flood protection. Repetitive loss can be attributed to development within the 100-year floodplain as well as localized stormwater flooding. As mentioned above, both types of flooding could increase in the future if measures are not taken to mitigate the effects of development. Therefore, it is very likely that unmitigated repetitive loss properties will continue to flood in the future. Repetitive loss areas identified by the FMPC are shown in Figure 5.71.

Identified Area #4: Sea Level Rise Risk Areas

Sea level rise will continue to affect low lying lands along the coast, in some cases permanently inundating areas along the coast. NOAA estimates that sea level will rise between 8 inches and 6.6 feet by 2100 depending on emissions scenarios. According to the National Climate Assessment, the frequency, extent, and depth of coastal flooding due to high water events will increase.

The flood impacts of sea level rise extend far beyond the lands at risk of immediate inundation from rising seas. As seas rise, coastal marshes and wetlands will inundate permanently, unable to migrate inland fast enough to keep up with rising seas. The loss of these protective features will allow heightened coastal erosion, decrease flood storage area, and make inland areas more vulnerable to tidal flooding, storm surge, and riverine flooding. Thus, as a result of sea level rise, future flood risk in all of the above-identified areas will be further increased.

Impact of Future Flooding

Changes in the watersheds (particularly an increase in impervious area) could make these identified areas even more likely to flood in the future. Chatham County is located within the Ogeechee Coastal Sub-basin, with additional areas in the Lower Savannah River Sub-basin and the Lower Ogeechee Sub-basin.

The SFHA extends throughout the entire County, with VE Zone along the Atlantic coast, the Savannah River, the Ogeechee River, and throughout the coastal marshes. AE Zone covers much of the land along the Savannah and Ogeechee Rivers as well as along smaller creeks throughout the County and lands around Skidaway Island, Isle of Hope, and Wilmington Island. Areas of localized stormwater flooding are located throughout the County, primarily in the Ogeechee Coastal basin.

Repetitive loss properties are scattered throughout the southeastern portions of the County, and located primarily within the Ogeechee Coastal drainage basin. Repetitive loss property locations align with areas of tidal flooding and localized stormwater flooding, both of which may be vulnerable to increased risk in the future. Localized stormwater flooding can increase as a result of increased development, therefore

properties downstream of West Chatham and other areas planned for development may be at risk of increased flooding. Similarly, as sea levels continue to rise, repetitive loss properties in areas affected by tidal flooding may experience increased flooding in the future.

The future land use component of the comprehensive plan (discussed in greater detail in Section 3.8), recommends mixed use development, town centers, cluster and conservation design, and New Urban development options and it encourages open space preservation. However, these development forms are not fully supported by the policy framework needed for their implementation. Additionally, the plan recognizes that past development forms pose a challenge to smart development and growth management, as large lot sizes, strip malls, grayfields, and suburban development have created a sprawling form difficult to reverse.

According to the U.S. Census Bureau's Building Permits Survey data, shown in Table 5.29, residential building permit issuance rose from 2010 to 2014 but has since begun to slow. Despite the recent drop in permits issued, there were still more permits issued in 2016 than in 2010 or 2011. The majority of building permits issued in all years since 2010 have been for single family homes. Single family detached homes are also the most common housing type in the County, making up 63.8% of the housing supply as of 2014. Single family homes typically produce the most impervious surface per unit, which means the development trends in Chatham County have been greatly increasing impervious surface coverage.

Table 5.29 – Building Permits Issued in Chatham County since 2010

Year	1-unit		2-units		3-4 units			5+ units		
	Bldgs	Value	Bldgs	Value	Bldgs	Units	Value	Bldgs	Units	Value
2010	676	$87,335,207	1	$140,000	2	8	$258,888	21	271	$13,946,583
2011	655	$84,463,420	3	$437,850	5	20	$2,294,000	20	376	$22,141,746
2012	811	$122,205,698	1	$197,500	1	4	$175,000	13	198	$11,142,608
2013	901	$156,331,898	9	$1,803,902	1	4	$200,000	19	127	$6,486,958
2014	1,048	$205,885,088	3	$657,120	0	0	$ -	42	263	$45,184,142
2015	933	$200,307,059	1	$210,000	0	0	$ -	1	24	$2,000,000
2016	780	$194,149,166	4	$713,744	0	0	$ -	10	170	$12,915,000
Total	**5,804**	**$1,050,677,536**	**22**	**$4,160,116**	**9**	**36**	**$2,927,888**	**126**	**1,429**	**$113,817,037**

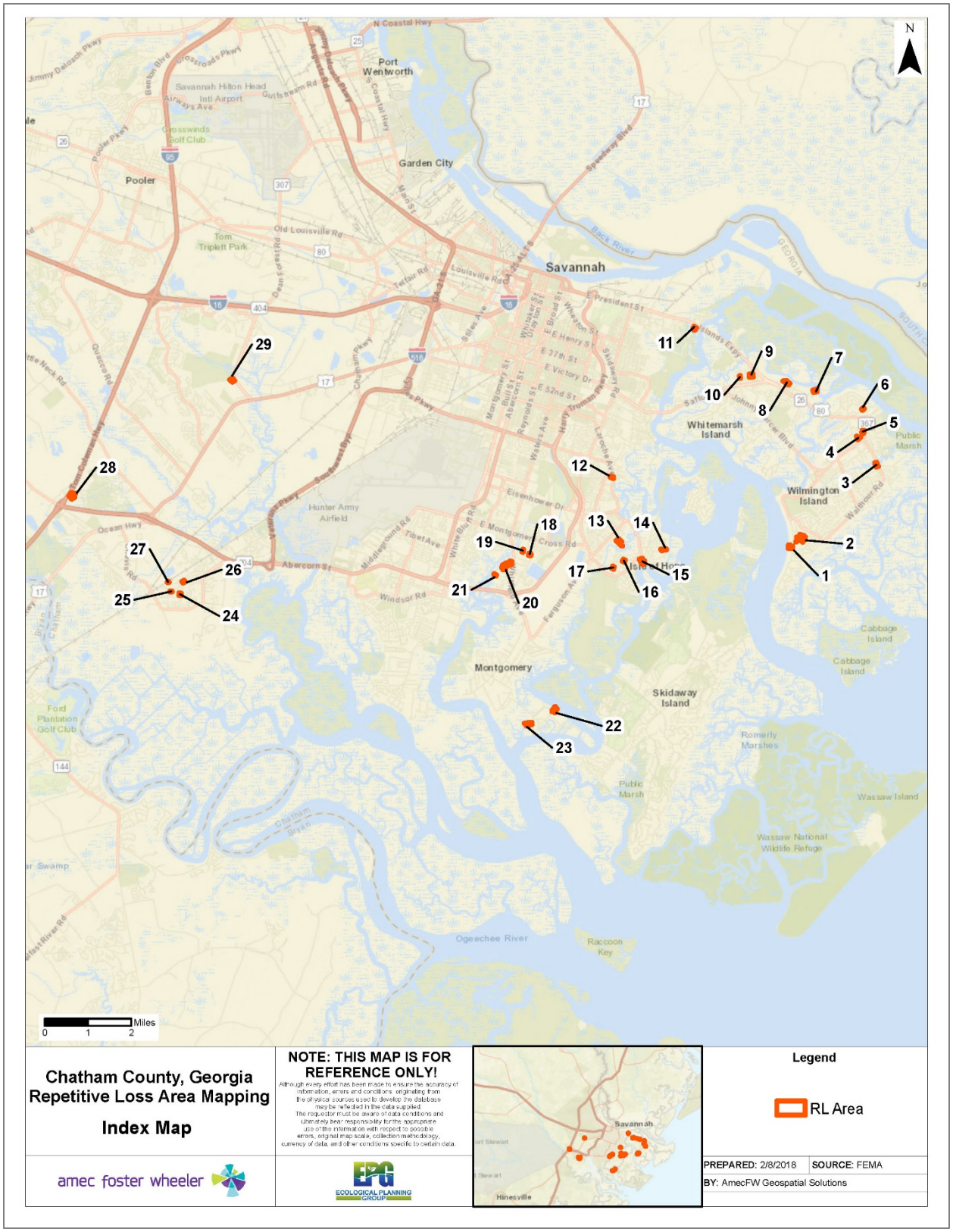


Figure 5.71 – Repetitive Loss Areas in Chatham County

5.9 PRIORITY RISK INDEX RESULTS

Table 6.30 summarizes the degree of risk assigned to each identified hazard using the PRI method.

Table 5.30 – Summary of PRI Results

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Climate Change/Sea Level Rise	Highly Likely	Minor	Moderate	> 24 hours	> 1 week	2.6
Dam Failure	Unlikely	Minor	Negligible	< 6 hours	< 6 hours	1.3
100-/500-year Flood	Possible	Limited	Moderate	6 to 12 hours	< 1 week	2.4
Stormwater/Localized Flooding	Highly Likely	Minor	Small	6 to 12 hours	< 24 hours	2.3
Hurricane/Tropical Storm	Likely	Critical	Large	> 24 hours	< 1 week	3.0
Coastal / Stream Bank Erosion	Likely	Minor	Small	> 24 hours	> 1 week	2.1

The results from the PRI have been classified into three categories based on the assigned risk value which are summarized in Table 6.31 below:

- **Low Risk** – Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal. This is not a priority hazard.
- **Medium Risk** – Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High Risk** – Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread.

Table 5.31 – Summary of Hazard Risk Classification

High Risk (2.5 – 3.0)	Hurricane/Tropical Storm Climate Change/Sea Level Rise
Moderate Risk (2.0 – 2.4)	100-/500-year Flood Stormwater/Localized Flooding Coastal Erosion
Low Risk (< 2.0)	Dam Failure

6 CAPABILITY ASSESSMENT

The findings of the capability assessment are summarized in this chapter to provide insight into the relevant capacity of Chatham County to implement flood hazard mitigation measures. All information is based upon the review of the existing Chatham County Multi-Jurisdictional Pre-Disaster Hazard Mitigation Plan (December 2015), Chatham County's website, and input provided by local government officials. This section contains the following subsections:

- Capability Assessment Overview
- Review of Departments and Agencies
- Review of Existing Policies and Programs
- Community Capability Assessment
- Administrative and Technical Capability
- Fiscal Capability Review
- Political Capability
- Continued Compliance with the NFIP

6.1 CAPABILITY ASSESSMENT OVERVIEW

The purpose of conducting a capability assessment is to determine the community's ability to implement feasible mitigation actions based on an understanding of the capacity of those agencies or departments tasked with their implementation. The process of conducting a capability assessment includes developing an inventory of relevant plans, ordinances, or programs already in place and assessing the community's resources and ability to implement existing and/or new policies. Through the capability assessment, a community can identify any gaps or weaknesses in existing programs and policies as well as positive measures already in place which should be supported through additional mitigation efforts.

6.2 REVIEW OF DEPARTMENTS AND AGENCIES

This section summarizes all local government entities (departments, agencies, etc.) involved with flood hazard mitigation and/or hazard control.

The Chatham County Administrative office is located at 124 Bull Street in Savannah, GA. Chatham County operates under the commission-manager plan of local government. The Chatham County Board of Commissioners sets policy, adopts laws, sets budget limits, sets tax rates, and decides zoning issues. The Board appoints a county manager who acts as the chief administrative officer responsible for implementing policies and managing the day-to-day operations of the County offices. Summarized below are the County offices and departments responsible for hazard control and hazard mitigation responsibilities.

Table 1: Unincorporated Chatham County Department and Agency Review

Department	Contact Information
Planning and Development	
Planning and development within Chatham County (and the City of Savannah) is the responsibility of the Metropolitan Planning Commission (MPC). The MPC is sub-divided into the following departments: Comprehensive Planning Department – Long-term planning	Metropolitan Planning Commission (MPC) (921) 651-1440 MPC Comprehensive Planning (912) 651-1454

including establishing a desirable built environment, promoting economic development, protecting natural resources. This department works with all jurisdictions within the County on stormwater management, sea level rise, and other natural resource issues that cross municipal boundaries. Development Services – Focuses on current planning maters including the review of site plans, subdivision plats, zoning amendments to the zoning ordinance. Historic Preservation and Urban Planning – Reviews projects and makes recommendations to the Historic District Board of Review, Chatham County Historic Preservation Commission, Historic Site and Monument Commission, Chatham County Resource Protection Commission and the Metropolitan Planning Commission on historic preservation matters.	MPC Development Services (912) 651-1468 MPC Historic Preservation (912) 651-1482
Building Codes and Inspections	
Chatham County Building Safety & Regulatory Services issues permits, performs building inspections, and administers county laws and ordinances.	Chatham County Building Safety & Regulatory Services (912) 201-4300
Zoning	
Chatham County Building Safety and Regulatory Services issues / states the "official" zoning of a property in unincorporated portions of the County. The County Zoning Board of Appeals (ZBA) reviews variances, special uses, appeals of decisions and extensions of nonconforming uses for the County.	Chatham County Building Safety and Regulatory Services Department (912) 201-4300 Metropolitan Planning Commission (921) 651-1440
Engineering	
The Chatham County Department of Engineering (DOE) protects public interest in the County by administering the County Engineering Policy, Land Disturbing Activities Ordinance, and Storm Water Management Ordinance. The DOE manages and administers the road and drainage capital improvement programs including design, environmental permitting, and construction management. The DOE coordinates projects with local municipalities, state agencies, federal agencies, and provides contract management for other County construction projects. The DOE reviews residential and commercial development plans, approves and issues development permits, and enforces compliance with County ordinances and state and federal statutes.	Chatham County Engineering (912) 652-7800
Water and Sewer	
The County does not provide water and sewer services to its residents. Most customers are served by Water Utility Management which is located at 621 Stephenson Avenue. A small percentage of customers within the County who live on Hopeton Court, Zipperer Drive and Little Neck Road is serviced by Coastal Water & Sewerage.	Water Utility Management (912) 352-9339 Coastal Water & Sewerage (912) 233-3254
Stormwater Management / Drainage Maintenance	
The County Public Works Department provides stormwater maintenance including canal and ditch maintenance, herbicide,	Chatham County Public Works (912) 652-6840

storm drain maintenance, and storm line blockage inspections.	
Emergency Management	
Chatham Emergency Management Agency (CEMA) is responsible for providing a county-wide emergency management program to provide for the safety and welfare of county residents before, during, and after a major emergency or disaster.	Chatham County Emergency Management (912) 201-4500
Law Enforcement	
Law enforcement is provided by the Chatham County Police Department.	Chatham County Police Headquarters (912) 652-6920
Fire	
Unincorporated Chatham County does not have a government funded fire service. Chatham Emergency Services is a not for profit combination service that provides fire protection for areas not covered by a city or township jurisdiction. Chatham Emergency Services currently maintains 13 Fire/EMS Stations and 1 Headquarters complex within Chatham County. There are 15 Fire Departments in Chatham County – Chatham Emergency Services manages the following five (5) departments: Southside FD, Islands FD, Skidaway Island FD, Montgomery FD, 7th District FD.	Chatham Emergency Services (912) 354-1011
Electricity	
Electric service throughout Chatham County is provided by Georgia Power.	Georgia Power (912) 232-2176
Roads / Streets	
Road maintenance and repairs are performed by the Chatham County Public Works Department. Responsibilities includes litter/debris pick-up, roadside maintenance, pothole repair, street sweeping, sign installation and repair, and road closures.	Chatham County Public Works (912) 652-6840
Parks, Greenways, Open Space	
The Chatham County Parks & Recreation Department manages parks and recreational facilities including: parks, boat ramps and fishing piers, nature preserves, multipurpose trails, community centers, sports facilities, and swimming pools.	Chatham County Parks & Recreation (912) 652-6780
Healthcare	
The Chatham County Board of Health is part of the Coastal Health District of the Georgia Department of Public Health. The intent of the County Board and Coastal Health District is to improve the health of residents by preventing illness and injury, promoting healthy behaviors, and protecting from harm. The Health District helps prepare and respond to disasters as well as coordinate disaster response with other agencies and organizations in the eight county-district.	Chatham County Health Department (912) 644-5200
Shelters	
The Savannah Chapter of the American Red Cross has primary responsibility for providing public shelters.	Savannah Office Southeast & Coastal Georgia American Red Cross (912) 651-5300

6.3 REVIEW OF EXISTING POLICIES AND PROGRAMS

The purpose of this section is to describe policies, programs, ordinances, etc. which affect hazard mitigation in floodplains. The most common ordinances and programs are summarized in this section, subdivided by the following categories:

- Emergency Management
- General Planning
- Floodplain Management

Table 6.1 summarizes the regulatory mitigation capabilities, including planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities, and indicates those that are in place in Chatham County.

Table 6.1 – Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Elements Related to Mitigation
Comprehensive Plan	Y	Natural Resources Element & Goals
Land Use Plan	Y	(element of Comprehensive Plan)
Zoning Ordinance	Y	
Subdivision Ordinance	Y	Recorded plats show flood zones, minimum BFE's, wetlands and natural habitats that protect against flood hazards.
Floodplain Ordinance	Y	
Erosion, Sedimentation and Pollution Control Ordinance	Y	E&S approved plans protect natural streams and marsh from sediment loads, prevent the accumulation of sediment in the public storm system that can create restrictions and blockages which increase the chances of flooding.
Other special purpose ordinance (stormwater, growth management, wildfire, etc.)	-	
Building Code	Y	Version: 2012 Edition, International Building Code
Fire department ISO rating	-	Rating:
BCEGS Rating	Y	Rating: 5 residential, 4 commercial
Stormwater Management Program	-	
Site Plan Review Requirements	Y	Requires compliance to the Zoning Ordinance; Structures are required to be set at a freeboard of 1' above BFE and structural fill has to be mitigated on-site for each project that is reviewed.
Capital Improvements Plan	Y	Includes improvements to increase capacity of channels and conduits to reduce flood levels. Request specifics from Engineering.
Local Emergency Operations Plan	Y	
Flood Insurance Study or Other Engineering Study for Streams	Y	Completed drainage studies for many basins which identify obstructions to flow and identify channels and conduits which can be improved to reduce flooding. Request specifics from Engineering.
Repetitive Loss Plan	-	Under development
Elevation Certificates	Y	
Other:	-	

6.3.1 Emergency Management

Hazard mitigation is widely recognized as one of the four primary phases of emergency management. The three other phases are preparedness, response, and recovery. In reality, each phase is interconnected with hazard mitigation. Opportunities to reduce potential losses through mitigation practices are most often implemented before disaster strikes, such as the elevation of flood prone structures or the continuous enforcement of policies that prevent and regulate development that is vulnerable to hazards due to its location, design, or other characteristics. Mitigation opportunities will also be presented during immediate preparedness or response activities, such as installing storm shutters in advance of a hurricane, and certainly during the long-term recovery and redevelopment process following a hazard event. Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions. Chatham Emergency Management Agency (CEMA) coordinates emergency management within Unincorporated Chatham County.

Hazard Mitigation Plan

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

- Chatham County adopted the Countywide Hazard Mitigation Plan in December 2015. This plan addresses flooding related to hurricanes, tropical storms, flood, storm surge, and sea level rise.
- Mitigation activities identified within this plan that address flooding hazards should be included within the Floodplain Management Plan as appropriate for unincorporated Chatham County.

Disaster Recovery Plan

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

- CEMA developed a Disaster Recovery Plan in September of 2015. This plan address how CEMA, Chatham County, local municipalities and other relevant agencies will coordinate in the immediate aftermath of a disaster and during long-term recovery from a disaster, including disasters related to flooding.
- The pre-disaster goals of this plan include the following:
    - Be prepared and proactive.
    - Coordinate with local jurisdictions.
    - Establish and maintain the County's leadership role.
    - Leverage existing relationships with private and non-profit sectors.
    - Promote legitimacy and credibility.
    - Focus on fairness
    - Build on existing deliberative plans and asset identification/ prioritization.
    - Ensure sufficient financial reserves
- Mitigation is also built into post-disaster procedures through the goal to "promote mitigation and foster resilient redevelopment and construction." This County envisions meeting this goal by using "education, incentives, and regulation to reduce community vulnerability to various hazards by fostering more resilient land use patterns and building practices" as well as by incorporating actions identified in other mitigation planning processes.

- The general roles and responsibilities identified for local governments, including Chatham County include:
    - Lead local preparedness, pre-disaster and mitigation planning efforts.
    - Pre-identify a structure for managing recovery.
    - Establish agreements and mechanisms to address surge capabilities.
    - Institute mechanisms for immediate post-disaster damage assessment.
    - Ensure compliance with local, state, and federal civil rights obligations.
- Redevelopment is addressed in the Community Development, Planning, and Housing Annex to the plan, which established a Long-Term Housing Reconstruction and Relocation Recovery group. The main focus of this group is to develop a long-term housing redevelopment and relocation strategy and to identify and address regulatory and statutory changes necessary to expedite rehabilitation and facilitate resilient reconstruction and new construction. This group is also tasked with implementing programs to facilitate long-term resilient reconstruction and promoting hazard mitigation and resilience strategies.

Emergency Operations Plan

An emergency operations plan outlines responsibility and the means by which resources are deployed during and following an emergency or disaster.

- CEMA maintains an emergency operations plan that addresses unincorporated Chatham County and was last updated in March 2012.
- This plan outlines local procedures for responding to disasters including those that involve flooding. It includes a detailed description of 15 Emergency Support Functions (ESF).

Flood Response Plan

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

- Chatham County has a Flood Incident Management (FIM) plan (dated 2014) in Incident Annex -I of the County's Emergency Operations Plan.
- The FIM plan includes:
    - Flood Threat Recognition System (FTR) which is the operation of a system to notify the community that a flood is on the way
    - Emergency Warning Dissemination (EWD) which establishes how the flood warning will be disseminated to the community
    - Flood Response Operations (FRO) plan which establishes which actions and resources will be necessary in response to floods
    - Critical Facilities Planning (CFP) which is the coordination of the flood warning and response effort with critical facilities
    - Criteria needed to accomplish certification as a StormReady community by the National Weather Service (NWS)

Continuity of Operations Plan

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

- CEMA has adopted a Continuity of Operations Plan in June of 2012.

6.3.2 General Planning

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

Comprehensive Land Use Plan

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

- Chatham County adopted a joint Comprehensive Plan with the City of Savannah in 2016.
- The following goals related to flooding and floodplain management were included in this Plan:
    - Riparian buffer and natural floodplain protection
    - Local preparedness
- The following activities were listed in this plan to address potential flooding hazards:
    - Evaluate the vulnerability of proposed residential and commercial developments to increased flooding due to sea-level rise.
    - Maintain adequate and open floodplains to prevent property damage from floodwaters and natural shoreline migration due to sea level rise.
    - Floodplain ordinances adopted by Chatham County can be amended by adding standards to prevent fill and drainage of wetland portions of the floodplain.
    - Subdivision and planned unit development codes can be used to encourage clustering of buildings on upland sites and to require dedication or permanent preservation of wetland areas.
    - Building codes can be used to control development on hydric soils and in flood hazard areas.
    - Address climate change and improve resiliency to sea level rise through the following:
        - Re-establishment of oyster beds
        - Better stormwater retention during high tides
        - Assessment of infrastructure and potential disinvestments
        - Bridge footing retrofits
        - “Eco-armoring” or utilizing creative methods of protection such as berms with increased natural vegetation
        - Elevation of infrastructure
        - Transition to renewable energy

Capital Improvement Plan

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

- Chatham County has a CIP that is managed primarily through the DOE.
- The CIP includes many drainage projects intended to improve drainage system conveyance and capacity to reduce flooding during storm events.
- The CIP has traditionally been SPLOST funded, but this may not be adequate to complete all planned CIP. Additionally, SPLOST has many other funding priorities and must be passed every 5 to 6 years by a popular vote, and therefore is not a reliable funding source.

Historic Preservation Plan

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

- Chatham County has a Natural, Cultural, and Historic Properties Coordination plan that was last updated in 2013. This plan that includes general guidelines on pre-event planning, hurricane evacuation, damage assessment, recovery and salvage, and funding as well as a list of historic sites of significance.

Zoning Ordinance

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

- Chatham County has adopted a Zoning Ordinance, and land use and development standards that address flooding area summarized below:
    - The County's Zoning Ordinance establishes Environmental Overlay Districts (EO) which increase the marsh buffers and setbacks from 25 to 35 feet for marshside communities
    - The Zoning ordinance also establishes Marsh Conservation (C-M) Districts intended to protect marshlands which provide natural storage for flood waters
- The Chatham County – Savannah Metropolitan Planning Commission had been working for many years to update the Zoning Code and create a Unified Zoning Ordinance (UZO). While this has not been successfully adopted by Chatham County, several provisions in this ordinance could potentially address flooding issues and could be considered independently for adoption.

Subdivision Ordinance

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

- Chatham County has adopted a Subdivision Ordinance that was last amended in 2010.
- The County's Subdivision Ordinance establishes that:
    - Ground level within the building area to be a minimum of 8 ft above mean sea level
    - First floor elevation must be at least the level of the 100-yr flood

- Prohibits residential subdivision lots within floodplains
- The location, elevation, and construction of public utilities must minimize or eliminate damage from flooding

Building Codes, Permitting, and Inspections

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

The Georgia Department of Community Affairs (DCA) states that local jurisdictions may adopt their own local codes; but in order to enforce them, the proposed amendment must have been submitted and approved by the DCA. Chatham County has adopted building codes and the Building and Inspections Department provides building inspection services for all unincorporated areas of the County.

The adoption and enforcement of building codes by local jurisdictions is routinely assessed through the Building Code Effectiveness Grading Schedule (BCEGS) program developed by the Insurance Services Office, Inc. (ISO). In Georgia, the Department of Community Affairs assesses the building codes and provides the minimum requirements. In conducting the assessment, ISO collects information related to personnel qualification and continuing education as well as the number of inspections performed per day. This type of information combined with local building codes is used to determine a grade for that jurisdiction. The grades range from 1 to 10 with a BCEGS grade of 1 representing exemplary commitment to building code enforcement and a grade of 10 indicating less than minimum recognized protection. Chatham County's current CBEGS rating for residential codes is 5 and for commercial codes is 4.

Disaster Redevelopment Plan

A disaster redevelopment plan is intended to provide a guiding action and decision making during long-term redevelopment periods after a disaster such as a hurricane and flooding. The Chatham County Emergency Management Agency (CEMA) developed a Disaster Redevelopment Plan (DRP) in 2016.

The DRP is the first of its kind in the State of Georgia and will serve as a model for other communities. The County's plan also is intended to ensure rebuilding that occurs following a disaster is done in sustainable manner consistent with other plans and incorporates hazard mitigation techniques. The plan was developed to cover the unincorporated areas of the County along with the jurisdictions of Bloomingdale, Garden City, Pooler, Port Wentworth, Savannah, Thunderbolt, Tybee Island, and Vernonburg. The DRP includes:

- Redevelopment goals
- Priority areas for redevelopment, determined with incorporation of resilience-oriented criteria, including that areas are not in a floodplain and are not vulnerable to storm surge
- Redevelopment policies for land use including growth management tools such as transfer of development rights, conservation easements, and deed restrictions
- Redevelopment policies for financial capacity, including pre-established recovery contracts
- Recommendations for building institutional capacity
- Inventory of vulnerable assets

6.3.3 Floodplain Management

Flooding represents the greatest natural hazard facing the nation. At the same time, the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards such as

education, outreach, and the training of local officials, the National Flood Insurance Program (NFIP) contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments; however, program participation is strongly encouraged by FEMA as a first step for implementing and sustaining an effective hazard mitigation program. It is therefore used as part of this assessment as a key indicator for measuring local capability.

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

A key service provided by the NFIP is the mapping of identified flood hazard areas. Once completed, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices, and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials, and the private sector about the likelihood of flooding in their community. Chatham County's FIRM was recently updated through the FEMA RiskMap project. The Letter of Final Determination is expected early in 2018, and the new FIRMS will be effective by the end of 2018. A detailed assessment of NFIP statistics for Chatham County can be found in the Flood Insurance Analysis under the risk and vulnerability assessment in Section 5.3 Flood: 100-/500-year.

Community Rating System

An additional indicator of floodplain management capability is the active participation of local jurisdictions in the Community Rating System (CRS). The CRS is an incentive-based program that encourages counties and municipalities to undertake defined flood mitigation activities that go beyond the minimum requirements of the NFIP by adding extra local measures to provide protection from flooding. All of the 18 creditable CRS mitigation activities are assigned a range of point values. As points are earned and reach identified thresholds, communities can apply for an improved CRS class rating in order to earn discounted flood insurance premiums for policyholders within the community.

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10. Chatham County participates in the CRS and improved their CRS score to a 5 in 2014. For details on Chatham County's efforts to participate in the NFIP and CRS, see Section 6.7 Continued Compliance with the NFIP.

Flood Damage Prevention Ordinance

A flood damage prevention ordinance establishes minimum building standards in the floodplain with the intent to minimize public and private losses due to flood conditions. All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance.

- Chatham County last adopted the Flood Damage Prevention (FDP) Ordinance in January of 2017.
- The FDP Ordinance establishes the following provisions:
    - General standards for all areas in Areas of Special Flood Hazards
        - Requires new construction to be constructed to minimize flood damage, anchored, and utilizing materials resistant to flood damage
        - Requirements for elevated buildings with enclosed areas on the first floor to be designed to equalize hydrostatic forces
        - Water, sewer, HVAC equipment, and power must be designed and located to prevent flood damage

- Specific standards of flood hazard areas with estimated or established base flood elevations (BFE)
  - Minimum of one foot of freeboard should be provided above the BFE and the lowest floor or any wood framed foundation
  - Encroachments are prohibited in areas designated as floodways
- Standards for areas of shallow flooding (AO Zones)
- Requirements for Coastal High Hazard Areas (V-Zones and Coastal A)
- Standards for subdivisions
- Provisions for watercourse alterations

Floodplain Management Plan

A floodplain management plan (or a flood mitigation plan) (FMP) provides a framework for action regarding corrective and preventative measures to reduce flood related impacts. The below information summarizes the County's December 2012 FMP. Note that this document is a comprehensive update to the 2012 plan. The 2012 FMP was developed to satisfy the certification requirements of the NFIP Community Rating System. The FMP establishes six (6) goals, existing programs in place that help achieve each goal, and additional action items recommended to help achieve each goal. The goals and action items include:

- Establish measures to prevent flooding
  - Develop GIS floodplain mapping to produce flood zone determinations
  - Preserve open space through building demolition and acquisition
  - Regulate development within the floodplain through the Flood Damage Prevention Ordinance
  - Regulate construction methods through building codes
  - Manage growth and development through regular updates to the County's Master Plan and MPC's Comprehensive Plan
  - Develop stormwater conveyance systems
  - Implement stormwater management regulations
  - Maintain drainage systems
- Implement property protection activities
  - Acquire/demolition repetitive loss properties
  - Relocate, elevate or retrofit repetitive loss properties
  - Encourage purchase of flood insurance for homeowners that currently do not have it
  - Display road signs along routes and subdivisions within the 100-yr floodplain
- Ensure natural resource protection
  - Preserve wetland and natural resources
  - Regulate erosion and sedimentation control problems
  - Develop a natural area restoration plan
  - Monitor and improve water quality
  - Regulate development within the County's coastal barrier areas
  - Conserve natural and ecological functions
- Enhance emergency services
  - Integrate the Flood Mitigation Plan into the Emergency Operations Plan, Pre-Disaster Hazard Mitigation Plan, Comprehensive Plan, and Capital Improvement Plan
  - Develop post-disaster mitigation procedures that assign responsibilities for public information, code enforcement, planning and efforts that encourage and/or fund loss reduction activities

- Construct structural projects
    - Implement channel modifications, storm drain improvements, use of structural floodgates, and regular maintenance schedules
    - Implement other flood control structures
- Perform public information activities
    - Implement outreach program to educate residents on flood risks, maps, and mitigation activities
    - Provide technical assistance to homeowners, real estate agents and insurance agents through requests for elevation certificates, flood zone determination letters, general flood history of neighborhoods
    - Provide education material on the benefits of natural floodplains, stormwater information, water quality, and environmental protection
    - Develop web-based outreach efforts

Greenway Implementation Plan

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

- Chatham County developed and adopted a Greenway Implementation Study in March 2016 that recommends preservation of floodplains associated with drainage canals.
- The Plan was developed after assessing stormwater drainage canals and retired rail corridors in the County to determine their viability as potential greenway trails.
- After potential greenways were evaluated, three corridors were selected.
- Additionally, the County developed a guide to properly maintain the trail systems and adjacent habitats.

Stormwater Management Plan / Stormwater Ordinance

A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of more frequently occurring minor urban flooding. Chatham County has adopted a stormwater management ordinance that is consistent with the Georgia Stormwater Management Manual and the Coastal Stormwater Supplement.

- This ordinance requires infiltration or treatment of the water quality volume (the first 1.2” of run off) through the use of green infrastructure and low impact development best management practices.
- This ordinance also requires developers to address the 25-year, 24-hour storm and to safely pass the 100-year storm.

The County’s Stormwater Management Plan was developed to meet the requirements of the National Pollution Discharge Elimination System (NPDES) Phase I Municipal Separate Storm Sewer System (MS4) Permit as required by the Georgia Water Quality Control Act and the Federal Clean Water Act.

6.4 ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

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

Table 6.2 identifies personnel responsible for activities related to mitigation and loss prevention in Chatham County.

Table 6.2 – Administrative Capabilities

Personnel Resources	Y/N	Department/Position	Licensure/Certification
Planner with knowledge of land development and management practices	Y	Metropolitan Planning Commission	AICP
Building official trained in construction practices	Y	Department of Building Safety and Regulatory Services / Director	Certified Building Official, Certified Building Inspector
Engineer with an understanding of natural hazards	Y	Engineering / Drainage Engineer	GA Professional Engineer, GSWCC Level II Certified Design Professionals
Staff skilled in GIS	Y	Savannah Area GIS / GIS Analyst	ASPRS Certified Mapping Scientist (CMS), GISCI GISP (GIS "Professional)
Floodplain Manager	Y	Engineering	Certified Floodplain Manager
Emergency Manager	Y	Chatham County Emergency Management	GA Certified Emergency Manager, Certified Professional Emergency Manager
Grant Writer	-		
Public Information Officer	Y	Public Information Office	
Other personnel: Scientists familiar with the hazards of the community	Y	UGA Marine Extension Service	

Technical capability can be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using Geographic Information Systems (GIS) to analyze and assess community hazard vulnerability. Available tools and resources are also important to consider in evaluating a community's technical capabilities.

Table 6.3 summarizes data and technical resources available to the County.

Table 6.3 – Technical Capabilities

Data Resources	Y/N	How often is it updated?	How is it used?	How/To whom is it accessible?
Warning Systems	Y	Yearly	Tornado Warning Sirens	CEMA – County
Real time flood gauge data	Y	Has to be driven and downloaded	One on Pipemakers Canal	Department of Engineering
GIS data: flood zones / hazard areas	Y	As needed – based on lidar	For flood determinations	Everyone within Chatham County and outside

Data Resources	Y/N	How often is it updated?	How is it used?	How/To whom is it accessible?
GIS data: critical facilities	Y	Yearly	Used for Emergency Management Planning	CEMA – Coordinated with CEMA
GIS data: current/future land use	Y	MPC Updates	Used to determine current and proposed land use plan.	MPC – SAGIS Open Data Portal
GIS data: building footprints	Y	As permits come in	To determine if new construction is in a flood zone	Chatham County Engineering
GIS data: tax assessor's data	Y	Yearly	For tax digest purpose	SAGIS Open Data Portal
GIS data: parcels	Y	Yearly	For tax digest purpose	SAGIS Open Data Portal
GIS data: shelter locations	Y	As-needed	Used for potential shelter locations. Not meant for all situations	CEMA
Elevation certificates	Y			Department of Engineering
Other data:				

6.5 FISCAL MITIGATION CAPABILITIES

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

Table 6.4 identifies financial tools or resources that the County could potentially use to fund mitigation activities.

Table 6.4 – Fiscal Mitigation Capabilities

Financial Resources	Y/N	Estimate of funds available	Example of use
Community Development Block Grants	Y		
Capital improvements project funding	-		
Special purpose taxes	Y	$ 25,000,000	Special Purpose Local Option Sales Tax (SPLOST), has been used for Improvement projects to lower water surface elevations
Gas or electric utility fees	N		
Water or sewer fees	N		
Stormwater utility fees	N		
Impact fees for new development	N		
Incur debt through general obligation bonds	-		

Financial Resources	Y/N	Estimate of funds available	Example of use
Incur debt through special tax bonds	-		
Incur debt through private activities	-		
Withhold spending in hazard prone areas	-		
Other: Special Service District Taxes, Local Option Sales Tax (LOST), partnering arrangements or intergovernmental agreements, HMGP, PDM, FMA, SBA	Y		

6.6 POLITICAL CAPABILITY

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

The previous pre-disaster hazard mitigation plan was reviewed for general examples of local political capability, such as guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (i.e., building codes, floodplain management, etc.).

- The previous pre-disaster hazard mitigation plan identified existing ordinances that address natural hazards or are related to hazard mitigation such as flood damage prevention, stormwater management, soil erosion and sedimentation control, zoning, and subdivision.
- The County currently participates in the NFIP and has adopted the requirement flood damage prevention ordinance. The County also participates in the CRS which demonstrates to some extent both favorable political support and a willingness to adopt hazard mitigation efforts in an active manner.

6.7 CONTINUED COMPLIANCE WITH THE NFIP

Given the flood hazards in the planning area, an emphasis will be placed on continued compliance with the NFIP and participation in the CRS. The County meets or exceeds the following minimum requirements as set by the NFIP:

- Issuing or denying floodplain development/building permits
- Inspecting all development to assure compliance with the local ordinance
- Maintaining records of floodplain development
- Assisting in the preparation and revision of floodplain maps
- Helping residents obtain information on flood hazards, floodplain map data, flood insurance and proper construction measures

The Chatham County Engineering Department is responsible for the review and approval of all development applications to the County. Once a development begins construction, there are multiple, periodic on-site inspections performed by trained inspection staff to ensure compliance before construction can proceed toward completion. The Planning and Inspections Department also maintains the record of all map revisions and changes received from FEMA. As a part of the services offered to the public, the Department provides FEMA floodplain mapping information, flood insurance program information, flooding hazards, and proper construction methods within the special flood hazard area.

The CRS was created in 1990. It is designed to recognize floodplain management activities that are above and beyond the NFIP's minimum requirements. Chatham County is currently classified as a Class 5 community, which gives a 25% premium discount to individuals in the Special Flood Hazard Area, and a 10% discount to policyholders outside the Special Flood Hazard Area. The following is a summary of the CRS Activities for which Chatham County currently receives credit based on the 2014 verification report:

Activity 310 – Elevation Certificates: The Department of Building Safety and Regulatory Services maintains elevation certificates for new and substantially improved buildings. Copies of elevation certificates are made available upon request.

Activity 320 – Map Information Service: Credit is provided for furnishing inquirers with basic flood zone information from the community's latest FIRM. Credit is also provided for the community furnishing additional FIRM information, information about problems not shown on the FIRM, flood depth data, special flood related hazards, historical flood information, and natural floodplain functions. The service is publicized annually and records are maintained.

Activity 330 – Outreach Projects: Credit is provided for informational outreach projects that include brochures placed at public building locations, general outreach projects that include publications in local newspapers, and expos at fairs, and targeted outreach projects that include mailings to residents in repetitive loss areas and those in the Special Flood Hazard Area. These projects are disseminated annually. Credit is also provided for having a pre-flood plan for public information.

Activity 340 – Hazard Disclosure: Credit is provided for state and community regulations requiring disclosure of flood hazards. Real estate agents provide a brochure advising prospective buyers about insurance and checking property flood hazards.

Activity 350 – Flood Protection Information: Documents relating to floodplain management are available in the reference section of the Chatham County Regional Library. Credit is also provided for floodplain information displayed on the community's website.

Activity 360 – Flood Protection Assistance: Credit is provided for offering one-on-one advice regarding property protection and making site visits before providing advice. Credit is also provided for giving advice on financial assistance programs and advisor training at appropriate EMI courses.

Activity 410 – Additional Flood Data: Credit is provided for a cooperating technical partnership agreement with FEMA.

Activity 420 – Open Space Preservation: Credit is provided for preserving approximately 70% of the SFHA as open space, protecting open space land with deed restrictions, and preserving open space land in a natural state. Credit is also provided for regulations and incentives that minimize development in the SFHA and protect natural shorelines and channels.

Activity 430 – Higher Regulatory Standards: Credit is provided for enforcing regulations that require development limitations, freeboard for new and substantial improvement construction, cumulative substantial improvement, protection of critical facilities and enclosure limits. Credit is also provided for the enforcement of building codes, BCEGS Classification of 5/4, state mandated regulatory standards, and regulations administration.

Activity 440 – Flood Data Maintenance: Credit is provided for maintaining and using digitized maps, overlay maps and parcel records in the day to day management of the floodplain. Credit is also provided for establishing and maintaining a system of benchmarks.

Activity 450 – Stormwater Management: The community enforces regulations for stormwater management and soil and erosion control.

Section 502 – Repetitive Loss Category: Based on the updates made to the NFIP Report of Repetitive Losses as of January 1, 2011, Chatham County, GA has 38 repetitive loss properties and is a Category C community for CRS purposes. The community is required to submit either a Repetitive Loss Area Analysis or Floodplain Management Plan.

Activity 510 – Floodplain Management Planning: Credit is provided for the adoption and implementation of the Chatham County Floodplain Mitigation Plan, adopted on December 21, 2012. A progress report must be submitted on an annual basis. An update to the credited plan will be due by October 1, 2017.

Activity 520 – Acquisition and Relocation: Credit is provided for acquiring and relocating 22 buildings from the community's regulatory floodplain.

Activity 540 – Drainage System Maintenance: A portion of the community's drainage system is inspected regularly throughout the year and maintenance is performed as needed. Credit is also provided for listing problem sites that are inspected more frequently, and for implementing an ongoing Capital Improvements Program. The community enforces a regulation prohibiting dumping in the drainage system, and annually publicizes the regulation or has appropriate signs posted.

Activity 610 – Flood Warning Program: Credit is provided for a program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities. Credit is also provided for the designation as a Storm Ready Community by the National Weather Service.

Activity 710 – County Growth Adjustment: All credit in the 400 series is multiplied by the growth rate of the county to account for growth pressures. The growth rate for Chatham County is 1.11.

7 MITIGATION STRATEGY

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

This section describes the mitigation strategy process and mitigation action plan for the Chatham County Floodplain Management Plan. It describes how the County met the following requirements from the 10-step planning process:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

7.1 GOALS AND OBJECTIVES

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

Section 5 documents the flood hazards and associated risks that threaten Chatham County, and Section 6 assesses the vulnerability of structures, infrastructure, and critical facilities. Section 7 evaluates the capacity of the County to reduce the impact of those hazards. The intent of Goal Setting is to identify areas where improvements to existing capabilities (policies and programs) can be made so that community vulnerability is reduced. Goals are also necessary to guide the review of possible mitigation measures. This Plan needs to make sure that recommended actions are consistent with what is appropriate for the County. Mitigation goals need to reflect community priorities and should be consistent with other plans in the County.

- **Goals** are general guidelines that explain what is to be achieved. They are usually broad-based policy type statements, long term and represent global visions. Goals help define the benefits that the plan is trying to achieve.
- **Objectives** are short term aims, when combined, form a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

7.1.1 Coordination with Other Planning Efforts

The goals of this plan need to be consistent with and complement the goals of other planning efforts. The primary planning document where the goals of this Plan must complement and be consistent with is the Chatham County-Savannah Comprehensive Plan. The Comprehensive Plan is important as it is developed and designed to guide future growth within the community. Therefore, there should be some consistency in the overall goals and how they relate to each other. Likewise, the goals of the Pamlico Sound Regional Hazard Mitigation Plan play an important role as it also focuses on flood hazards and mitigation projects.

Post-Disaster Mitigation Policies and Procedures

Chatham County maintains an Emergency Operations Plan which outlines local procedures for disaster response, including floods. It includes a detailed description of 15 Emergency Support Functions that are integral to disaster response and recovery. The County also has a Disaster Recovery Plan, prepared in 2015, which addresses how the County will work with neighboring jurisdictions and other entities involved in disaster recovery to plan for long-term recovery. The plan is intended to encourage disaster redevelopment policies that break the cycle of repetitive disaster losses by inserting effective mitigation

into the rebuilding process. Additionally, in 2016 the County developed a Disaster Redevelopment Plan to proactively identify procedures and policies that will ensure post-disaster redevelopment incorporates hazard mitigation techniques. More details of these plans are discussed in Section 6 Capability Assessment.

7.1.2 Goal Setting Exercise

On June 20, 2017, the FMPC conducted an exercise to outline and recommend goals for this Floodplain Management Plan. The first part of the exercise involved asking each committee member: *"What should be the goals of our mitigation program?"* Each member was given a handout which appears in Figure 7.1 along with a full summary of responses.

Committee members discussed their choices with the larger committee membership. There was some consistency in the members' topics. The was notable support for addressing the impact of future development and many responses related to the need to protect various critical facilities. The committee members' prevailing goals are listed below:

- Make sure future development doesn't make things worse
- Protect people's lives and public health
- Help people protect themselves
- Protect critical facilities and public services

Following this exercise, the committee members reviewed their joint choices and brainstormed potential goals for Chatham County's Floodplain Management Plan. Members were led in a discussion of potential goals and asked to agree or disagree with each potential goal. Committee members were also asked to suggest other goals they felt would be appropriate.

The exercise revealed important information to guide the planning effort. For example, members stressed the importance of managing future development, as well as protecting critical facilities.

7.1.3 Resulting Goals and Objectives

At the end of the exercises, the FMPC agreed upon four general goals for this planning effort. The FMPC also included objectives in support of the goals. The refined goals and objectives are as follows:

Goal 1 – Reduce vulnerability of people, property, critical facilities and infrastructure to flood hazards to protect the health, safety and welfare of residents and visitors.

Objective 1.1: Advise the community of the safety and health precautions to implement before, during, and after a flood.

Objective 1.2: Publish a list of locations (roads, intersections) which often flood after heavy rain events.

Objective 1.3: Educate everyone on the benefits of improved water quality and associated habitat.

Objective 1.4: Identify the location of vulnerable populations to aid in emergency evacuations.

Objective 1.5: Conduct site investigations, research exposure and hazard data, and evaluate proposed modifications to repair and mitigate stormwater management problems.

Objective 1.6: Implement flood mitigation measures or strategies, as necessary, to protect critical facilities.

Goal 2 – Reduce damage to development through flood resilient strategies and measures.

Objective 2.1: Prioritize capital improvements to address areas where poor drainage causes flooding.

Objective 2.2: Encourage development outside the special flood hazard area (1%-annual-chance flood).

Objective 2.3: Use the most effective approaches to protect buildings from flood damage, including elevation, acquisition, and other retrofitting techniques where appropriate.

Objective 2.4: Encourage property owners to assume an appropriate level of responsibility for their own protection, including the purchase of flood insurance.

Goal 3 – Protect natural resources by employing watershed-based approaches that balance environmental, economic and engineering considerations.

Objective 3.1: Maintain and enforce regulations to protect and restore wetlands and ecological functions for long-term environmental, economic and recreational values.

Objective 3.2: Pursue water management approaches and techniques that improve water quality and protect public health.

Objective 3.3: Preserve and maintain open space in flood prone areas to reduce flood damage to buildings and to provide recreational benefits.

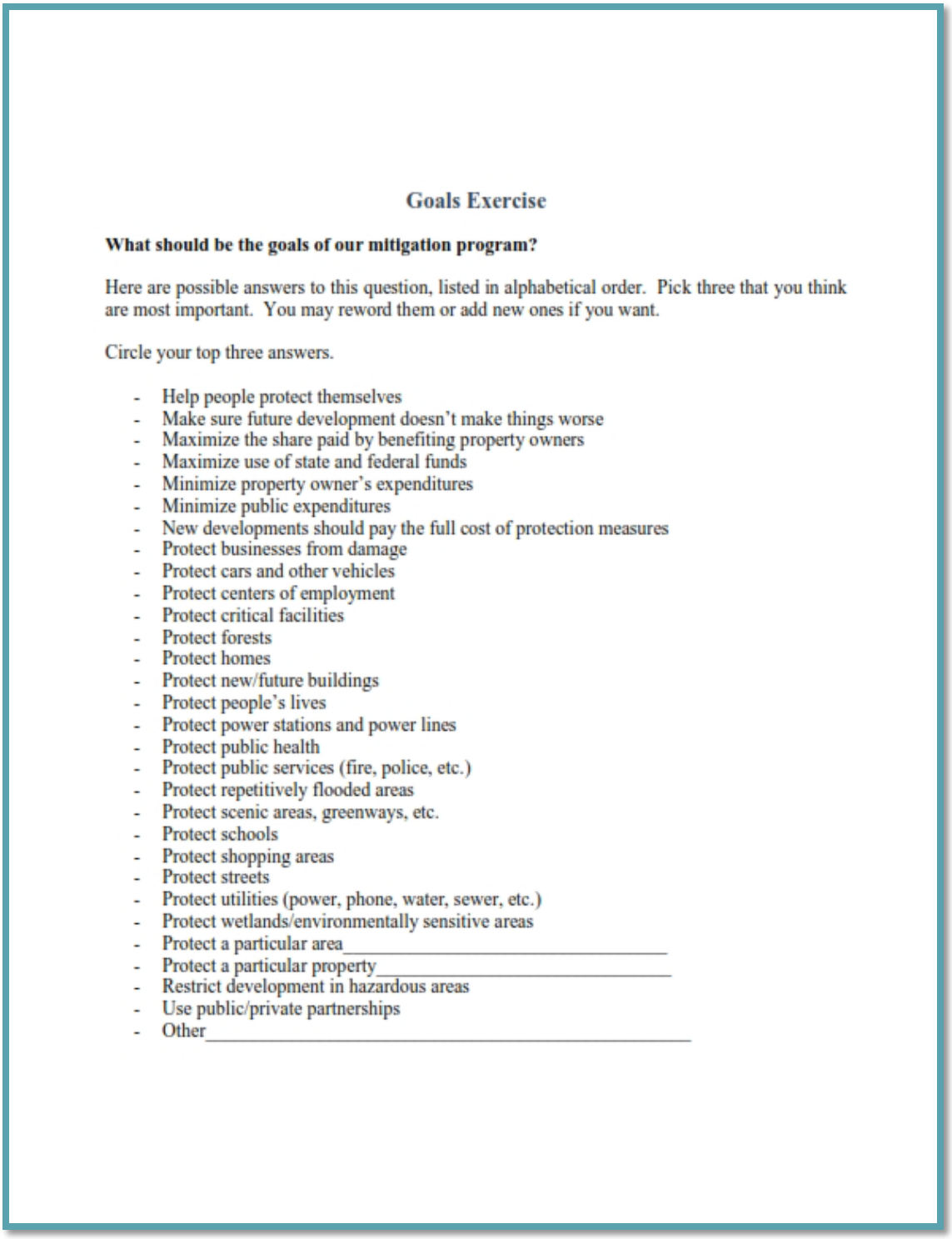
Objective 3.4: Continue to protect wetlands and environmentally sensitive areas from encroachment of development by requiring buffers and other setback mechanisms.

Goal 4 – Encourage property owners, through education and outreach measures, to protect their homes and businesses from flood damage.

Objective 4.1: Educate property owners, including repetitive loss properties, on FEMA grant programs and other methods to mitigate possible flood damage.

Objective 4.2: Provide current flood-proofing and retrofitting information to property owners.

Objective 4.3: Effectively communicate flood risk to residents, businesses, contractors, realtors and prospective buyers.



Goals Exercise

What should be the goals of our mitigation program?

Here are possible answers to this question, listed in alphabetical order. Pick three that you think are most important. You may reword them or add new ones if you want.

Circle your top three answers.

- Help people protect themselves
- Make sure future development doesn't make things worse
- Maximize the share paid by benefiting property owners
- Maximize use of state and federal funds
- Minimize property owner's expenditures
- Minimize public expenditures
- New developments should pay the full cost of protection measures
- Protect businesses from damage
- Protect cars and other vehicles
- Protect centers of employment
- Protect critical facilities
- Protect forests
- Protect homes
- Protect new/future buildings
- Protect people's lives
- Protect power stations and power lines
- Protect public health
- Protect public services (fire, police, etc.)
- Protect repetitively flooded areas
- Protect scenic areas, greenways, etc.
- Protect schools
- Protect shopping areas
- Protect streets
- Protect utilities (power, phone, water, sewer, etc.)
- Protect wetlands/environmentally sensitive areas
- Protect a particular area_____
- Protect a particular property_____
- Restrict development in hazardous areas
- Use public/private partnerships
- Other_____

Figure 7.1 – Handout for Goals Exercise, Part 1

Table 7.1 – Goal Setting Response Summary

Goal	Number of times selected
Help people protect themselves	3
Make sure future development doesn't make things worse	8
Maximize use of state and federal funds	1
New developments should pay the full cost of protection measures	1
Protect centers of employment	1
Protect critical facilities	2
Protect homes	1
Protect people's lives	7
Protect power stations and power lines	1
Protect public health	2
Protect public services (fire, police, etc.)	2
Protect repetitively flooded areas	1
Protect utilities	1
Protect wetlands/environmentally sensitive areas	1

Note: Those goal options from Figure 7.1 above that are not shown here received zero (0) votes.

7.2 IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIVITIES

Requirement §201.6(c)(3)(ii): [The mitigation strategy section shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

To identify and select mitigation projects that support the mitigation goals, each hazard identified in Section 4 Hazard Identification was evaluated. The following were determined to be priority flood-related hazards:

- Climate Change and Sea Level Rise
- Hurricane and Tropical Storm
- Flood: 100-/500-year
- Flood: Stormwater/ Localized Flooding
- Coastal/Stream Bank Erosion

Once it was determined which flood hazards warranted the development of specific mitigation actions, the FMPC analyzed viable mitigation options that supported the identified goals and objectives. The FMPC was provided with the following list of mitigation categories which are utilized as part of the CRS planning process.

- Prevention (Required to be evaluated)
- Property Protection
- Natural Resource Protection
- Emergency Services
- Structural Projects
- Public Information and Outreach

The FMPC was also provided with examples of potential mitigation actions for each of the above categories. The FMPC was instructed to consider both future and existing buildings in evaluating possible mitigation actions. A facilitated discussion then took place to examine and analyze the options. Appendix B, Mitigation Strategy, provides a detailed discussion organized by CRS mitigation category of possible mitigation alternatives to assist the County in the review and identification of possible mitigation activities. This comprehensive review of possible mitigation activities details why some were appropriate for implementation and why others were not. As promoted by CRS, Prevention-type mitigation alternatives were discussed for the flood hazards. This discussion was followed by a brainstorming session that generated a list of preferred mitigation actions by hazard.

7.2.1 Prioritization Process

Once the mitigation actions were identified, the FMPC was provided with a set of prioritization criteria to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. The criteria included the following:

- **Area of Impact:** Does the action have a community-wide impact? Does the action target a hazard area? Does it address a high-risk priority hazard?
- **Goals:** Does the action meet multiple goals?
- **Technical:** Is the action technically feasibly? Is it a long-term solution to the problem? Does it capitalize on existing planning mechanisms for implementation?

- **Administrative Resources:** Are there adequate staffing, funding and other capabilities to implement the project? Is there adequate additional capability to ensure ongoing maintenance, if necessary?
- **Political/Legal:** Will there be adequate political and public support for the project? Does the project have a local champion? Does the community have the legal authority to implement the action?
- **Financial:** Can the action be funded through the operating budget? Will the action need to be grant-funded, and has that funding been secured? How much will the project cost?
- **Environmental:** Does the action comply with environmental regulations? Does the action meet the community's environmental goals?

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining action priority. The four criteria, reflected in the prioritization criteria above, reflect the consideration of benefit-cost analysis for each action:

- Contribution of the action to save life or property
- Availability of funding and perceived cost-effectiveness
- Available technical and administrative resources for implementation
- Ability of the action to address the problem

The consideration of these criteria helped to prioritize and refine mitigation actions but did not constitute a full benefit-cost analysis. The cost-effectiveness of any mitigation alternative will be considered in greater detail through performing benefit-cost project analyses when seeking FEMA mitigation grant funding for eligible actions associated with this plan.

Using these prioritization criteria, the FMPC was able to score each action on a scale of 0-20 in order to arrive at a priority ranking for each action. See Table 7.2 for details on points available for each criterion. Point totals were divided into priority rankings as follows:

- **Low Priority:** 0 – 8 points
- **Medium Priority:** 9 – 13 points
- **High Priority:** 14 – 20 points

Table 7.2 on the following page details the prioritization ranking for each mitigation action considered by the FMPC.

Table 7.2 – Mitigation Action Prioritization

Action Item	Mitigation Action Item	Area of Impact			Goals	Technical			Administrative Resources		Political/Legal			Financial					Environmental		Overall Priority Score	Priority Ranking
		Community -wide	Targets hazard area	Addresses high risk hazard	Meets multiple goals	Feasible	Long-term solution	Existing planning mechanism in place	Project implementation	Maintenance capability	Political support	Local champion	Legal authority	Funded through community funding source	Needs grant funding	Cost: < $10,000	Cost: $10,000 -$50,000	Cost: > $50,000	Consistent with federal laws	Consistent with community enviro. goals		
	Points Possible	**1**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**2**	**3**	**1**	**1**		
1	Update County website incorporating new technology to create interactive data and mapping system that will provide online technical assistance to homeowners, real estate agents and insurance agents. Include access to elevation certificates, flood zones, general flood history, repetitive loss areas, and mitigated properties, etc.	1	-	2	1	1	-	-	1	1	-	-	-	2	-	1	-	-	-	-	10	Medium
2	Acquire and demolish high-risk flood-prone buildings and repetitive loss structures and preserve land as open space.	-	2	2	1	1	1	1	1	1	-	-	-	-	1	-	-	3	1	1	16	High
3	Update and enforce building codes and Flood Damage Prevention Ordinance and consider higher regulatory standards to better protect existing and future development.	-	2	-	1	1	-	1	1	-	1	-	1	2	-	1	-	-	-	-	11	Medium
4	Continue to enforce Flood Damage Prevention requirements through on-site floodplain inspections.	-	2	-	1	1	-	1	1	-	-	-	-	2	-	1	-	-	-	-	9	Medium
5	Develop stormwater conveyance systems to alleviate flooding for existing and new development.	1	-	-	1	1	1	-	1	-	-	-	-	-	1	-	-	3	1	-	10	Medium
6	Improve stormwater management regulations to include higher standards for design storm, size of development regulated, low-impact development, and public maintenance of detention and retention facilities.	1	-	-	1	1	-	1	1	-	1	1	1	2	-	1	-	-	1	-	12	Medium
7	Create new drainage maintenance SOP to include natural drainage features within unincorporated Chatham County.	1	-	-	1	1	-	1	1	-	-	1	-	2	-	-	2	-	-	1	11	Medium
8	Relocate, elevate, or retrofit substantially damaged and/or pre-FIRM properties.	-	2	2	1	1	1	1	1	-	-	-	1	-	1	-	-	3	1	1	16	High
9	Encourage the purchase of flood insurance and educate public on Increased Cost of Compliance (ICC) coverage through outreach materials, face-to-face meetings, and presentations to HOAs.	1	-	-	1	1	-	1	1	-	-	-	-	2	-	1	-	-	-	-	8	Low
10	Display signs along roads and canals at entrances to high, moderate, and low flood risk areas.	1	-	-	-	1	-	-	1	-	-	-	-	2	-	1	-	-	-	-	6	Low
11	Promote low-impact development projects where applicable to improve water quality and reduce runoff.	1	-	-	1	1	1	1	1	-	-	1	1	2	-	1	-	-	1	1	13	Medium
12	Enact deed restrictions and other growth management tools to preserve wetland and natural resource areas and conserve their natural and ecological functions.	1	-	2	-	1	1	1	1	-	1	1	1	2	-	-	2	-	1	1	16	High
13	Develop a Natural Floodplain Functions Plan to protect and or restore endangered species and habitat.	1	-	-	-	1	-	1	1	-	1	1	-	-	1	1	-	-	1	1	10	Medium

Action Item	Mitigation Action Item	Area of Impact			Goals	Technical			Administrative Resources		Political/Legal			Financial					Environmental		Overall Priority Score	Priority Ranking
		Community -wide	Targets hazard area	Addresses high risk hazard	Meets multiple goals	Feasible	Long-term solution	Existing planning mechanism in place	Project implementation	Maintenance capability	Political support	Local champion	Legal authority	Funded through community funding source	Needs grant funding	Cost			Consistent with federal laws	Consistent with community enviro. goals		
																< $10,000	$10,000 -$50,000	> $50,000				
	Points Possible	**1**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**2**	**3**	**1**	**1**		
14	Integrate the FMP into the Emergency Operations Plan, Pre-Disaster Hazard Mitigation Plan, Comprehensive Plan, and Capital Improvement Program.	1	-	-	-	1	-	1	1	-	-	-	-	2	-	1	-	-	-	-	7	Low
15	Implement an outreach campaign to educate residents on flood risks, maps, mitigation activities, stormwater, water quality, environmental protection, and the benefits of natural floodplains.	1	-	-	1	1	-	-	1	1	1	1	1	2	-	-	2	-	1	1	14	High
16	Develop web-based outreach efforts, including social media.	1	-	-	1	1	-	-	1	1	-	-	-	2	-	1	-	-	-	-	8	Low
17	Improve recurring local funding for Public Works maintenance and flood management activities implemented through the Capital Improvements Program.	1	-	-	1	1	1	-	1	1	1	1	-	2	-	-	-	3	-	-	13	Medium
18	Use Flood Protection Questionnaire results to identify target areas for outreach and flood protection.	1	1	-	-	1	-	-	1	-	-	-	-	2	-	1	-	-	-	-	7	Low
19	Elevate lift stations and electrical components above the base flood elevation (BFE).	-	1	-	-	1	1	-	1	-	1	-	-	-	1	-	-	3	-	1	10	Medium
20	Partner with Georgia Tech to install additional tidal and riverine flood gauges at various locations throughout the County to help provide real-time flood data on the County website.	-	2	2	1	1	1	-	1	1	1	1	-	-	1	-	-	3	-	1	16	High
21	Develop a long-range regional plan for sea level rise which evaluates multiple adaptation methods.	1	-	2	1	1	-	-	1	-	1	1	-	-	1	-	2	-	-	1	12	Medium

The FMPC members were also asked to determine an implementation timeline for each project. The priority time frames for project implementation were determined to be as follows:

Short Range = Project can be completed in less than one year from plan adoption
Medium Range = Project can be implemented in more than two years but less than five years
Long Range = Project will likely require more than five years to implement

This timeline distinguishes projects that can be completed within the five-year lifetime of the plan (short and medium range projects) from those that will likely not be completed prior to the required plan update.

The process of establishing a priority ranking and an implementation timeline for each mitigation action allowed the FMPC to come to consensus and to rank the actions in order of relative importance. Using the Implementation Ranking Matrix shown in Figure 7.2, the FMPC ranked each mitigation action on a scale of one to nine, one indicating those actions that should be implemented first and nine signifying the lowest implementation priority. These scores allow the FMPC and those individuals, agencies, and organizations responsible for implementation to plan which actions to pursue first. Note that with this ranking matrix, multiple actions can earn the same overall implementation ranking.

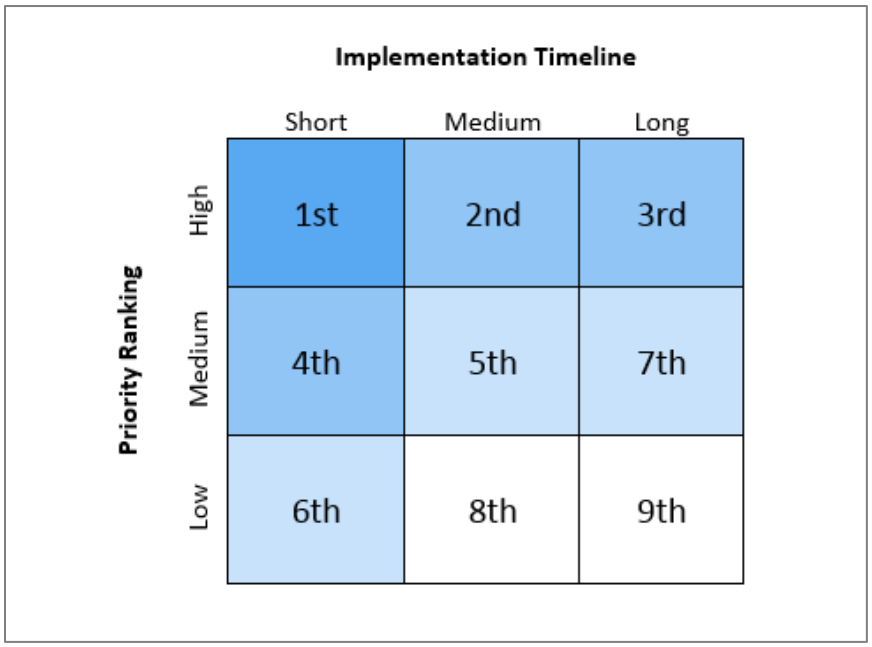


Figure 7.2 – Implementation Ranking Matrix

The priority ranking, timeline, and overall implementation ranking for each mitigation action is listed in Table 8.3 – Mitigation Action Plan.

7.3 MITIGATION ACTION PLAN

Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include an] action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

This action plan was developed to present the recommendations developed by the FMPC for how Chatham County can reduce the risk and vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. Emphasis was placed on both future and existing development. The action plan summarizes who is responsible for implementing each of the prioritized actions as well as when and how the actions will be implemented. Each action summary also includes a discussion of the benefit-cost review conducted to meet the regulatory requirements of the Disaster Mitigation Act. Table 7.3 identifies the mitigation actions.

The FMPC also realizes that new needs and priorities may arise as a result of a disaster or other circumstances and reserves the right to support new actions, as necessary, as long as they conform to the overall goals of this plan.

Moreover, the actions included in this mitigation strategy are subject to further review and refinement; alternatives analyses; and reprioritization due to funding availability and/or other criteria. The County is not obligated by this document to implement any or all of these projects. Rather, this mitigation strategy represents the desires of the community to mitigate the risks and vulnerabilities from identified hazards. The actual selection, prioritization, and implementation of these actions will also be further evaluated in accordance with the CRS mitigation categories and criteria contained in Appendix B.

Table 7.3 – Summary of Chatham County Mitigation Actions

Action Item	Project	Goals Addressed	Mitigation Category	Responsible Department/ Agency/Person	Funding Source	Priority	Timeline	Implementation Ranking
1	Update County website incorporating new technology to create interactive data and mapping system that will provide online technical assistance to homeowners, real estate agents and insurance agents. Include access to elevation certificates, flood zones, general flood history, repetitive loss areas, and mitigated properties, etc.	1, 4	Public Information & Outreach	Chatham County Department of Engineering, ICS	Operating Budget	Medium	Short	4
2	Acquire and demolish high-risk flood-prone buildings and repetitive loss structures and preserve land as open space.	2, 3	Property Protection	Chatham County Department of Engineering, MPC	FEMA HMGP	High	Long	3
3	Update and enforce building codes and Flood Damage Prevention Ordinance and consider higher regulatory standards to better protect existing and future development.	1, 2	Prevention	Chatham County Department of Engineering	Operating Budget	Medium	Medium	5
4	Continue to enforce Flood Damage Prevention requirements through on-site floodplain inspections.	1, 2, 4	Prevention	Chatham County Department of Engineering	Operating Budget	Medium	Short	4
5	Develop stormwater conveyance systems to alleviate flooding for existing and new development.	1, 2	Structural Projects	Chatham County Department of Engineering, Public Works	Operating Budget	Medium	Long	7
6	Improve stormwater management regulations to include higher standards for design storm, size of development regulated, low-impact development, and public maintenance of detention and retention facilities.	1, 2	Prevention	Chatham County Department of Engineering	Operating Budget	Medium	Medium	5
7	Create new drainage maintenance SOP to include natural drainage features within unincorporated Chatham County.	1, 3	Prevention	Chatham County Department of Engineering, Public Works	Operating Budget	Medium	Medium	5
8	Relocate, elevate, or retrofit substantially damaged and/or pre-FIRM properties.	1, 2	Property Protection	Chatham County Department of Engineering	FEMA HMGP, FMA	High	Long	3
9	Encourage the purchase of flood insurance and educate public on Increased Cost of Compliance (ICC) coverage through outreach materials, face-to-face meetings, and presentations to HOAs.	2, 4	Property Protection, Public Information & Outreach	Chatham County Department of Engineering	Operating Budget	Low	Short	6
10	Display signs along roads and canals at entrances to high, moderate, and low flood risk areas.	4	Public Information & Outreach	Chatham County Department of Engineering, Public Works	Operating Budget	Low	Medium	8
11	Promote low-impact development projects where applicable to improve water quality and reduce runoff.	2, 3	Natural Resource Protection	Chatham County Department of Engineering	Operating Budget	Medium	Short	4
12	Enact deed restrictions and other growth management tools to preserve wetland and natural resource areas and conserve their natural and ecological functions.	3	Prevention	MPC	Operating Budget	High	Medium	2
13	Develop a Natural Floodplain Functions Plan to protect and or restore endangered species and habitat.	3	Natural Resource Protection	Chatham County Department of Engineering	-	Medium	Short	4
14	Integrate the FMP into the Emergency Operations Plan, Pre-Disaster Hazard Mitigation Plan, Comprehensive Plan, and Capital Improvement Program.	1	Prevention	CEMA, MPC, Chatham County Department of Engineering	Operating Budget	Low	Medium	8
15	Implement an outreach campaign to educate residents on flood risks, maps, mitigation activities, stormwater, water quality, environmental protection, and the benefits of natural floodplains.	1, 4	Public Information & Outreach	Chatham County Department of Engineering	Operating Budget	High	Medium	2
16	Develop web-based outreach efforts, including social media.	1, 4	Public Information & Outreach	Chatham County Department of Engineering, CEMA, ICS	Operating Budget	Low	Short	6
17	Improve recurring local funding for Public Works maintenance and flood management activities implemented through the Capital Improvements Program.	1, 2	Structural Projects	Chatham County Department of Engineering, Public Works, Finance Department	Operating Budget	Medium	Medium	5
18	Use Flood Protection Questionnaire results to identify target areas for outreach and flood protection.	1	Public Information & Outreach	Chatham County Department of Engineering	Operating Budget	Low	Short	6
19	Elevate lift stations and electrical components above the base flood elevation (BFE).	1	Property Protection	Chatham County Department of Engineering, Public Works	-	Medium	Long	7
20	Partner with Georgia Tech to install additional tidal and riverine flood gauges at various locations throughout the County to help provide real-time flood data on the County website.	1, 4	Emergency Services, Public Information & Outreach	CEMA, Georgia Tech University	-	High	Medium	2
21	Develop a long-range regional plan for sea level rise which evaluates multiple adaptation methods.	2, 3	Prevention	Chatham County Department of Engineering, MPC	-	Medium	Medium	5

7.4 DETAILED MITIGATION ACTIONS

1. Update County website incorporating new technology to create interactive data and mapping system that will provide online technical assistance to homeowners, real estate agents and insurance agents. Include access to elevation certificates, flood zones, general flood history, repetitive loss areas, and mitigated properties, etc.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Residents and visitors are more likely to take preparedness and mitigation actions if they are aware of the risk they face.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: This effort could be coordinated with the existing Savannah Area Geographic Information System (SAGIS) tool.
Responsible Office: The Chatham County Department of Engineering and the Information and Communication Services (ICS) Department will oversee this effort and coordinate the data and information needs.
Priority: Medium
Cost Estimate: To be determined; < $10,000
Benefits (Losses Avoided): Providing information on flood risk and mitigation options to the public can reduce vulnerability through better awareness and encourage private action to reduce risk.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Short

2. Acquire and demolish high-risk flood-prone buildings and repetitive loss structures and preserve land as open space.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Repetitive loss structures are known to be vulnerable to flooding and are likely to continue to flood without mitigation. Demolition ensures that future risk is eliminated and allows the land as open space to better manage floodwaters.
Other Alternatives: Elevation, barriers, and drainage improvements are alternatives to acquisition, but none of these other options can ensure that risk on a repetitive loss property is completely mitigated.
Existing Planning Mechanism(s) through which Action Will Be Implemented: This effort could be coordinated with existing land preservation efforts and supported through integration with the County's land use planning and zoning.
Responsible Office: The Chatham County Department of Engineering, Metropolitan Planning Commission
Priority: High
Cost Estimate: Cost must be determined on a case by case basis
Benefits (Losses Avoided): Acquisition and demolition of repetitive loss structures completely removes the flood problem and eliminates vulnerability while also expanding open space and enhancing the land's natural and beneficial flood management functions.
Potential Funding: The cost will be paid for by FEMA Hazard Mitigation Grant Program (HMGP) funds.
Timeline: Long

3. Update and enforce building codes and Flood Damage Prevention Ordinance and consider higher regulatory standards to better protect existing and future development.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized

Flooding; Hurricane/Tropical Storm
Issue/Background: The building code and Flood Damage Prevention Ordinance dictate how new development can occur. By updating these regulations to require higher standards, such as an increased freeboard or elevation of electrical equipment, and by enforcing these codes throughout the development process to ensure compliance, Chatham County can limit the vulnerability of new development to flooding.
Other Alternatives: Encourage developers to build to higher standards voluntarily
Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing building codes and Flood Damage Prevention Ordinance will be updated; current enforcement protocols could be expanded
Responsible Office: The Chatham County Department of Engineering
Priority: Medium
Cost Estimate: Staff time
Benefits (Losses Avoided): New development will be less vulnerable to flooding.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Medium

4. Continue to enforce Flood Damage Prevention requirements through on-site floodplain inspections.

Hazards Addressed: Flood: 100-/500-year
Issue/Background: Chatham County has established additional development regulation enforcement in the form of on-site floodplain inspections. These inspections should be continued and expanded to ensure full compliance of new development with standards of the Flood Damage Prevention Ordinance.
Other Alternatives: Encourage voluntary compliance with floodplain development regulations
Existing Planning Mechanism(s) through which Action Will Be Implemented: These floodplain inspections can continue to be implemented alongside traditional code enforcement inspections
Responsible Office: The Chatham County Department of Engineering
Priority: Medium
Cost Estimate: Staff time
Benefits (Losses Avoided): Increased enforcement of development regulations will ensure that new development will be less vulnerable to flooding.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Short

5. Develop stormwater conveyance systems to alleviate flooding for existing and new development.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Inadequate stormwater drainage causes flooding issues across the County.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: The Department of Engineering maintains the County's stormwater management system and can make improvements to the drainage system through the Capital Improvements Program.
Responsible Office: The Chatham County Department of Engineering and Public Works Department
Priority: Medium
Cost Estimate: To be determined
Benefits (Losses Avoided): Improving stormwater conveyance systems in areas where drainage is currently inadequate will reduce stormwater flooding and prevent losses.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Long

6. Improve stormwater management regulations to include higher standards for design storm, size of development regulated, low-impact development, and public maintenance of detention and retention facilities.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Stormwater flooding is a problem throughout the County.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: Improvement will be made to the existing stormwater management regulations.
Responsible Office: The Chatham County Department of Engineering and Public Works Department
Priority: Medium
Cost Estimate: Staff time
Benefits (Losses Avoided): Incorporating higher standards into stormwater management regulations will help to minimize the stormwater runoff generated by new development and can potentially provide for on-site stormwater management to mitigate existing problems.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Medium

7. Create new drainage maintenance SOP to include natural drainage features within unincorporated Chatham County.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Blocked channels in natural channels can cause upstream drainage issues and stormwater flooding. Maintenance of the County's drainage system must include natural drainage features in order to ensure that the entire system is capable of handling flood waters.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: Maintenance of natural channels will be incorporated into the existing drainage maintenance SOP
Responsible Office: The Chatham County Department of Engineering
Priority: Medium
Cost Estimate: Staff time to update the drainage maintenance SOP; cost of increased maintenance to be determined
Benefits (Losses Avoided): Expanding drainage maintenance procedures to include natural drainage features will reduce the risk of flooding by ensuring the entire drainage system is functioning properly.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Medium

8. Relocate, elevate, or retrofit substantially damaged and/or pre-FIRM properties.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm
Issue/Background: Pre-FIRM properties were not required to incorporate flood damage prevention building requirements when built, therefore if these properties are at risk of flooding they are likely to continue incurring flood damages if not properly mitigated. Similarly, substantially damaged properties are likely to be vulnerable to continued flooding. However, substantially damaged properties must be brought up to current standards when repaired, whereas non-substantial improvements to pre-FIRM structures are not required to be elevated above the existing finished floor elevation. Pre-FIRM properties

vulnerable to major flooding should be mitigated to prevent substantial damages. In both of these cases, relocation, additional elevation, or retrofits to be encouraged as mitigation options for property owners.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: None
Responsible Office: The Chatham County Department of Engineering
Priority: High
Cost Estimate: Cost to be determined on a case by case basis, depending on mitigation method.
Benefits (Losses Avoided): Relocating, elevating, or retrofitting substantially damaged and/or pre-FIRM properties will greatly reduce exposure and/or vulnerability to flooding.
Potential Funding: The cost will be paid for by FEMA Hazard Mitigation Grant Program (HMGP) funds.
Timeline: Long

9. Encourage the purchase of flood insurance and educate public on Increased Cost of Compliance (ICC) coverage through outreach materials, face-to-face meetings, and presentations to HOAs.

Hazards Addressed: Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm
Issue/Background: ICC coverage pays up to $30,000 to bring a building into compliance with state or local flood damage prevention ordinance regulations if it is declared to be substantially damaged or if it is a repetitive loss property.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: None
Responsible Office: The Chatham County Department of Engineering
Priority: Low
Cost Estimate: Staff time
Benefits (Losses Avoided): Educating the public on ICC coverage and encouraging the purchase of flood insurance will help protect property owners in the event of a major flood by ensuring that they are aware of the resources available to them to help cover the cost of necessary mitigation.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Short

10. Display signs along roads and canals at entrances to high, moderate, and low flood risk areas.

Hazards Addressed: Flood: 100-/500-year
Issue/Background: Displaying signs at entrances to high, moderate, and low flood risk areas will help increase public awareness of flood risk throughout the County.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: None
Responsible Office: The Chatham County Department of Engineering and Public Works Department
Priority: Low
Cost Estimate: To be determined
Benefits (Losses Avoided): Posting signage around high, moderate, and low flood risk areas will reduce vulnerability to flooding by increasing awareness and therefore encouraging residents and visitors to avoid high and moderate flood risk areas during or leading up to a flood event.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Medium

11. Promote low-impact development (LID) projects where applicable to improve water quality and reduce runoff.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Low-impact development techniques incorporate green infrastructure into site design to manage stormwater on-site and improve water quality through increased stormwater infiltration.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: Discussions of LID can be incorporated into the site plan and development review process
Responsible Office: The Chatham County Department of Engineering
Priority: Medium
Cost Estimate: To be determined
Benefits (Losses Avoided): LID techniques reduce flood risk by managing stormwater on-site and improve water quality, helping to meet NPDES targets.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Short

12. Enact deed restrictions and other growth management tools to preserve wetland and natural resource areas and conserve their natural and ecological functions.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Wetlands provide important natural functions, including improving water quality through filtration and natural pollution treatment and managing flooding by containing and slowing floodwaters. Existing wetlands and natural resource areas must be protected to preserve these beneficial ecological functions.
Other Alternatives: Discourage development of these areas through site development regulations
Existing Planning Mechanism(s) through which Action Will Be Implemented: Growth management techniques can be incorporated into future planning efforts and formally supported through ordinance updates.
Responsible Office: Metropolitan Planning Commission
Priority: High
Cost Estimate: Staff time
Benefits (Losses Avoided): Preserving wetlands and natural resource areas will protect these important areas for future flood protection and continued water quality improvement.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Medium

13. Develop a Natural Floodplain Functions Plan to protect and or restore endangered species and habitat.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Through the development of a Natural Floodplain Functions Plan, the County can inventory its floodplain natural resources and functions, and identify strategies and tools to protect, preserve, and restore these resources.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Office: The Chatham County Department of Engineering
Priority: Medium
Cost Estimate: $6,000
Benefits (Losses Avoided): Developing this plan will identify mitigation actions to further protect natural floodplain resources and will provide credit in the Community Rating System toward lowering flood insurance premiums.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Short

14. Integrate the FMP into the Emergency Operations Plan, Pre-Disaster Hazard Mitigation Plan, Comprehensive Plan, and Capital Improvement Program.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Integrating planning efforts can ensure that goals and objectives are aligned so that actions identified in this FMP are not undermined by conflicting planning efforts. Instead, these planning efforts can be used to reinforce each other and support implementation.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: This action can be implemented through existing plan maintenance and update processes.
Responsible Office: The Chatham County Department of Engineering
Priority: Low
Cost Estimate: Staff time
Benefits (Losses Avoided): Integrating planning efforts will help to reinforce the goals, objectives, and actions of this plan and increase the ease and likelihood of implementation.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Medium

15. Implement an outreach campaign to educate residents on flood risks, maps, mitigation activities, stormwater, water quality, environmental protection, and the benefits of natural floodplains.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Educating the public on flooding and the hazard area will make people more aware of their risk. Expanding this outreach campaign to include mitigation activities and ecological functions will make people more likely to implement mitigation actions and understand the importance of mitigation actions taken by the County.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing outreach methods can be utilized but should also be expanded upon.
Responsible Office: The Chatham County Department of Engineering
Priority: High
Cost Estimate: Staff time and outreach materials
Benefits (Losses Avoided): Individuals will be more aware of flood risk and more likely to take action to mitigate their own risk.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Medium

16. Develop web-based outreach efforts, including social media.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Social media is an increasingly essential way to communicate with the public. Developing web-based outreach efforts will give Chatham County a larger audience, especially with younger residents.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: This project can build upon Chatham County's existing website and social media.
Responsible Office: The Chatham County Department of Engineering
Priority: Low
Cost Estimate: Staff time
Benefits (Losses Avoided): Increasing the audience for Chatham County's outreach efforts will make more people aware of their risk and likely to mitigate their risk.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Short

17. Improve recurring local funding for Public Works maintenance and flood management activities implemented through the Capital Improvements Program.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: A Capital Improvements Program (CIP) is a forward-looking plan for infrastructure improvements that considers needs and available funding. By looking ahead at future maintenance needs for the stormwater management system, the County can ensure funds are set aside to pay for those improvements. Currently, the County is limited in this effort by a lack of steady funding.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: A CIP can be developed by expanding upon existing annual budgeting efforts
Responsible Office: The Chatham County Department of Engineering will be responsible for assessing and planning for the capital improvement needs of the stormwater management system.
Priority: Medium
Cost Estimate: Staff time
Benefits (Losses Avoided): identifying additional funding sources for a capital improvement program will enable better advanced planning of Improvements to the stormwater system and more assurance that funding will be available for the needed maintenance.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Medium

18. Use Flood Protection Questionnaire results to identify target areas for outreach and flood protection.

Hazards Addressed: Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Responses to the Flood Protection Questionnaire may provide information on problem stormwater flooding areas that can help the County to target and prioritize repairs, maintenance, and capital improvements.
Other Alternatives: No action; County may be unaware of problem flooding areas
Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Office: The Chatham County Department of Engineering
Priority: Low
Cost Estimate: Staff time to review and follow up on survey responses; cost of resulting mitigation to be determined on case by case basis.
Benefits (Losses Avoided): The County will become informed of areas with stormwater flooding problems and thus better able to address these problems.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Short

19. Elevate lift stations and electrical components above the base flood elevation (BFE).

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Lift stations are an important component of flood protection, moving water from low-lying areas that would not normally drain on their own. Lift stations and other electrical equipment are not able to operate once they are flooded. Elevating this equipment to above the BFE ensures that lift stations are operable in the event of at least 100-year or lesser flood.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: These improvements can be planned for through the Capital Improvements Program once additional funding is established.
Responsible Office: The Chatham County Department of Engineering
Priority: Medium
Cost Estimate: To be determined
Benefits (Losses Avoided): Lift stations provide flood protection for low-lying areas. Elevating this and other electrical equipment ensures operation during flood events, which limits flood damages.
Potential Funding: The cost will be paid for by Chatham County's operating budget.
Timeline: Long

20. Partner with Georgia Tech to install additional tidal and riverine flood gauges at various locations throughout the County to help provide real-time flood data on the County website.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion
Issue/Background: Tidal and riverine gauges provide data on water levels and enable more accurate monitoring of flood conditions, allowing for more timely warnings, when necessary.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: None
Responsible Office: The Chatham County Dep2artment of Engineering
Priority: High
Cost Estimate: Approximately $25,000 to install and $16,000/year to operate per gauge
Benefits (Losses Avoided): The County will have better data on flooding and be able to recognize flood threats and issue more timely, accurate warnings. With this data available on the County website, the public can be better informed of flood hazards and risk data.
Potential Funding: Not yet identified.
Timeline: Medium

21. Develop a long-range regional plan for sea level rise which evaluates multiple adaptation methods.

Hazards Addressed: Climate Change & Sea Level Rise; Flood: 100-/500-year; Flood: Stormwater/Localized Flooding; Hurricane/Tropical Storm; Coastal/Stream Bank Erosion

Issue/Background: Chatham County's geography makes it extremely vulnerable to sea level rise. Current projections indicated that parts of the County will be permanently inundated within the next few decades. Analyzing exactly which areas and properties are at risk and then planning and implementing adaptation strategies accordingly can protect the County from suffering the full impact of sea level rise.
Other Alternatives: No action;
Existing Planning Mechanism(s) through which Action Will Be Implemented: None
Responsible Office: The Chatham County Department of Engineering
Priority: Medium
Cost Estimate: To be determined
Benefits (Losses Avoided): The County will be able to plan for and mitigate the impacts of sea level rise before it can cause property and infrastructure damages.
Potential Funding: Not yet identified.
Timeline: Medium

8 PLAN ADOPTION

Requirement §201.6(c)(5): [The plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).

The purpose of formally adopting this plan is to secure buy-in from Chatham County, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 of the 10-step planning process: Adopt the Plan, in accordance with the requirements of DMA 2000. The Chatham County Board of Commissioners will adopt the Floodplain Management Plan by passing a resolution.

9 PLAN IMPLEMENTATION AND MAINTENANCE

Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This is Planning Step 10 of the 10-step planning process. This section provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The section also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

9.1 IMPLEMENTATION

Once adopted, the plan must be implemented to be effective. While this plan contains many worthwhile actions, Chatham County will need to decide which action(s) to undertake first. The priority assigned the actions in the planning process and funding availability will affect that decision. Low or no-cost actions most easily demonstrate progress toward successful plan implementation.

An important implementation mechanism that is highly effective and low-cost is incorporation of the Floodplain Management Plan recommendations and their underlying principles into other plans and mechanisms, such as the Comprehensive Plan. The County already implements policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms.

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government. Implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits to each program and the community. This effort is achieved through the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities.

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the costlier recommended actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the County will be positioned to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

9.1.1 Responsibility for Implementation of Goals and Activities

Elected officials, officials appointed to head community departments and community staff are charged with implementation of various activities in the plan. During the quarterly reviews as described later in this section, an assessment of progress on each of the goals and activities in the plan will be determined and noted. At that time, recommendations will be made to modify timeframes for completion of activities, funding resources, and responsible entities. On a quarterly basis, the priority standing of various activities may also be changed. Some activities that are found not to be doable may be deleted from the plan entirely and activities addressing problems unforeseen during plan development may be added.

9.1.2 Role of FMPC in Implementation, Monitoring and Maintenance

With adoption of this plan, the County will be responsible for the plan implementation and maintenance. The FMPC identified in Section 2 will reconvene **quarterly** each year to ensure that mitigation strategies are being implemented and that the County continues to maintain compliance with the NFIP. As such, the County agrees to continue its relationship with the FMPC and:

- Act as a forum for flood mitigation issues;
- Disseminate flood mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Ensure flood mitigation remains a consideration for community decision makers;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended revisions to the County Board of Commissioners; and
- Inform and solicit input from the public.

The FMPC's primary duty moving forward is to see the plan successfully carried out and report to the County Board of Commissioners, GEMA/HS, FEMA, and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about flood mitigation, passing concerns on to appropriate entities, and posting relevant information on the County's website (and others as appropriate).

9.2 MAINTENANCE

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as progress, roadblocks, or changing circumstances are recognized.

9.2.1 Maintenance Schedule

Chatham County's Department of Engineering is responsible for initiating plan reviews. In order to monitor progress and update the mitigation strategies identified in the action plan, the County will revisit this plan quarterly and following a hazard event. The County will submit a five-year written update to GEMA/HS and FEMA Region IV, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. With this plan update anticipated to be fully approved and adopted in 2018, the next plan update for Chatham County will occur in 2023.

9.2.2 Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or
- Increased vulnerability as a result of new development (and/or further annexation).

Updates to this plan will:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;

- Incorporate growth and development-related changes to infrastructure inventories; and
- Incorporate new action recommendations or changes in action prioritization.

Changes will be made to the plan during the update process to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as is appropriate and necessary, and as approved by the County Board of Commissioners. In keeping with the five-year update process, the FMPC or similar committee will convene public meetings to solicit public input on the plan and its routine maintenance and the final product will be adopted by the County Board of Commissioners.

Specifically, the County will adhere to the following process for the next update of this FMP:

Quarterly Plan Review Process

For the 2018 Floodplain Management Plan update review process, the Chatham County Department of Engineering will be responsible for facilitating, coordinating, and scheduling reviews and maintenance of the plan. The review of the Floodplain Management Plan will be conducted as follows:

- The County's Department of Engineering will reconvene the FMPC or similar committee to meet and review the progress toward implementation of the plan's mitigation action plan. This review will evaluate the progress made on implementation of each mitigation action listed in Section 8.4 Mitigation Action Plan.
- Meetings of the FMPC shall be published in accordance with local rules regarding public notice.
- Prior to the review, department heads and others tasked with implementation of the various activities will be queried concerning progress on each activity in their area of responsibility and asked to present a report at the review meeting.
- After each quarterly meeting, minutes of the meeting and a status report will be prepared by the County's Department of Engineering.
- The results of each quarterly FMPC meeting will be made available to the local news media and the County Board of Commissioners for informational purposes.
- The County's Department of Engineering will maintain copies of minutes and status reports to provide to ISO/FEMA as part of the community's annual recertification to the CRS program.

Criteria for Annual Reviews in Preparation for 5-Year Update

The criteria recommended in 44 CFR 201 and 206 will be utilized in reviewing and updating the plan. More specifically, annual reviews will monitor changes to the following information:

- Community growth or change in the past quarter.
- The number of substantially damaged or substantially improved structures by flood zone.
- The renovations to public infrastructure including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- Natural hazard occurrences that required activation of the Emergency Operations Center (EOC) and whether the event resulted in a presidential disaster declaration.
- Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the community or closure of businesses, schools, or public services.
- The dates of hazard events descriptions.
- Documented damages due to the event.

- Closures of places of employment or schools and the number of days closed.
- Road or bridge closures due to the hazard and the length of time closed.
- Assessment of the number of private and public buildings damaged and whether the damage was minor, substantial, major, or if buildings were destroyed. The assessment will include residences, mobile homes, commercial structures, industrial structures, and public buildings, such as schools and public safety buildings.
- Review of any changes in federal, state, and local policies to determine the impact of these policies on the community and how and if the policy changes can or should be incorporated into the Floodplain Management Plan. Review of the status of implementation of projects (mitigation strategies) including projects completed will be noted. Projects behind schedule will include a reason for delay of implementation.

9.2.3 Incorporation into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is incorporation of the Floodplain Management Plan recommendations and their underlying principles into other plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. As previously stated, mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. As described in this plan's capability assessment, Chatham County already implements policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. These existing mechanisms include:

- Hazard Mitigation Plans
- Land Use Plans
- Emergency Management Plans
- Ordinances
- Other plans, regulations, and practices with a mitigation focus

Those involved in these other planning mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, programs, etc., as appropriate. As described in Section 10.1 Implementation, incorporation into existing planning mechanisms will be done through the routine actions of:

- Monitoring other planning/program agendas;
- Attending other planning/program meetings;
- Participating in other planning processes; and
- Monitoring community budget meetings for other community program opportunities.

The successful implementation of this mitigation strategy will require constant and vigilant review of existing plans and programs for coordination and multi-objective opportunities that promote a safe, sustainable community.

Efforts should continuously be made to monitor the progress of mitigation actions implemented through other planning mechanisms and, where appropriate, their priority actions should be incorporated into updates of this Floodplain Management Plan.

9.2.4 Continued Public Involvement

Continued public involvement is imperative to the overall success of the plan's implementation. The update process provides an opportunity to solicit participation from new and existing stakeholders and to

publicize success stories from the plan implementation and seek additional public comment. The plan maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated committee meetings, web postings, press releases to local media, and through public hearings.

Public Involvement Process for Quarterly Reviews

The public will be noticed by placing an advertisement on the County's website specifying the date and time for the review and inviting public participation.

Public Involvement for Five-year Update

When the FMPC reconvenes for the five-year update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. In reconvening, the FMPC will be responsible for coordinating the activities necessary to involve the greater public, including disseminating information through a variety of media channels detailing the plan update process. As part of this effort, public meetings will be held and public comments will be solicited on the plan update draft. The subcommittee will also coordinate this public outreach process with the program for public information established pursuant to the most current guidelines from the CRS.

APPENDIX A PLANNING PROCESS

Planning Step 1: Organize to Prepare the Plan

Table A.1: FMPC Meeting Dates

Note: All FMPC Meetings were open to the public.

Meeting Type	Meeting Topic	Meeting Date	Meeting Location
FMPC #1 (Kick-off)	1) Introduction to DMA, CRS and the planning process 3) Organize resources: the role of the FMPC, planning for public involvement, and coordinating with other agencies and stakeholders	May 10, 2017 3:00 – 4:00 p.m.	Chatham County Department of Engineering 124 Bull St., Rm 430
FMPC #2	1) Review Flood Protection Questionnaire and other public involvement strategies 3) Discuss/develop mitigation goals for the FMP	June 20, 2017 1:30 – 2:30 p.m.	Metropolitan Planning Commission Arthur A. Mendonsa Hearing Room 110 E. State St.
FMPC #3	1) Review Capability Assessment 2) Review/discussion of Flood Risk Assessment (Assess the Hazard) 3) Review/discussion of Vulnerability Assessment (Assess the Problem)	October 26, 2017 5:00 – 7:00 p.m.	Frank Murray Community Center 160 Whitemarsh Island Drive
FMPC #4	1) Review/discussion of Flood Risk and Vulnerability Assessment 2) Discuss/develop mitigation strategies for the FMP	November 29, 2017 1:30 – 3:30 p.m.	Frank Murray Community Center 160 Whitemarsh Island Drive
FMPC #5	1) Review "Draft" Floodplain Management Plan 2) Solicit comments and feedback from the FMPC	February 15, 2018 2:30 – 3:30 p.m.	761 Wheaton Street, Room #1009A Savannah, GA

FMPC Meeting Agendas, Minutes, and Sign-in Sheets

FMPC Meeting 1: May 10, 2017

Chatham County Floodplain Management Plan

Floodplain Management Planning Committee Project Kick-Off Meeting Agenda
Wednesday, May 10, 2017, 3:00-4:00 p.m.
Held at Chatham County Department of Engineering

1. Introductions
2. Trends in Disasters – Why Plan?
3. Planning Requirements
    a. Disaster Mitigation Act (DMA) Requirements
    b. Community Rating System (CRS) Requirements
        i. Basics of the CRS
        ii. NFIP Flood Insurance Discounts
        iii. Benefits of the CRS
4. Planning Process
    a. CRS Activity 510 Floodplain Management Planning (FMP) Process
        i. 10-step process
    b. CRS Activity 510 Repetitive Loss Area Analysis (RLAA) Process
        i. 5-step process
    c. CRS Activity 510 Natural Floodplain Functions Plan (NFP) Process
        i. 7-step process
5. Adjourn

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Chatham County Floodplain Management Plan

FMPC Project Kick-Off Meeting Minutes
Wednesday, May 10, 2017, 3:00-4:00 p.m.
Held at Chatham County Department of Engineering

Introductions

David Stroud, a consultant with Amec Foster Wheeler, opened the meeting by providing the meeting agenda. Eight people were in attendance, including five members of the FMPC, a County representative serving in an advisory capacity, as well as Mr. Stroud and Courtney Reich, a consultant with Ecological Planning Group. Mr. Stroud then discussed the agenda items as reviewed below.

Trends in Disasters

Mr. Stroud began a PowerPoint presentation with a review of the trends in disasters. There has been an increase in population and community growth in recent years, which means that more people are living in hazardous areas and there is greater exposure to hazard risk. Exposure to risk include the people as well as the infrastructure and buildings. Because exposure has increased, when hazard events occur they cause more damage. There has been a continual increase in hazard expenses and an increase in the issuance of major disaster declarations. Mr. Stroud reviewed a list of the top 10 natural disasters by FEMA relief costs. All of them occurred within the last 28 years, and 4 of the top 5 occurred within the last 13 years. Mr. Stroud also noted that these costs generally include federal aid amounts, but that the actual cost of disasters to state and local governments, businesses, insurance companies, homeowners, and others is much higher. Four reasons why addressing these trends is a priority were presented: 1) the cost of doing nothing is too high, as the costs of response and recovery continue to grow; 2) many events are predictable and repetitive; 3) loss reduction activities can be undertaken, and they work, they're cost effective and environmentally sound, and there are funds available to help; and 4) there are legal and moral responsibilities to act.

Planning Requirements

Next, Mr. Stroud reviewed the Disaster Mitigation Act (DMA) of 2000 planning requirements, which include a four-phase planning process: organize resources, risk assessment, develop a mitigation plan, and adoption and implementation. The approach that will be led by Mr. Stroud and Amec Foster Wheeler blends this four-phase process with the processes of the Flood Mitigation Assistance (FMA) Program and the Community Rating System (CRS) Floodplain Management Planning. This completed Floodplain Management Plan (FMP) will meet the requirements of all three FEMA programs.

A review of the CRS basic requirements and benefits was provided. The CRS has 10 classes defined by a point-based system, where points are earned for floodplain management, mitigation, and higher standards, and a 5 percent premium discount is awarded for every 500 points (or 1 class level improvement). Chatham County is currently a Class 5 community and is seeking to become a Class 4 community through this process. Currently, the average premium cost is $714 in Chatham County, with an average savings of $182 and a total of 17,266 policies. There are 11,629 policies inside the Special Flood Hazard Area (SFHA) with an average premium of $855 and an average savings of $267. Mr. Stroud summarized recent changes in the CRS Manual from the 2013 to the 2017 schedule and reviewed the series of activities within the program.

Planning Process

This planning process will include the development of a Floodplain Management Plan (FMP), Repetitive Loss Area Analysis (RLAA), and Natural Floodplain Functions Plan (NFP). A detailed review of the entire planning process for each of these projects was provided and the FMPC was given a review of their role and duties throughout the process.

The flood hazards identified in a preliminary review were discussed. The hazards identified are: Stream Bank Erosion, Dam/Levee Failure, Flood: 100-/500-year, Flood: Stormwater/Localized, Hurricane and Tropical Storms, and Repetitive Flooding.

Next Steps

To conclude the meeting, Mr. Stroud discussed the upcoming next steps, which include gathering data from the County as well as from other local, state, and federal sources. A select sample of data to collect include: parcel data, floodplain mapping, plans, studies, capital improvements plan, localized flooding locations, endangered species, and repetitive loss properties. Amec Foster Wheeler will coordinate with the Department of Engineering to gather data from County sources.

Mr. Stroud and Ms. Reich took questions from the group.

Adjourn

The meeting was adjourned at 4:00 p.m.

Chatham County, GA
Floodplain Management Planning Committee Meeting

Wednesday May 10th, 3:00 PM

	Name	Organization	Phone	E-Mail
1.	DAVID STROUD	AMEC FOSTER WHEELER	919-325-6497	david.stroud@amecfw.com.
2.	Cliff Growe	Citizen	912-927 1577	CGROWE97@COMCAST.NET
3.	Randall Mathews	CEMA	912-201-4500	rjmathews@chathamcounty.org
4.	JEFF BRADY	Rountree Brady Ins	912-356-3815	JEFF-BRADY@ALLSTATE.COM
5.	Michael Blakely	Chatham Co.	912 652-7814	mblakely@chathamcounty.org
6.	Courtney Reich	EPD	912-656+1316	courtney@ecologicalplanning.us
7.	David Anderson	Chatham County Department of Engineering	912-652-7834	dganders@chathamcounty.org
8.	Jill Growe	Chatham County	912-927 1577 652-7820	jcgrowe@chathamcounty.org
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FMPC Meeting 2: June 20, 2017

Chatham County Floodplain Management Plan

Floodplain Management Planning Committee Meeting #2 Agenda
Wednesday, June 20, 2017, 1:30-2:30 p.m.
Held at Metropolitan Planning Commission Hearing Room

1. Planning Process Progress Review
    a. FMPC members
    b. Kickoff Meeting
    c. Hazard Profiles
2. Development of Goals
    a. Messages to develop goals
    b. Potential goals
    c. Open discussion
3. Flood Protection Questionnaire
4. Next Steps
5. Adjourn

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Chatham County Floodplain Management Plan

FMPC Meeting #2 Minutes
Tuesday, June 20, 2017, 1:30-2:30 p.m.
Held at Metropolitan Planning Commission Hearing Room

David Stroud, a consultant with Amec Foster Wheeler, opened the meeting by providing the meeting agenda. There were 11 people in attendance, including nine members of the FMPC, a County representative serving in an advisory capacity, as well as Mr. Stroud. Mr. Stroud then discussed the agenda items as reviewed below.

Planning Process Progress Review

Mr. Stroud began a PowerPoint presentation with a review of the progress made thus far in the planning process. Progress has been made toward fulfilling CRS Steps 1 and 2 through the Kickoff meeting and first public meeting as well as the organization of the FMPC. Progress has been made on CRS Step 2 initial efforts to coordinate with outside stakeholders for information, participation, and other support of the planning process. A list of outside stakeholders has already been prepared. Additionally, the consultant team at Amec Foster Wheeler has already begun to collect data to profile the identified hazards, commencing progress on CRS Step 4. Next Steps will involve completing the flood hazard profiles, including assessing vulnerability to each hazard.

Development of Goals

The focus of this meeting is the identification of goals and objectives that can guide the development of mitigation actions. Mr. Stroud led the FMPC through a series of exercises to help the FMPC select goals and arrive at consensus. FMPC members were each asked to vote on their top three priorities for the mitigation program out of a list of options. The group also reviewed the goals of the County's hazard mitigation plan and past Floodplain Management Plan to ensure consistency across planning efforts. The group decided on five preliminary goals and it was decided that the Amec Foster Wheeler consulting team would draft a selection of preliminary objectives for each goal for the FMPC to review.

Flood Protection Questionnaire

To conclude the meeting, Mr. Stroud discussed the Flood Protection Questionnaire, which will be used as a public outreach and information gathering tool.

Next Steps

Mr. Stroud asked the FMPC to brainstorm other opportunities and ideas to incorporate public outreach and involvement into the planning process. To conclude the meeting, Mr. Stroud took questions from the group.

Adjourn

The meeting was adjourned at 2:30 p.m.

Chatham County, GA
Floodplain Management Planning Committee Meeting

Tuesday June 20th, 1:30 PM

	Name	Organization	Phone	E-Mail
1.	DAVID STROUD	Amec Foster Wheeler	919-325-6497	david.stroud@amecfw.com
2.	David Nash	CCPW	652-6856	DANASH@ChathamCounty.org
3.	Cliff Growe	Citizen - CC	912 401 2737	cgrowe07@comcast.net
4.	Jill Growe	Chatham County	9129271577	jcgrowe@chathamcounty.org
5.	Tim Moody	Armstrong State	912-344-3090	Tim.moody@armstrong.edu
6.	Michael BLAKELY	Chatham Co.	912 652-7814	mblakely@chathamcounty.org
7.	Randall Mathews	CEMA	912-201-4500	rjmathews@chathamcounty.org
8.	Nicole Helmholdt	MPC	" 651 1454	helmholdtn@thempc.org
9.	TOM MCDONALD	COS	912 651 6530	tmcdonald@savannahga.gov
10.	Jeff BRADY	Rountree BRADY Jr/s	912-356-3815	JeffBRADY@ALLSTATE.com
11.	Maddy Russell	UGA Marine Ext GA Sea Grant	912.222.1363	madrussell@uga.edu
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FMPC Meeting 3: October 26, 2017

Chatham County Floodplain Management Plan

Floodplain Management Planning Committee Meeting #3 Agenda
Thursday, October 26, 2017, 5:00-6:00 p.m.
Held at Frank Murray Community Center

1. Planning Process Progress Review
    a. Public Involvement & Coordination
2. Discussion of Other Planning Efforts
    a. Repetitive Loss Area Analysis
    b. Natural Floodplain Protection Plan
3. Review Draft Hazard Identification and Risk Assessment
4. Review Draft Capability Assessment
    a. Capability Assessment Exercise
5. Adjourn

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Chatham County Floodplain Management Plan

FMPC Meeting #3 Minutes
Thursday, October 26, 2017, 5:00-6:00 p.m.
Held at Frank Murray Community Center

David Stroud, a consultant with Amec Foster Wheeler, opened the meeting by providing the meeting agenda. There were 8 people in attendance, including three members of the FMPC, two County representatives serving in an advisory capacity, as well as Mr. Stroud and two consultants from Ecological Planning Group, Courtney Reich and Chris Tolleson. Mr. Stroud then discussed the agenda items as reviewed below.

Planning Process Progress Review

Mr. Stroud began a PowerPoint presentation with a review of the progress made thus far in the planning process. Currently we are moving forward on CRS Step 4 Assess the hazard and CRS Step 5 Assess the problem. The consulting team has prepared a draft hazard identification and risk assessment to fulfill these steps for the FMPC and the public to review. Efforts on CRS Step 2 Involve the public and CRS Step 3 Coordinate will continue throughout the planning process.

Discussion of Other Planning Efforts

Planning is underway on the preparation of the Repetitive Loss Area Analysis (RLAA) and the Natural Floodplain Functions Plan (NFP). Mr. Stroud Reviewed the steps for the RLAA process and discussed the Flood Protection Questionnaire that will be sent to all properties in repetitive loss areas. He also reviewed the progress made on the NFP, including the identification and mapping of important habitat areas as well as the development of preliminary actions.

Review Draft Hazard Identification & Risk Assessment (HIRA)

Next, Mr. Stroud reviewed the findings of the HIRA, including a profile and vulnerability assessment for each hazard. Hazard profiles include a description of the hazard, the location and spatial extent, past occurrences, and probability of future occurrences. The vulnerability assessments cover the assets at risk to the hazard, including critical facilities and potential changes in exposure due to future development. The hazards assessed are climate change & sea level rise, dam/levee failure, 100-/500-year flood, stormwater/localized flooding, hurricane & tropical storm, and coastal/stream bank erosion. Overall, hurricane & tropical storm was found to be a high risk hazard; climate change & sea level rise, 100-/500-year flood, stormwater/localized flooding, and coastal/stream bank erosion were found to be moderate risk hazards, and dam failure was found to be a low risk hazard. The full HIRA is available for review on the County website for the FMPC and the public to review and submit comments.

Capability Assessment Exercise

The FMPC was then led through a review of the preliminary capability assessment and an exercise to provide greater detail to that assessment, whereby each committee member could offer their own specific knowledge of their department/agency/community capability. Mr. Stroud provided a data collection guide and led the group in a discussion of important topics to consider in measuring capability.

Adjourn

Mr. Stroud, Ms. Reich, and Mr. Tolleson answered questions from the group. The meeting was adjourned at 6:00 p.m.

Chatham County, GA
Floodplain Management Planning Committee Meeting

Thursday October 26th, 5:00 PM

	Name	Organization	Phone	E-Mail
1.	DAVID STROUD	AMEC FW	919 325 6497	david.stroud@amecfw.com
2.	Cliff Growe		912 401 2737	cgrowe07@comcast.net
3.	Randall Mathews	CEMA	912-201-4500	rjmathews@chathamcounty.org
4.	CHRIS TOLLESON	EPG	912-660-4847	~~dctolleson@~~ chris@ecologicalplans
5.	Michael Blakely	Chatham Co.	912 652-7814	mblakely@chathamcounty.org
6.	Courtney Reich	EPG	912 656 1316	courtney@ecologicalplans.net
7.	Christine Williams	Chatham Co	912-652-7850	cwilliams@chathan county
8.	D Sullens	CEMA	912 201 4500	dwsullens@chathamcountyga.org
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FMPC Meeting 4: November 29, 2017

Chatham County Floodplain Management Plan

Floodplain Management Planning Committee Meeting #4 Agenda
Thursday, November 29, 2017, 1:30-3:30 p.m.
Held at Frank Murray Community Center

1. Planning Process Progress Review
    a. Public Involvement & Coordination Ongoing
    b. Draft an Action Plan
2. Recap of Flood Hazards & Goals
3. Develop Mitigation Strategies
    a. 2012 Flood Mitigation Plan
    b. 2015 Hazard Mitigation Plan
    c. Natural Floodplain Functions Plan
    d. Other planned mitigation efforts
    e. Brainstorm additional strategies
4. Next Steps
5. Adjourn

Page 1 of 1

Chatham County Floodplain Management Plan

FMPC Meeting #4 Minutes
Thursday, November 29, 2017, 1:30-3:30 p.m.
Held at Frank Murray Community Center

David Stroud, a consultant with Amec Foster Wheeler, opened the meeting by providing the meeting agenda. There were 11 people in attendance, including 6 members of the FMPC, 2 County representatives serving in an advisory capacity, as well as Mr. Stroud and 2 consultants from Ecological Planning Group, Ed DiTommaso and Chris Tolleson. Mr. Stroud then discussed the agenda items as reviewed below.

Planning Process Progress Review

Mr. Stroud began a PowerPoint presentation with a review of the progress made thus far in the planning process. Currently we are moving forward to CRS Step 7 Review possible activities and CRS Step 8 Draft an action plan. Efforts on CRS Step 2 Involve the public and CRS Step 3 Coordinate will continue throughout the planning process.

Recap Flood Hazards & Goals

To prepare the FMPC to develop mitigation strategies, Mr. Stroud first led a review of the flood hazards identified in the Hazard Identification and Risk Assessment (HIRA). The planning team found in the HIRA that hurricane & tropical storm, climate change & sea level rise, 100-/500-year flood, stormwater/localized flooding, and coastal/stream bank erosion were all priority hazards, while dam failure was not a priority hazard for the community.

Develop Mitigation Strategies

Next, Mr. Stroud led the FMPC in the development of mitigation actions. First, the group reviewed mitigation strategies from the 2012 Flood Mitigation Plan and the 2015 Hazard Mitigation Plan to determine whether any of these actions were relevant to the goals of this plan and should be incorporated into this planning effort. The FMPC also reviewed and discussed plans, policies, and actions from other mitigation efforts, including the Disaster Recovery Plan, the Comprehensive Plan, the Capital Improvement Plan, and the Greenway Implementation Study. Mr. Stroud asked the FMPC to consider any other mitigation projects that might be relevant to this plan when they brainstormed mitigation actions. Throughout the process of brainstorming mitigation actions for the FMP, the FMPC also considered the findings of the Natural Floodplain Functions Plan (NFP) and considered actions that could meet the goals of that plan as well. Through this process, the group developed a preliminary list of actions for both plans. It was agreed that the consultant team with Amec Foster Wheeler would review this list and make additional suggestions for the FMPC to review and prioritize using a prioritization ranking table to score each action on a variety of criteria within the following categories: area of impact, goals, technical, administrative resources, political/legal, financial, and environmental.

Next Steps

Mr. Stroud asked the FMPC to continue brainstorming mitigation actions and provide their feedback on prioritization for each action. He informed the group that the next step would be to finish and review the complete draft plan and hold the final FMPC and public meetings before submitting the plan for scoring by ISO. To conclude the meeting, Mr. Stroud took questions from the group.

Adjourn

The meeting was adjourned at 3:30 p.m.

Chatham County, GA
Floodplain Management Planning Committee Meeting

Wednesday November 29th, 1:30 PM

	Name	Organization	Phone	E-Mail
1.	DAVID STROUD	AMEC FW	919-325-6497	david.Stroud@amecfw.com
2.	Jodi Moody	Chatham County	912 898-3320	jlmoody@chathamCounty.org
3.	Michael Blakely	Chatham Co. Engr.	912 652-7814	mblakely@chathamcounty.org
4.	CHRIS TOLLESON	EPG	912-660-4847	chris@ecologicalplanning.net
5.	Cliff Grove	Chatham Res.	912 401 2737	cgrowe07@comcast.net
6.	Randall Mathews	CEMA	912-201-4500	rjmathews@chathamcounty.org
7.	ED DOMMISSE	EPG	912 598 3407	ED@ecologicalplanning.net
8.	Christine Williams	Chatham Co.	912 652-7850	cwilliams@chathamcounty.org
9.	DAVID ANDERSON	Engineering	912 652-7854	dganderson@chathamcounty.org
10.	TOM MCDONALD	CITY OF SAVANNAH	912 651 6530	tmcdonald@savannahga.gov
11.	Jeff Brady	Rountree Brady Ins	912-356-3815	JEFFBRADY@ALLSTATE.COM
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FMPC Meeting 5:

Chatham County Floodplain Management Plan

Floodplain Management Planning Committee Meeting #5 Agenda
Thursday, February 15, 2018, 2:30-3:30 p.m.
Held at the Department of Family and Children Services (DFCS), 761 Wheaton Street

1. Planning Process Progress Review
    a. Public Involvement & Coordination Ongoing
    b. Adopt the Plan
    c. Implementation & Maintenance
    d. Next Steps
2. Structure of the Plan
3. Recap of Goals & Objectives
4. Review of the Planning Process
5. Review of the HIRA
6. Review Mitigation Strategies
7. Questions
8. Adjourn

Page 1 of 1

Chatham County Floodplain Management Plan

FMPC Meeting #5 Minutes
Thursday, February 15, 2018, 2:30-3:30 p.m.
Held at the Department of Family and Children Services, 761 Wheaton St.

David Stroud, a consultant with Amec Foster Wheeler, opened the meeting by providing the meeting agenda. There were 9 people in attendance, including 7 members of the FMPC, 2 County representatives serving in an advisory capacity, as well as Mr. Stroud and a consultant from Ecological Planning Group, Chris Tolleson. Mr. Stroud then discussed the agenda items as reviewed below.

Planning Process Progress Review

Mr. Stroud began a PowerPoint presentation with a review of the progress made thus far in the planning process. With the draft plan complete, the next step will be to adopt the plan after it has been reviewed and updated to incorporate feedback on the draft. Once the plan is adopted, implementation and maintenance will begin and will be ongoing. Efforts on CRS Step 2 Involve the public and CRS Step 3 Coordinate will also continue throughout the implementation and maintenance process. Next steps include sending the plan to ISO for a technical review, gathering feedback and incorporating comments into a final draft, adopting the plan, and setting up quarterly FMPC meetings to review implementation.

Structure of the Plan

Mr. Stroud next went through a review of the major components of the plan to familiarize the FMPC with the document and prepare committee members for providing comments and feedback. He presented an overview of each section of the plan and its contents.

Review of the Plan

Following the structural overview, Mr. Stroud discussed several components of the plan in more detail. He reviewed the plan goals and objectives, the planning process and participation throughout all planning meetings, public participation and outreach throughout the process, as well as a review of the HIRA findings. Finally, Mr. Stroud presented the mitigation strategy and reviewed the prioritization process with the FMPC. Projects were prioritized based on their meeting certain criteria for both ease and importance of implementation, including area of impact, goals, technical, administrative resources, political/legal, financial, and environmental. Using this process, each mitigation action was assigned an overall implementation ranking based on its expected implementation timeline and its priority ranking. The final action plan with ranked actions was presented and discussed to ensure consensus on the actions and their implementation rankings.

Questions

To conclude the meeting, Mr. Stroud took questions from the group.

Adjourn

The meeting was adjourned at 3:30 p.m.

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Chatham County, GA
Floodplain Management Planning Committee Meeting

Thursday February 15th, 3:00 PM

	Name	Organization	Phone	E-Mail
1.	CHRIS TOLLESON	ECOLOGICAL PLANNING GROUP	(912)660-4847	chris@ecologicalplanning.net
2.	Cliff Growe		912 401 2737	cgrowe07@comcast.net
3.	Christine Williams	Chatham Co.	912-652-7850	cwilliams@chathamcounty.org
4.	Bill McElveen		912-652-7824	smcelveen@chathamcounty.org
5.	Randall Mathews	Chatham EMA	912-201-4500	rjmathews@chathamcounty.org
6.	Jeff Brady	RBF	912-356-3815	JEFFBRADY@ALLSTATE.COM
7.	TOM MCDONALD	CITY OF SAVANNAH	912 651 6530	tmcdonald@savannahga.gov
8.	Michael Blakely	Chatham County Eng.	912 652-7814	mblakely@chathamcounty.org
9.	DAVID STROUD	AMEC FOSTER WHEELER	919 325 6497	david.stroud@amecfw.com
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Planning Step 2: Involve the Public

Table A.2: Public Meeting Dates

Meeting Type	Meeting Topic	Meeting Date	Meeting Locations
Public Meeting #1	3) Introduction to DMA, CRS and the planning process 4) Introduction to hazard identification	May 10, 2017 6:00 – 7:00 p.m.	761 Wheaton St. Room #1009C Savannah, GA
Public Meeting #2	3) Review "Draft" Floodplain Management Plan 4) Solicit comments and feedback from the FMPC	February 15, 2018 5:00 – 6:00 p.m.	761 Wheaton Street, Room #1009A Savannah, GA

Public Meeting Agendas, Minutes, Sign-in Sheets, and Advertisements

Public Meeting 1: May 10, 2017

Chatham County Floodplain Management Plan

Project Kick-Off - Public Meeting Agenda
Wednesday, May 10, 2017, 6:00-7:00 p.m.
Held at 761 Wheaton Street, Room 1009C, Savannah, GA

1. Introductions
2. Trends in Disasters – Why Plan?
3. Planning Requirements
    a. Disaster Mitigation Act (DMA) Requirements
    b. Community Rating System (CRS) Requirements
        i. Basics of the CRS
        ii. NFIP Flood Insurance Discounts
        iii. Benefits of the CRS
4. Planning Process
    a. CRS Activity 510 Floodplain Management Planning (FMP) Process
        i. 10-step process
    b. CRS Activity 510 Repetitive Loss Area Analysis (RLAA) Process
        i. 5-step process
    c. CRS Activity 510 Natural Floodplain Functions Plan (NFP) Process
        i. 7-step process
5. Adjourn

Page **1** of **1**

Chatham County Floodplain Management Plan

Project Kick-Off – Public Meeting Minutes
Wednesday, May 10, 2017, 6:00-7:00 p.m.
Held at 761 Wheaton Street, Room 1009C, Savannah, GA

Introductions

David Stroud, a consultant with Amec Foster Wheeler, opened the meeting by providing the meeting agenda. Eight people were in attendance, including two members of the FMPC, five members of the public, and Mr. Stroud. Mr. Stroud then discussed the agenda items as reviewed below.

Trends in Disasters

Mr. Stroud began a PowerPoint presentation with a review of the trends in disasters. There has been an increase in population and community growth in recent years, which means that more people are living in hazardous areas and there is greater exposure to hazard risk. Exposure to risk include the people as well as the infrastructure and buildings. Because exposure has increased, when hazard events occur they cause more damage. There has been a continual increase in hazard expenses and an increase in the issuance of major disaster declarations. Mr. Stroud reviewed a list of the top 10 natural disasters by FEMA relief costs. All of them occurred within the last 28 years, and 4 of the top 5 occurred within the last 13 years. Mr. Stroud also noted that these costs generally include federal aid amounts, but that the actual cost of disasters to state and local governments, businesses, insurance companies, homeowners, and others is much higher. Four reasons why addressing these trends is a priority were presented: 1) the cost of doing nothing is too high, as the costs of response and recovery continue to grow; 2) many events are predictable and repetitive; 3) loss reduction activities can be undertaken, and they work, they're cost effective and environmentally sound, and there are funds available to help; and 4) there are legal and moral responsibilities to act.

Planning Requirements

Next, Mr. Stroud reviewed the Disaster Mitigation Act (DMA) of 2000 planning requirements, which include a four-phase planning process: organize resources, risk assessment, develop a mitigation plan, and adoption and implementation. The consultant team's approach blends this four-phase process with the processes of the Flood Mitigation Assistance (FMA) Program and the Community Rating System (CRS) Floodplain Management Planning. This completed Floodplain Management Plan (FMP) will meet the requirements of all three FEMA programs.

A review of the CRS basic requirements and benefits was provided. The CRS has 10 classes defined by a point-based system, where points are earned for floodplain management, mitigation, and higher standards, and a 5 percent premium discount is awarded for every 500 points (or 1 class level improvement). Chatham County is currently a Class 5 community seeking improvement to Class 4. Currently, the average premium cost is $714 in Chatham County, with an average savings of $182 and a total of 17,266 policies. There are 11,629 policies inside the Special Flood Hazard Area (SFHA) with an average premium of $855 and an average savings of $267.

Planning Process

This planning process will include the development of a Floodplain Management Plan (FMP), Repetitive Loss Area Analysis (RLAA), and Natural Floodplain Functions Plan (NFP). The public was presented a review of the process and opportunities for involvement throughout and told how to find more information.

The flood hazards identified in a preliminary review were discussed. The hazards identified are: Stream Bank Erosion, Dam/Levee Failure, Flood: 100-/500-year, Flood: Stormwater/Localized, Hurricane and Tropical Storms, and Repetitive Flooding.

Next Steps

To conclude the meeting, Mr. Stroud discussed the upcoming next steps, including a forthcoming survey that members of the public can complete to provide information to the planning committee.

Mr. Stroud took questions from the group.

Adjourn

The meeting was adjourned at 7:00 p.m.

Chatham County, GA
Floodplain Management Planning Public Meeting

Wednesday May 10th, ~~3:00~~ PM 6:00PM

	Name	Organization	Phone	E-Mail
1.	DAVID STRAUD	AMEC FOSTER WHEELER	919 325-6497	david.straud@amecfw.com
2.	Michael Blakely	Chatham County Engr.	912 652-7814	mblakely@chathamcounty.org
3.	Surita Campbell	(resident) Chatham Cty	912.351-0844	campbellsgc@hotmail.com
4.	Aaron and Karen Blanz	Resident	912-662-2899	aaron.blanz@Gmail.com
5.	Randall Mathews	CEMA	912-201-4500	rjmathews@chathamcounty.org
6.	BERT BARRETT, JR	BARRETT LAND SURVEYING	912-897-6661	bert@barrettlandsurveying.net
7.	Kerry Demere	Resident	912-308-1465	Kerdeme@gmail.com
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Public Meeting 1 Press Release

Chatham County Board of Commissioners
124 Bull Street, Savannah, GA 31401

News Release • May 4, 2017
For Immediate Release

Public Meeting on Floodplain Management Announcement

Savannah, GA – (May 4, 2017) Chatham County is seeking public input in developing a Floodplain Management Plan, a requirement to maintain eligibility for FEMA's National Flood Insurance Program funding and Community Rating System insurance discounts. A public meeting is scheduled for May 10, 2017 at 6 PM at 761 Wheaton Street, Savannah, GA, Room1009C.

Participating individuals and organizations will be asked to share their thoughts on Chatham County's flood hazard risks. The information will be used to develop the hazard identification and risk assessment portion of the plan. Your participation is encouraged to help to further reduce the flooding risk in Chatham County.

For more information, please contact Michael Blakely, Chatham County Floodplain Administrator, at mblakely@chathamcounty.org.

Public Meeting 1 County Announcement

Chatham County Board of Commissioners
124 Bull Street, Savannah, GA 31401

Public Meeting on Floodplain Management Announcement

Savannah, GA – (May 4, 2017) Chatham County is seeking public input in developing a Floodplain Management Plan, a requirement to maintain eligibility for FEMA's National Flood Insurance Program funding and Community Rating System insurance discounts. A public meeting is scheduled for May 10, 2017 at 6 PM at 761 Wheaton Street, Savannah, GA, Room1009C.

Participating individuals and organizations will be asked to share their thoughts on Chatham County's flood hazard risks. The information will be used to develop the hazard identification and risk assessment portion of the plan. Your participation is encouraged to help to further reduce the flooding risk in Chatham County.

For more information, please contact Michael Blakely, Chatham County Floodplain Administrator, at mblakely@chathamcounty.org.

FOR MORE INFORMATION CONTACT:
Catherine Neal Glasby
Public Information Officer
Chatham County
912-652-7897

Public Meeting 1 Announcement in Local News

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Public meeting being held to discuss Chatham County's Floodplain Management Plan

Published: Wednesday, May 10th 2017, 5:21 am EDT
Updated: Wednesday, May 10th 2017, 5:32 am EDT

By Jennifer Lifsey, Digital Producer CONNECT

(Source: WTOC)

SAVANNAH, GA (WTOC) - Chatham County is hosting a public meeting on Wednesday, May 10 to discuss the county's Floodplain Management Plan.

This is a requirement to maintain eligibility for FEMA's National Flood Insurance Program funding and Community Rating System insurance discounts.

Participating individuals and organizations will be asked to share their thoughts on Chatham County's flood hazard risks. The information will be used to develop the hazard identification and risk assessment portion of the plan.

The city of Savannah website shows that FEMA officials previously prepared a coastal flood study to update Flood Insurance Rate Maps for communities in coastal Chatham County.

Developing a floodplain management plan will help area residents understand and reduce the risk of flooding, know how future floods may affect them and if specific flood insurance and building requirements apply to their property.

Wednesday's public meeting will begin at 6 p.m. at 761 Wheaton Street, Room 1009C.

Public Meeting 1 Announcement in Local News

Posted May 8, 2017 11:05 am - Updated May 8, 2017 11:07 am

Chatham County hosting public meeting on floodplain management

Comments 0 Share

Chatham County is inviting the public to weigh in on a new floodplain management plan being developed by staff.

There will be a public meeting at 6 p.m., Wednesday at 761 Wheaton Street, Savannah, GA, Room 1009C., to discuss the plan, which, according to a notice from the county, is a requirement for the county to stay eligible under the Federal Emergency Management Agency's National Flood Insurance Program and the Community Rating System, which offers discounts to participating communities.

The county's ranking in the Community Rating System is **one of the best around,** but it's also been a source of contention with the public because additional insurance savings come with **additional rules.**

The information gathered at the public meeting Wednesday will be used to help the county develop hazard identification and risk assessment portions of the floodplain management plan. Those in attendance will get to share their thoughts on the county's flood hazard risks. It could benefit some to be involved. Many Chatham Countians learned the hard way during Hurricane Matthew that flooding can occur, **even in the areas not considered at high risk for flooding**.

For more information about the meeting, contact Michael Blakely, Chatham County Floodplain Administrator, at **mblakely@chathamcounty.org**.

Public Meeting 1 Announcement on Facebook

Public Meeting 1 Announcement on County Website

Public Meeting 2: February 15, 2018

Chatham County Floodplain Management Plan

Public Meeting #2 Agenda
Thursday, February 15, 2018, 5:00-6:00 p.m.
Held at the Department of Family and Children Services (DFCS), 761 Wheaton Street

1. Planning Process Progress Review
    a. Public Involvement & Coordination Ongoing
    b. Adopt the Plan
    c. Implementation & Maintenance
    d. Next Steps
2. Structure of the Plan
3. Review of Plan
    a. Recap of Goals & Objectives
    b. Review of the Planning Process
    c. Review of the HIRA
4. Present Mitigation Strategies
5. Questions
6. Adjourn

Page 1 of 1

Chatham County Floodplain Management Plan

Public Meeting #2 Minutes
Thursday, February 15, 2018, 5:00-6:00 p.m.
Held at the Department of Family and Children Services, 761 Wheaton St.

David Stroud, a consultant with Amec Foster Wheeler, opened the meeting by providing the meeting agenda. There were 4 people in attendance, including 2 members of the public, a member of the FMPC, as well as Mr. Stroud. Mr. Stroud then discussed the agenda items as reviewed below.

Planning Process Progress Review

Mr. Stroud began a PowerPoint presentation with a review of the progress made thus far in the planning process. With the draft plan complete, the next step will be to adopt the plan after it has been reviewed and updated to incorporate feedback on the draft. Once the plan is adopted, implementation and maintenance will begin and will be ongoing. Efforts on CRS Step 2 Involve the public and CRS Step 3 Coordinate will also continue throughout the implementation and maintenance process. Next steps include sending the plan to ISO for a technical review, gathering feedback and incorporating comments into a final draft, adopting the plan, and setting up quarterly FMPC meetings to review implementation.

Structure of the Plan

Mr. Stroud next went through a review of the major components of the plan to familiarize attendees with the document. He presented an overview of each section of the plan, discussing its contents and importance to the document.

Review of the Plan

Following the structural overview, Mr. Stroud discussed several components of the plan in more detail. He reviewed the plan goals and objectives, the planning process and participation throughout all planning meetings, public participation and outreach throughout the process, as well as a review of the HIRA findings. Within the HIRA, each hazard was presented, total County exposure was shown, and the risk and vulnerability to each flood hazard was discussed. The final priority risk index for ranking the hazards was shown and discussed. Hurricane/tropical storm and climate change/sea level rise are high risk hazards. Coastal erosion, stormwater/localized flooding, and 100-/500-year flooding are moderate risk hazards, and dam failure is a low risk hazard.

Finally, Mr. Stroud presented the mitigation strategy and reviewed the prioritization process with the attendees. Projects were prioritized based on their meeting certain criteria for both ease and importance of implementation, including area of impact, goals, technical, administrative resources, political/legal, financial, and environmental. Using this process, each mitigation action was assigned an overall implementation ranking based on its expected implementation timeline and its priority ranking. The final action plan with ranked actions was presented and discussed.

Questions

To conclude the meeting, Mr. Stroud took questions from the group. He also informed the attendees that they could review the document online and provide feedback or comments that would be reviewed for incorporation into the final draft.

Adjourn

The meeting was adjourned at 6:00 p.m.

Chatham County, GA
Floodplain Management Planning Public Meeting

Thursday February 15th, 5:00 PM

	Name	Organization (resident)	Phone	E-Mail
1.	DAVID STROUD	Amec Foster Wheeler	919 325 6497	david.stroud@amecfw.com
2.	Michael BLAKELY	Chatham County.org	912 596-8006	mblakely@chathamcounty.org
3.	Bob Wells	WJCL-TV		
4.	Jessica Routt	Thomas & Hutton	912-721-4342	routt.j@thomasandhutton.com
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Public Meeting 2 Announcement in Local News

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Public encouraged to attend Chatham County flood management meeting Thursday

Published: Thursday, February 15th 2018, 8:26 am EDT
Updated: Thursday, February 15th 2018, 8:26 am EDT

By WTOC Staff CONNECT

Flooded street in Savannah following a heavy downpour. (Source: WTOC)

SAVANNAH, GA (WTOC) - Chatham County and its Floodplain Management Planning Committee have been working for months to develop a plan that addresses the different types of flooding impacting our area.

A draft plan will be presented at the Chatham County Department of Family and Children Services at 761 Wheaton Street (Room #1009A), on Thursday evening at 5 p.m. The public is encouraged to attend this presentation.

If you are not able to go, a copy of the draft can be found on the Chatham County website by clicking here. Comments on the draft plan can also be submitted to Michael Blakely Floodplain Administrator / CRS Program Manager, Chatham County Department of Engineering, 124 Bull Street, Room 430, Savannah, Georgia 31401, or by e-mail at mblakely@chathamcounty.org.

Public Survey

Chatham County distributed a public survey that requested public input into the Floodplain Management Plan planning process and the identification of mitigation activities that could lessen the risk and impact of future flood hazard events. The survey was provided on the County's website and distributed at the first public meeting.

FLOODPLAIN PROTECTION QUESTIONNAIRE

Name: _____

Property Address: _____

1. How many years have you lived in the home/building at this address?
   - ☐ Less than 1
   - ☐ 1-5 years
   - ☐ 5-10 years
   - ☐ 10+ years

2. Do you rent or own this home/building?
   - ☐ Rent
   - ☐ Own

3. What type of foundation does the home/building have?
   - ☐ Slab
   - ☐ Crawl Space
   - ☐ Basement
   - ☐ Other: _____

4. Has this home/building or property ever been flooded or had a water problem?
   - ☐ Yes
   - ☐ No (If "no", please skip to question 9)

5. In what year(s) did it flood? _____

6. Where did you get water and how deep did it get?
   - ☐ In basement: _____ deep
   - ☐ In crawl space: _____ deep
   - ☐ Over 1st floor: _____ deep
   - ☐ In yard only: _____ deep
   - ☐ Water was kept out of house by sandbagging, sewer valve, or other protective measure

7. What was the longest time that water stayed in the house/building? _____

8. What do you feel was the cause of your flooding? Check all that affect your home/building.
   - ☐ Storm sewer backup
   - ☐ Sanitary sewer backup
   - ☐ Standing water next to house/building
   - ☐ Drainage from nearby properties
   - ☐ Saturated ground / leaks in basement walls
   - ☐ Overbank flooding from: _____
   - ☐ Other: _____

9. What flood protection measures have you installed on the property?
   - ☐ Sump pump
   - ☐ Waterproofed the outside walls
   - ☐ Re-graded yard to keep water away
   - ☐ Moved things out of basement
   - ☐ Backup power system / generator
   - ☐ Sandbagged
   - ☐ None
   - ☐ Other: _____

Page **1** of **2**

FLOODPLAIN PROTECTION QUESTIONNAIRE, *CONTINUED*

10. Did any of the measures checked in item 9 work? If so, which ones? If not, do you know why they did not work?

11. Is your home located in a Federal Emergency Management Agency (FEMA) floodplain?
    - ☐ Yes
    - ☐ No
    - ☐ I don't know

12. Do you have FEMA Flood Insurance?
    - ☐ Yes
    - ☐ No
    - ☐ I don't know

13. Do you want information on protecting your home/building from flooding?
    - ☐ Yes
    - ☐ No

14. Please include any additional information and comments you may have about flooding in your area:

Please help us by completing this survey by September 5, 2017 and returning it to:

Michael Blakely, Floodplain Administrator
Chatham County
Department of Engineering
124 Bull Street, Room 430
Savannah, Georgia 31404
Phone (912) 652-7814

Surveys can also be emailed to mblakely@chathamcounty.org

Page **2** of **2**

Only two responses to the survey were received, the results of which are summarized below. The County will continue to make the survey available and accept responses in order to identify any areas of stormwater flooding issues that can be addressed through the County's regular inspection and maintenance.

Q1. How many years have you occupied the building at this address?

Answer Choices	Number Responding
Less than 1	0
1-5	0
5-10	0
10+	2
Total	**2**

Q2: Do you rent or own this building?

Answer Choices	Number Responding
Rent	0
Own	2
Total	**2**

Q3: What type of foundation does the building have?

Answer Choices	Number Responding
Slab	2
Crawl Space	0
Basement	0
Other	0
Total	**2**

If other:

Q4: Has this building or property ever been flooded or had a water problem?

Answer Choices	Number Responding
Yes	0
No	2
Total	**2**

Q5: In what year(s) did it flood?

Q6: Where did you get water and how deep did it get?

Answer Choices	Number Responding
In basement	0
In crawl space	0
Over 1st floor	0
In yard only	0
Water was kept out of house by sandbagging, sewer valve, or other protective measure	0
Total	**0**

Q7: What was the longest time that water stayed in the building? No answers.

Q8: What do you feel was the cause of your flooding? Check all that affect your building.

	Number Responding
Storm sewer backup	0
Sanitary sewer backup	0
Standing water next to house/building	0
Drainage from nearby properties	0
Saturated ground / leaks in basement walls	0
Overbank flooding from: _____	0
Other	0
Total	**0**

Other:

Q9: Have you installed any flood protection measures on the property?

Answer Choices	Number Responding
Sump pump	0
Waterproofed the outside walls	0
Re-graded yard to keep water away	0
Moved things out of basement	0
Backup power system / generator	1
Sandbagged	0
Other	1
Total	**2**

Other: Placed furniture up on elevate blocks

Q10: Did any of the measures checked in item 9 work? If so, which ones? If not, do you know why they did not work?

Yes:

- Generator works fine
- The furniture that was elevated is ok. Carpets moved upstairs are ok. Heavier furniture and carpets are a loss

Q11: Is the building located in a Federal Emergency Management Agency (FEMA) floodplain?

Answer Choices	Number Responding
Yes	1
No	0
I don't know	1
Total	**2**

Q12: Do you have FEMA Flood Insurance?

Answer Choices	Number Responding
Yes	2
No	0
I don't know	0
Total	**2**

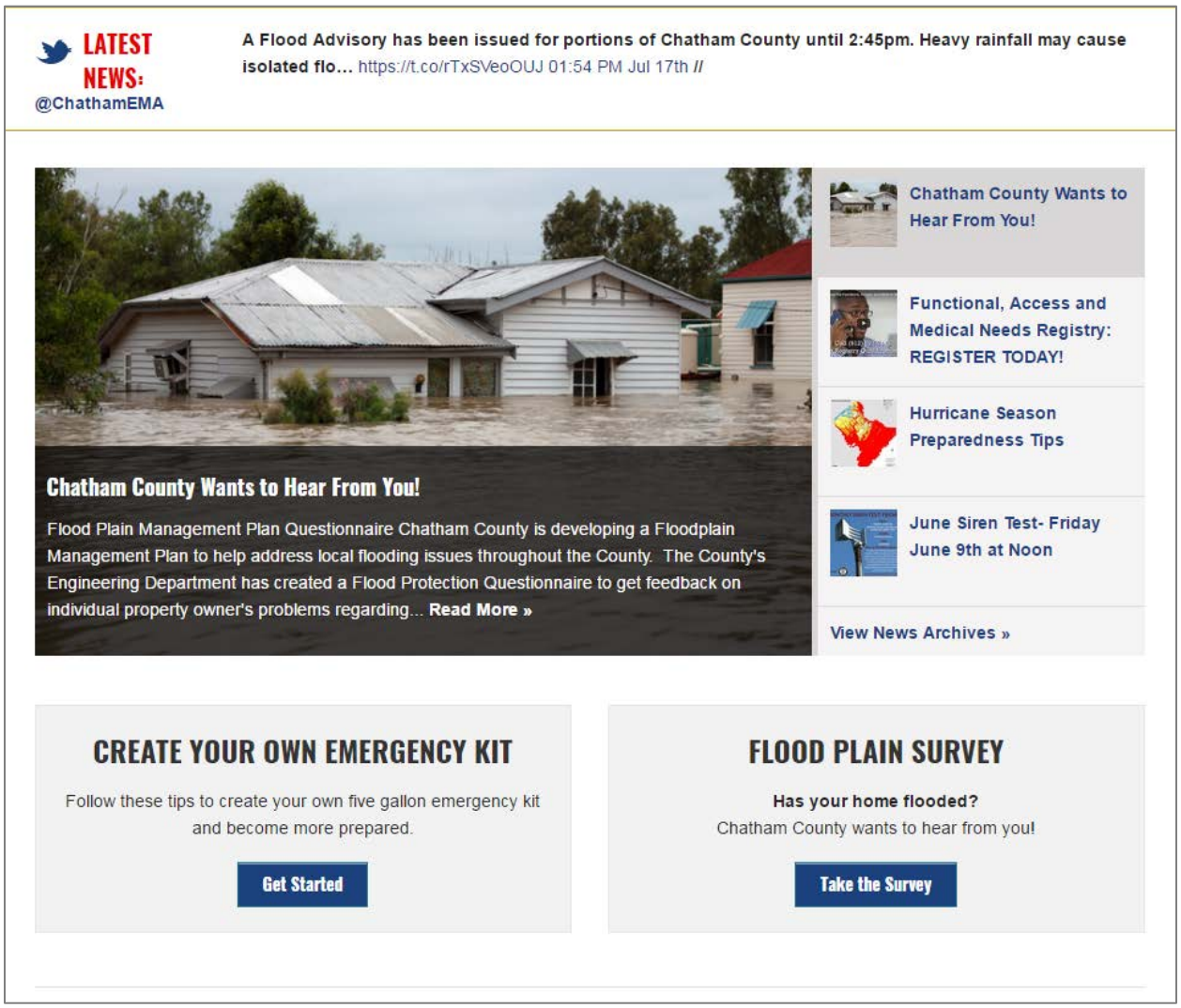
Q12: Do you want information on protecting your home/building from flooding?

Answer Choices	Number Responding
Yes	1
No	1
Total	**2**

Q13: Please include any additional information and comments you may have about flooding in your area:

- This was the first time in the 10 years we have lived in Marsh Harbor that anyone has had water in their house. We water in our yards and water in the road with tropical storms but never water in the house.

Public Survey posted on County's website



EMERGENCY MANAGEMENT
CHATHAM COUNTY

WHEN EMERGENCY SITUATIONS OCCUR: STAY INFORMED!

EMAILS | PHONE CALLS | TEXT MSGS | SIREN SYSTEM

NEWS | JULY 13, 2017 9:30 AM

CHATHAM COUNTY WANTS TO HEAR FROM YOU!

Flood Plain Management Plan Questionnaire

Chatham County is developing a Floodplain Management Plan to help address local flooding issues throughout the County. The County's Engineering Department has created a Flood Protection Questionnaire to get feedback on individual property owner's problems regarding flooding to support the plan's development. Now is the time to have your voice heard and help create positive change in our community.

Below, you will find the survey.
Chatham County Flood Protection Survey.pdf

All completed surveys should be mailed to:
Michael Blakely, Floodplain Administrator
Chatham County Department of Engineering
124 Bull Street, Room 430
Savannah, Georgia 31404
OR
send it via email to **Michael Blakely**

If you have questions or concerns, please call (912) 652-7814

NOW ACCEPTING RE-ENTRY APPLICATIONS FOR CRITICAL WORKFORCE

After a disaster, Chatham County's re-entry process is divided into four categories. For more information or to find out if you qualify for early re-entry, **click here.**

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Has your home flooded before? If so, Chatham County wants to hear from you!
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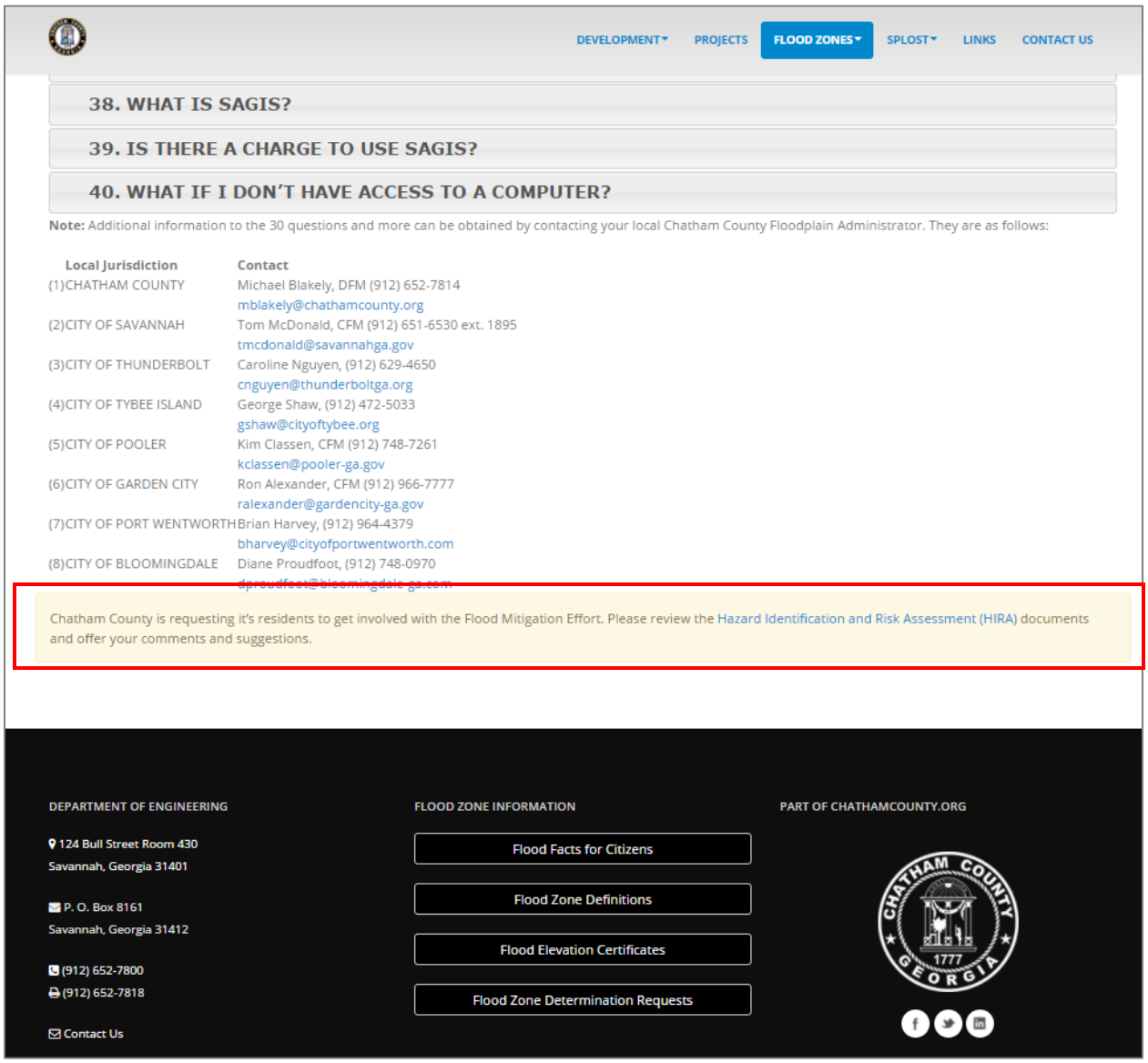
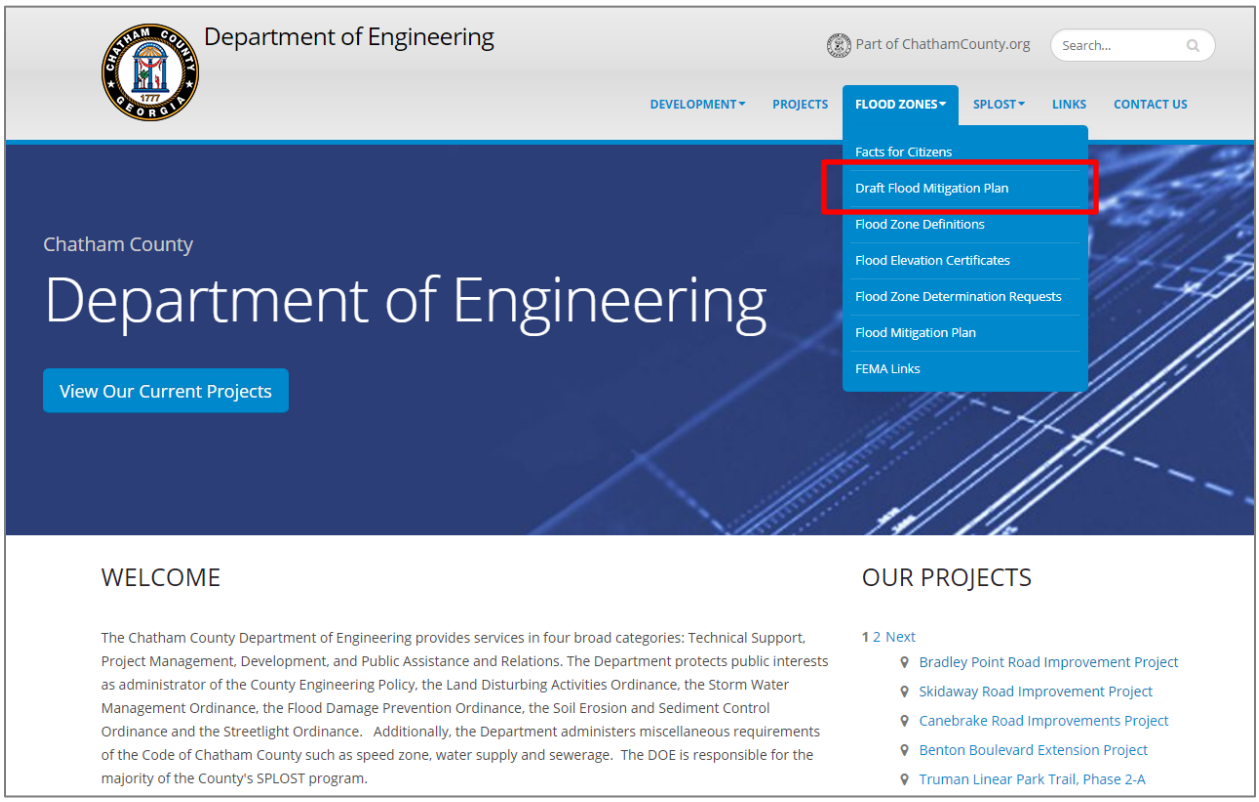
The **Draft Risk and Vulnerability Assessment** was posted for public review and comment on the County's website, and a copy was made available at the County's Administration Building.

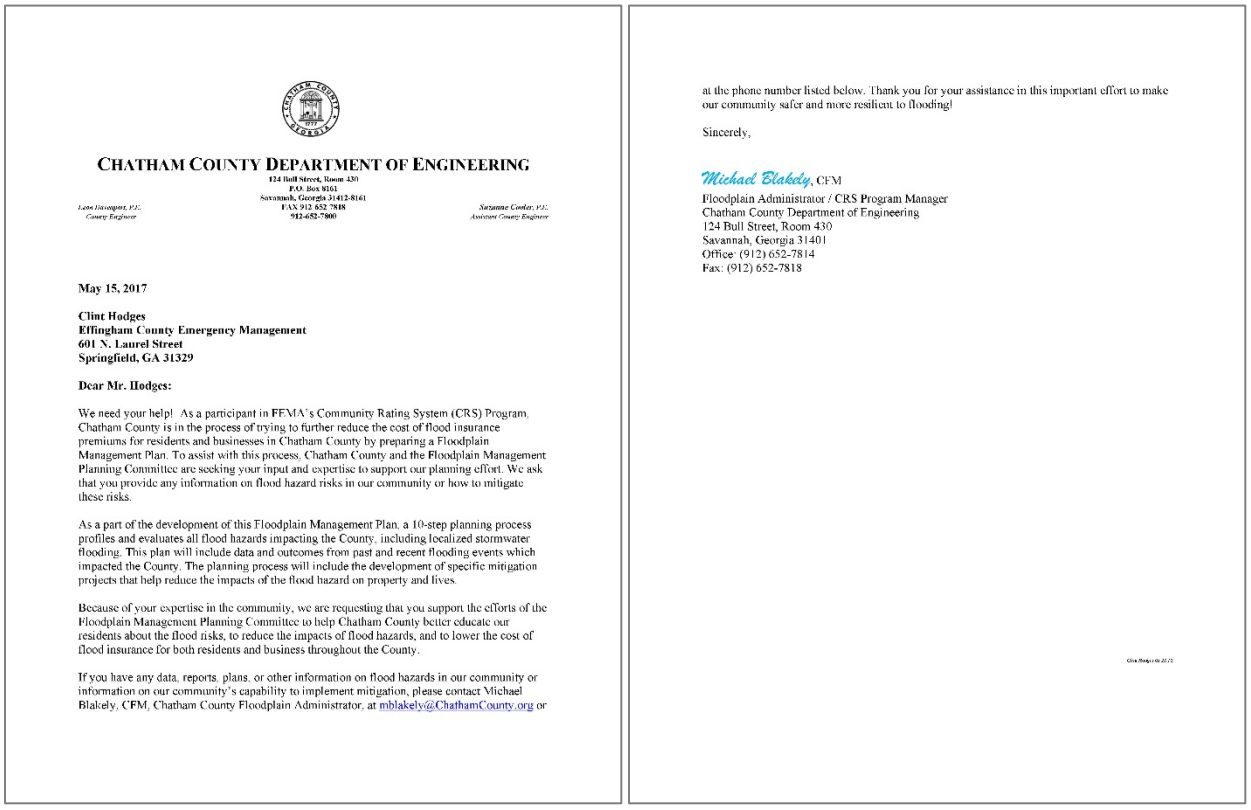


Chatham County posted the entire **Draft Floodplain Management Plan** on its website for public review and comment.



Planning Step 3: Coordinate

This planning step credits the incorporation of other plans and other agencies' efforts into the development of the Floodplain Management Plan. Other agencies and organizations must be contacted to determine if they have studies, plans and information pertinent to the Floodplain Management Plan, to determine if their programs or initiatives may affect the community's program, and to see if they could support the community's efforts. A sample coordination letter is provided below. A copy of all coordination letters can be provided upon request by the Chatham County Department of Engineering.



CHATHAM COUNTY DEPARTMENT OF ENGINEERING

124 Bull Street, Room 430
P.O. Box 8161
Savannah, Georgia 31412-8161
FAX 912 652 7818
912-652-7800

Lane Davenport, P.E.
County Engineer

Suzanne Cooler, P.E.
Assistant County Engineer

May 15, 2017

Clint Hodges
Effingham County Emergency Management
601 N. Laurel Street
Springfield, GA 31329

Dear Mr. Hodges:

We need your help! As a participant in FEMA's Community Rating System (CRS) Program, Chatham County is in the process of trying to further reduce the cost of flood insurance premiums for residents and businesses in Chatham County by preparing a Floodplain Management Plan. To assist with this process, Chatham County and the Floodplain Management Planning Committee are seeking your input and expertise to support our planning effort. We ask that you provide any information on flood hazard risks in our community or how to mitigate these risks.

As a part of the development of this Floodplain Management Plan, a 10-step planning process profiles and evaluates all flood hazards impacting the County, including localized stormwater flooding. This plan will include data and outcomes from past and recent flooding events which impacted the County. The planning process will include the development of specific mitigation projects that help reduce the impacts of the flood hazard on property and lives.

Because of your expertise in the community, we are requesting that you support the efforts of the Floodplain Management Planning Committee to help Chatham County better educate our residents about the flood risks, to reduce the impacts of flood hazards, and to lower the cost of flood insurance for both residents and business throughout the County.

If you have any data, reports, plans, or other information on flood hazards in our community or information on our community's capability to implement mitigation, please contact Michael Blakely, CFM, Chatham County Floodplain Administrator, at mblakely@ChathamCounty.org or at the phone number listed below. Thank you for your assistance in this important effort to make our community safer and more resilient to flooding!

Sincerely,

Michael Blakely, CFM
Floodplain Administrator / CRS Program Manager
Chatham County Department of Engineering
124 Bull Street, Room 430
Savannah, Georgia 31401
Office: (912) 652-7814
Fax: (912) 652-7818

Table A.3: FMPC Documentation Request List

	First Name	Last Name	Organization/Position	Email	Address 1	Address 2
CHATHAM COUNTY, GA FLOODPLAIN MANAGMENT PLAN LIST OF STAKEHOLDERS						
Educational Institutions						
1	Phillip	Adams	Savannah State University, University Advancement	adamsp@savannahstate.edu	Gardner Hall, Box 20439	Savannah, GA 31404
2	Paula	Wallace	Savannah College of Art & Design	communications@scad.edu	P.O. Box 2072	Savannah, GA 31402
3	Wei	Tu	Georgia Southern University, Geology & Geography	wtu@georgiasouthern.edu	P.O. Box 8149	Statesboro, GA 30460-8149
4	Letty	Shearer	Armstrong State University	shearerle@mail.armstrong.edu	11935 Abercorn Street	Savannah, Georgia 31419
Neighboring Communities						
5	Clint	Hodges	Effingham County, Emergency Management	EEMA@EffinghamCounty.org	601 N. Laurel Street	Springfield, GA 31329
6	Chief Freddy	Howell	Bryan County, Emergency Services	fhowell@bryan-county.org	51 North Courthouse Street	Pembroke, GA 31321
7			Jasper County, SC Emergency Management	emergencymanagement@jaspercountsc.gov	P.O. Box 1509	Ridgeland, SC 29936
8	Lt. Col. Neil	Baxley	Beaufort County, SC Emergency Management	neilb@bcgov.net	2001 Duke Street	Beaufort, SC 29902
9	Diane	Proudfoot	City of Bloomingdale, Floodplain Manager	dproudfoot@bloomingdale-ga.gov	P.O. Box 216	Bloomingdale, GA 31302
10	Kim	Classen	City of Pooler, Floodplain Manager	kclassen@pooler-ga.gov	100 SW Hwy 80	Pooler, GA 31322
11	Brian	Harvey	City of Port Wentworth, Development Services Department	bharvey@cityofportwentworth.com	305 South Coastal Highway	Port Wentworth, GA 31407
12	Caroline	Nguyen	Town of Thunderbolt, Floodplain Manager	cnguyen@thunderboltga.org	2821 River Drive	Thunderbolt, GA 31404
13	George	Shaw	City of Tybee Island Planning & Zoning	gshaw@cityoftybee.org	403 Butler Avenue	Tybee Island, GA 31328

	First Name	Last Name	Organization/Position	Email	Address 1	Address 2
Federal Government						
14	Susan	Wilson	FEMA Region IV, Chief, Floodplain Management & Insurance Branch	susan.wilson@fema.dhs.gov	3003 Chamblee Tucker Rd. - Hollins Bldg.	Atlanta, GA 30341
15	Janice	Mitchell	FEMA Region IV, Mitigation Division	janice.mitchell@fema.dhs.gov	3003 Chamblee Tucker Rd. - Hollins Bldg.	Atlanta, GA 30341
16	Sue	Hopfensperger	ISO/CRS Specialist	shopfensperger@iso.com	463688 State Road 200, Suite 1-428	Yulee, FL 32097
17	Eric	Strom	USGS – GA: Savannah Field Office	ewstrom@usgs.gov	5710 Ogeechee Road, Suite 200, #291	Savannah, GA 31405
18	Michael	Emlaw	NOAA - National Weather Service	nws.charlestonsc@noaa.gov	5777 South Aviation Avenue	North Charleston, SC 29406
19	Tom	Charles	U.S. Army Corps of Engineers Savannah District, Regulatory Division	cesas-rd@usace.army.mil	100 West Oglethorpe Avenue	Savannah, GA 31401
State Government						
20	Kristen	Higgs	GEMA/HS Area Eight Coordinator	kristen.higgs@gema.ga.gov	3395 Harris Road, Suite 300	Waycross, GA 31503
21	Terry	Lunn	State Hazard Mitigation Officer	terry.lunn@gema.ga.gov	P.O. Box 18055	Atlanta, GA 30316
22	Haydn	Blaize	GA DNR Environmental Protection Division – Floodplain Management	Haydn.blaize@dnr.ga.gov	2 Martin Luther King Jr. Drive, Suite 1456 East Tower	Atlanta, GA 30334
Business Community & Non-Profits Organizations						
23	Esther	Sheppard	American Red Cross	esther.sheppard@redcross.org	P.O. Box 9987	Savannah, GA 31412
24	Mary	Landers	Savannah Now	mary.landers@savannahnow.com	P.O. Box 1088	Savannah, GA 31402
25	Scott	Galloway	WTOC News	sgalloway@wtoc.com	P.O. Box 8086	Savannah, GA 31412
26	Heath	Lloyd	Savannah Water Supply - I & D WATER	hlloyd@savannahga.gov	P.O. Box 1027	Savannah, Georgia 31401
27	Tina	Tyus-Shaw	WSAV 3: Anchor/Reporter	ttyus@wsav.com	1430 East Victory Sr.	Savannah, GA 31404
28	Katherine	Moore	The GA Conservancy – Sustainable Growth Program Manager	kmoore@gaconservancy.org	Coastal Office, 428 Bull St.	Savannah, GA 31401
29	Karen	Jenkins	Savannah Tree Foundation, Executive Director	karen@savannahtree.com	3025 Bull Street	Savannah, GA 31405
30	Karen	Grainey	Sierra Club – Coastal Group	karengrainey@bellsouth.net	7609 La Roche Ave	Savannah, GA 31406

APPENDIX B REVIEW MITIGATION STRATEGIES

44 CFR Subsection D §201.6(c)(3)(ii): [The mitigation strategy section shall include] a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

As part of the process of developing the mitigation action plan found in Section 7.3, the FMPC reviewed and considered a comprehensive range of mitigation options before selecting the 21 actions identified for implementation. This section summarizes the full range of mitigation measures evaluated and considered by the FMPC, including a review of the categories of mitigation measures outlined in the 2017 CRS Coordinator's Manual, a discussion of current local implementation and CRS credits earned for those measures, and a list of the specific mitigation projects considered and recommended for implementation.

Mitigation alternatives considered for implementation by the Chatham County FMPC were evaluated and prioritized using the criteria discussed in Section 7.2.1 Prioritization Process.

B.1 CATEGORIES OF MITIGATION MEASURES CONSIDERED

Once it was determined which flood hazards warranted the development of specific mitigation actions, the FMPC analyzed viable mitigation options that supported the identified goals and objectives. The FMPC was provided with the following list of mitigation categories which are utilized as part of the CRS planning process.

- Prevention
- Property Protection
- Natural Resource Protection
- Emergency Services
- Structural Projects
- Public Information and Outreach

B.2 ALTERNATIVE MITIGATION MEASURES PER CATEGORY

Note: the CRS Credit Sections are based on the 2017 CRS Coordinator's Manual.

B.2.1 Preventative and Regulatory Measures

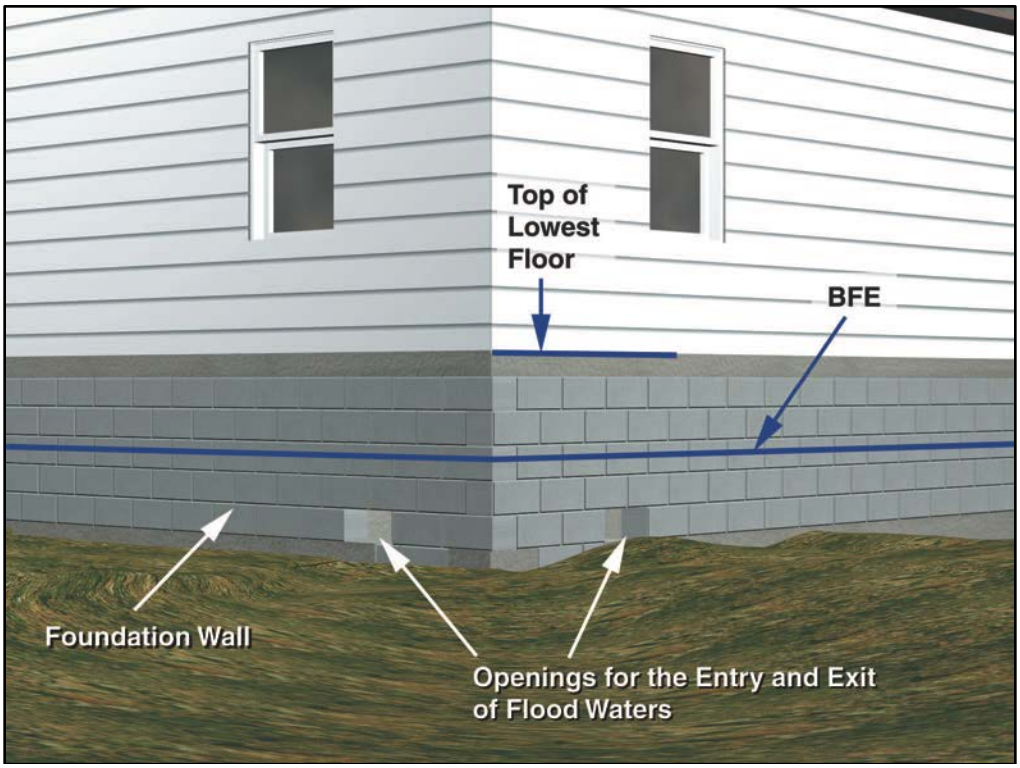
Preventative measures are designed to keep a problem - such as flooding - from occurring or from getting worse. The objective of preventative measures is to ensure that future development is not exposed to damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventative measures. Some examples of types of preventative measures include:

- Building codes
- Zoning ordinance
- Comprehensive or land use plan
- Open space preservation
- Floodplain regulations
- Subdivision regulations
- Stormwater management regulations

Building Codes

Building codes provide one of the best methods for addressing natural hazards. When properly designed and constructed according to code, the average building can withstand many of the impacts of natural hazards. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Building codes can ensure that the first floors of new buildings are constructed to be higher than the elevation of the 100-year flood (the flood that is expected to have a one percent chance of occurring in any given year). This is shown in Figure B.1.

Just as important as having code standards is the enforcement of the code. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly elevated and anchored requires site inspections at each step.



Source: FEMA Publication: *Above the Flood: Elevating Your Floodprone House, 2000*

Figure B.1 – Building Codes and Flood Elevations

As of February 26, 2016, Chatham County has adopted the current edition of the International Building Code. In accordance with the IBC, the ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than one unit vertical in 20 units horizontal (5-percent slope) for a minimum distance of 10 feet measured perpendicular to the face of the wall. If physical obstructions or lot lines prohibit 10 feet of horizontal distance, a 5-percent slope shall be provided to an *approved* alternative method of diverting water away from the foundation. Swales used for this purpose shall be sloped a minimum of 2 percent where located within 10 feet of the building foundation. Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2-percent away from the building.

ASCE 24 is a referenced standard in the International Building Code. Any building or structure that falls within the scope of the IBC that is proposed in a flood hazard area is to be designed in accordance with ASCE 24. Freeboard is required as a function of the nature of occupancy and the flood zone. Dwellings and most other buildings have 1-foot of freeboard; certain essential facilities have 2-3 feet; only agricultural facilities, temporary facilities and minor storage facilities are allowed to have their lowest floors at the BFE. In accordance with Chatham County's Flood Damage Prevention Ordinance (effective January 1, 2017), in all special flood hazard areas where BFE data has been provided, the elevation to which all structures and other development located within the special flood hazard areas must be elevated, or floodproofed if non-residential, shall be the BFE plus one foot of freeboard.

The Chatham County Department of Engineering is responsible for ensuring the public safety through the enforcement of federal, state, and local codes governing construction. County staff review plans, issue building permits, and perform inspections to ensure Code compliance related to aspects of life-safety, structural integrity, energy conversation, accessible design and electrical, plumbing, fuel gas, heating and air conditioning systems.

Comprehensive or Land Use Plan

Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, particularly floodplains and wetlands. They do this by designating land uses that are compatible with the natural conditions of land that is prone to flooding, such as open space or recreation. Planning and zoning activities can also provide benefits by simply allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach.

The 2016 Chatham County-Savannah Comprehensive Plan was adopted in February 2017. This plan was prepared by the Metropolitan Planning Commission, which is a joint planning commission that provides land use, transportation, natural resource, and related planning services to the Chatham County and Savannah, GA area. The 2016 Comprehensive Plan examines existing conditions in the region, including issues and opportunities for growth and development. The plan also considers future conditions that could impact the County such as housing, population characteristics and economic conditions. The Comprehensive Plan is intended to ensure that the region grows in ways that enhance the community's vitality and overall quality of life. The plan focuses on economic development opportunities, transportation, housing, and land use. It also addresses land preservation, the development of parks and recreation facilities, as well as the protection of natural resources and environmental quality.

Open Space Preservation

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Comprehensive and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced or a payment is made to the owner if the owner agrees to not build on the part set aside in the easement.

Although there are some federal programs that can help acquire or reserve open lands, open space lands and easements do not always have to be purchased. Developers can be encouraged to dedicate park land and required to dedicate easements for drainage and maintenance purposes.

Chatham County has many parks and other public lands designated as open space, including approximately 70 percent of the SFHA. Along some water features such as marsh lands, certain portions

of lots have restrictive regulations which prohibit any development including placement of fill (buffer requirements).

Zoning Ordinance

Chatham County zoning regulations consist of both a zoning map and a written ordinance that divides the jurisdictions into zoning districts, including various residential, commercial, mixed-use and industrial districts. The zoning regulations describe what type of land use and specific activities are permitted in each district, and how to regulate how buildings, signs, parking, and other construction may be placed on a lot. The zoning regulations also provide procedures for rezoning and other planning applications. The zoning map and zoning regulations provide properties in Chatham County's planning and zoning jurisdiction with certain rights to development.

Floodplain Regulations

Chatham County's Floodplain Management Ordinance requires that all new residential construction or substantial improvement shall have the lowest floor, including the basement, elevated to no lower than one foot above the base flood elevation (BFE). In VE Zones, structures must have their lowest horizontal member elevated to one foot above the BFE. Additionally, the Chatham County Zoning Ordinance requires that build permits be obtained from the County Department of Building Safety & Regulatory Services. The Stormwater Ordinance restricts the placement of fill in SFHAs. The County Land Disturbing Activities requires permits for certain activities and requires soil erosion control best management practices. Together, these ordinances protect development in the floodplain from flood damage.

Chatham County enforces reconstruction regulations to ensure that mitigation is integrated into recovery. Requiring permits for building repairs and conducting inspections are vital activities to ensure that damaged structures are safe for people to reenter and repair. There is a special requirement to do this in floodplains, regardless of the type of disaster or the cause of damage. The NFIP requires that local officials enforce the substantial damage regulations. These rules require that if the cost to repair a building in the mapped floodplain equals or exceeds 50% of the building's market value, the building must be retrofitted to meet the standards of a new building in the floodplain. In Chatham County, this means that a substantially damaged building must be elevated above the base flood elevation.

Stormwater Management Regulations

Stormwater runoff is increased when natural ground cover is replaced by urban development. Development in the watershed that drains to a river can aggravate downstream flooding, overload the community's drainage system, cause erosion, and impair water quality. There are three ways to prevent flooding problems caused by stormwater runoff:

1) Regulating development in the floodplain to ensure that it will be protected from flooding and that it won't divert floodwaters onto other properties;
2) Regulating all development to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions; and
3) Set construction standards so buildings are protected from shallow water.

Chatham County's Stormwater Management Ordinance requires that a stormwater management plan (SWMP) be developed for all projects required to have a permit for land disturbing activities. These SWMPs must include better site design practices for stormwater management, treat stormwater runoff quality, provide stream channel protection, and provide downstream overbank flood protection. The SWMPs must also provide extreme flood protection such that there is no increase in flood elevations upstream or downstream from the 100-year flood.

Reducing Future Flood Losses

Zoning and comprehensive planning can work together to reduce future flood losses by directing development away from hazard prone areas. Creating or maintaining open space is the primary way to reduce future flood losses. Chatham County has many open space and natural parcels which serve to reduce future flood losses by remaining open. These parks and natural preserved areas create opportunities for the public to benefit from education and recreation while eliminating potential for future flooding. The Chatham County-Savannah Future Land Use Map designates preservation, conservation, and conservation-residential lands to maintain open space throughout the County.

Planning for open space must also be supplemented with development regulations to ensure that stormwater runoff is managed and that development is protected from flooding. Future flood losses in Chatham County will be reduced through the implementation of the 2015 International Building Code, the County's 2017 Flood Damage Prevention Ordinance, and Stormwater Management Ordinance. Enforcement of the flood protection elevation requirement will provide an extra level of protection for buildings constructed in the County.

Stormwater management and the requirement that post-development runoff cannot exceed pre-development conditions is one way to prevent future flood losses. Retention and detention requirements also help to reduce future flood losses.

CRS Credit

The CRS encourages strong building codes. It provides credit in two ways: points are awarded based on the community's Building Code Effectiveness Grading Schedule (BCEGS) classification and points are awarded for adopting the International Code series. Chatham County's BCEGS rating is a 5/4 for residential and commercial, respectively. The FMPC did not recommend any projects related to the building code since the County is already implementing the most current version of the International Building Code.

CRS credits are available for regulations that encourage developers to preserve floodplains or other hazardous areas away from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. Chatham County currently receives credit for Activity 430 – Higher Regulatory Standards. Additionally, Chatham County currently receives credit for Activity 420 – Open Space Preservation for preserving 70 percent of the SFHA as open space. Preserving flood prone areas as open space is one of the highest priorities of the Community Rating System. The credits in the 2017 manual have doubled for OSP (Open Space Preservation). Chatham County also currently receives credit for Activity 450 – Stormwater Management for enforcing regulations for stormwater management and soil and erosion control. The FMPC did not recommend any changes to the County's Comprehensive Plan, Zoning Ordinance, or Subdivision Ordinance, but did agree that higher standards should be considered for the Flood Damage Prevention Ordinance.

Table B.1 – Prevention Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Prevention Measures Considered by FMPC and Not Recommended			
-	Encourage voluntary compliance with floodplain development regulations.	Could save money on enforcement but would not guarantee compliance with standards.	n/a
-	Manage growth and development in the County through a constantly updated Master Plan.	Limited staff resources to support constant updates to a Master Plan.	n/a
-	Regulate development within Chatham County's coastal barrier areas	Development of a sea level rise adaptation plan instead would enable better-informed regulation of these and other at-risk areas.	n/a

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Prevention Measures and Funding Recommended for Implementation			
3	Update and enforce building codes and Flood Damage Prevention Ordinance and consider higher regulatory standards to better protect existing and future development.	By updating these regulations to require higher standards, such as an increased freeboard or elevation of electrical equipment, and by enforcing these codes throughout the development process to ensure compliance, Chatham County can limit the vulnerability of new development to flooding.	Operating Budget
4	Continue to enforce Flood Damage Prevention requirements through on-site floodplain inspections.	Increased enforcement of development regulations will ensure that new development will be less vulnerable to flooding.	Operating Budget
6	Improve stormwater management regulations to include higher standards for design storm, size of development regulated, low-impact development, and public maintenance of detention and retention facilities.	Incorporating higher standards into stormwater management regulations will help to minimize the stormwater runoff generated by new development and can potentially provide for on-site stormwater management to mitigate existing problems.	Operating Budget
7	Create new drainage maintenance SOP to include natural drainage features within unincorporated Chatham County.	Expanding drainage maintenance procedures to include natural drainage features will reduce the risk of flooding by ensuring the entire drainage system is functioning properly.	Operating Budget
12	Enact deed restrictions and other growth management tools to preserve wetland and natural resource areas and conserve their natural and ecological functions.	Preserving wetlands and natural resource areas will protect these important areas for future flood protection and continued water quality improvement.	Operating Budget
14	Integrate the FMP into the Emergency Operations Plan, Pre-Disaster Hazard Mitigation Plan, Comprehensive Plan, and Capital Improvement Program.	Integrating planning efforts can be incorporated easily into regular updates. It will help to reinforce the goals, objectives, and actions of this plan and increase the ease and likelihood of implementation.	Operating Budget
21	Develop a long-range regional plan for sea level rise which evaluates multiple adaptation methods.	Analyzing exactly which areas and properties are at risk and then planning and implementing adaptation strategies accordingly can protect the County from suffering the full impact of sea level rise.	-

B.2.2 Property Protection Measures

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building;
- Modify the building (retrofit) so it can withstand the impacts of the hazard; and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency.

Keeping the Hazard Away

Generally, natural hazards do not damage vacant areas. As noted earlier, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. For example, a berm can be built to prevent floodwaters from reaching a house.

This low floodwall has landscaping to minimize the adverse impact on the property's appearance.

Flooding

There are five common methods to keep a flood from reaching and damaging a building:

- Erect a barrier between the building and the source of the flooding.
- Move the building out of the flood-prone area.
- Elevate the building above the flood level.
- Demolish the building.
- Replace the building with a new one that is elevated above the flood level.

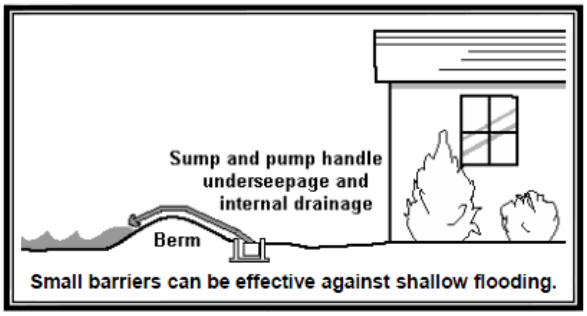
The latter three approaches are the most effective types to consider in Chatham County.

Small, wood frame buildings are the easiest to relocate

Source: Kennedy House Movers, Huntsville, AL

Barriers

A flood protection barrier can be built of dirt or soil (a "berm") or concrete or steel (a "floodwall"). Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that will fall inside the perimeter. This is usually done with a sump or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier. Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and properly maintained.



Small barriers can be effective against shallow flooding.

Relocation

Moving a building to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost increases for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.

Building Elevation

Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents. Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that

require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

Demolition

Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damages. It is cheaper to demolish them and either replace them with new, flood protected structures, or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move – such as larger, slab foundation or masonry structures – and for dilapidated structures that are not cost-beneficial to protect.

Demolishing a repetitively flooded home

Pilot Reconstruction

If a building is not in good shape, elevating it may not be worthwhile or it may even be dangerous. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood protection codes. FEMA funding programs refer to this approach as "pilot reconstruction." It is still a pilot program, and not a regularly funded option. Certain rules must be followed to qualify for federal funds for pilot reconstruction.

Retrofitting

An alternative to keeping the hazard away from a building is to modify or retrofit the site or building to minimize or prevent damage. There are a variety of techniques to do this, as described below.

- ***Dry Floodproofing***

  Dry floodproofing means making all areas below the flood protection level watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

  Dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other storms.

- ***Wet Floodproofing***

  The alternative to dry floodproofing is wet floodproofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Insurance

Technically, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild, and hopefully afford to incorporate some of the other property protection measures in the process. Insurance offers the advantage of protecting the property, so long as the policy is in force, without requiring human intervention for the measure to work.

- ***Private Property***
  Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the NFIP. Flood insurance coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area. Most people purchase flood insurance because it is required by the bank when they get a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. Contents coverage can be purchased separately. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. Most people don't realize that there is a 30-day waiting period to purchase a flood insurance policy and there are limits on coverage.

- ***Public Property***
  Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can drain the government's budget. Communities cannot expect federal disaster assistance to make up the difference after a flood.

Local Implementation/CRS Credit

The CRS provides the most credit points for acquisition and relocation under Activity 520, because this measure permanently removes insurable buildings from the floodplain. Chatham County does currently receive credit for Activity 520 – Acquisition and Relocation, for having acquired and relocated 22 buildings from the SFHA. The FMPC recommended that the County continue the purchase of repetitive loss buildings and other buildings which are subject to flood damage in order to return this land to open space.

The CRS also credits barriers and elevating existing buildings under Activity 530. The credit for Activity 530 is based on the combination of flood protection techniques used and the level of flood protection provided. Points are calculated for each protected building. Bonus points are provided for the protection of repetitive loss buildings and critical facilities. Chatham County does not currently receive credit for Activity 530 – Flood Protection, but the County does receive credit for Activity 360 – Flood Protection Assistance. The County staff has the technical expertise to provide advice and assistance to homeowners who may want to flood proof their home or business. Advice is provided both on property protection techniques and on financial assistance programs to help fund mitigation. Though it was not selected as a mitigation action due because it is already established and ongoing, the FMPC agreed that the County should continue to publicize technical assistance for Activity 360 Flood Protection Assistance.

Flood insurance information for the County is provided in Section 6.4.3. Chatham County publicizes the requirement for flood insurance to those requesting FIRM information through the Mandatory Purchase Requirement and through outreach brochures to residents of the SFHA and repetitive loss areas.

There is no credit for purchasing flood insurance, but the CRS does provide credit for local public information programs that, among other topics, explain flood insurance to property owners. The CRS also reduces the premiums for those people who do buy NFIP coverage. Chatham County currently receives credit for Activity 330 – Outreach Projects. The FMPC would like to focus outreach to property owners on the availability of Increased Cost of Compliance (ICC) coverage, which provides additional funds to repetitive loss properties and substantially damaged properties to offset the cost of improvements needed to bring these properties up to code.

Table B.2 – Property Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Prevention Measures Considered by FMPC and Not Recommended			
-	Continue to publicize technical assistance for Activity 360 Flood Protection Assistance.	This service is already well-established and no additional effort is required for ongoing implementation to continue.	n/a
Prevention Measures and Funding Recommended for Implementation			
2	Acquire and demolish high-risk flood-prone buildings and repetitive loss structures and preserve land as open space.	Acquisition and demolition of repetitive loss structures completely removes the flood problem and eliminates vulnerability while also expanding open space and enhancing the land's natural and beneficial flood management functions.	HMGP
8	Relocate, elevate, or retrofit substantially damaged and/or pre-FIRM properties.	Pre-FIRM properties vulnerable to major flooding should be mitigated to prevent substantial damages, and substantially damaged properties already face high costs to be brought up to code and may benefit from alternative mitigation such as relocation.	HMGP, FMA
9	Encourage the purchase of flood insurance and educate public on Increased Cost of Compliance (ICC) coverage through outreach materials, face-to-face meetings, and presentations to HOAs.	Educating the public on ICC coverage and encouraging the purchase of flood insurance will help protect property owners in the event of a major flood by ensuring that they are aware of the resources available to them to help cover the cost of necessary mitigation.	Operating Budget
19	Elevate lift stations and electrical components above the base flood elevation (BFE).	Lift stations provide flood protection for low-lying areas. Elevating this and other electrical equipment ensures operation during flood events, which limits flood damages.	-

B.2.3 Natural Resource Protection

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. These activities enable the naturally beneficial functions of fields, floodplains, wetlands, and other natural lands to operate more effectively. Natural and beneficial functions of watersheds, floodplains and wetlands include:

- Reduction in runoff from rainwater and stormwater in pervious areas
- Infiltration that absorbs overland flood flow
- Removal and filtering of excess nutrients, pollutants and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved through regulatory steps for protecting natural areas or natural functions. This section covers the resource protection programs and

standards that can help mitigate the impact of natural hazards, while they improve the overall environment. Six areas were reviewed:

- Wetland protection
- Erosion and sedimentation control
- Stream/River restoration
- Best management practices
- Dumping regulations
- Farmland protection

Wetland Protection

Wetlands are often found in floodplains and topographically depressed areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter, which helps to improve water quality, and they provide habitat for many species of fish, wildlife and plants. Chatham County contains 85,666 acres of tidal marshes, primarily in the Ogeechee Coastal and Lower Savannah River Basins.

Erosion and Sedimentation Control

Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along stream banks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil. Sediment suspended in the water tends to settle out where flowing water slows down. This can clog storm drains, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices. Chatham County has adopted a soil and erosion control ordinance.

Stream/River Restoration

There is a growing movement that has several names, such as "stream conservation," "bioengineering," or "riparian corridor restoration." The objective of these approaches is to return streams, stream banks and adjacent land to a more natural condition, including the natural meanders. Another term is "ecological restoration," which restores native indigenous plants and animals to an area.

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve retrofitting the shoreline with willow cuttings, wetland plants, or rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots.

In all, restoring the right vegetation to a stream has the following advantages:

- Reduces the amount of sediment and pollutants entering the water
- Enhances aquatic habitat by cooling water temperature
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and its property value

- Prevents property loss due to erosion
- Provides recreational opportunities, such as hunting, fishing and bird watching
- Reduces long-term maintenance costs

As required by state and federal regulations, Chatham County works with municipal governments to monitor its storm water drainage outfalls and control storm water runoff.

Best Management Practices

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the US EPA. Nonpoint source pollutants come from non-specific locations and harder to regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, other chemicals, animal wastes, oils from street surfaces and industrial areas, and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams.

The term "best management practices" (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). They can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They also minimize water quality degradation, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple usages of drainage and storage facilities.

Chatham County's Stormwater Management Ordinance contains regulations for stormwater BMPs. Because of Chatham County's unique geologic and hydrologic conditions (i.e., poorly drained soils and a shallow water table), the types of appropriate BMPs that can be effectively utilized in the County are limited.

Dumping Regulations

BMPs usually address pollutants that are liquids or are suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' abilities to convey or clean stormwater.

Many cities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property. Waterway dumping regulations need to also apply to "non-objectionable" materials, such as grass clippings or tree branches, which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard without realizing that is needed to drain street runoff. They may not understand how regarding their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

Farmland Protection

Farmland protection is an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime, unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can lead to additional stormwater runoff and emergency management difficulties.

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot afford to be taxed as urban land. The Farmland Protection Program in the United States Department of Agriculture's 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, and local governments as well as nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land.

The FMPC did not recommend any projects related to farmland protection.

Local Implementation/CRS Credit

There is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the percentage of the floodplain that can be documented as wetlands protected from development by ownership or local regulations. Chatham County currently receives credit for Activity 420 – Open Space Preservation for preserving 70 percent of the SFHA as open space. The FMPC recommended the development of a Natural Floodplain Functions plan, to incorporate strategies for the protection of wetlands.

Chatham County currently receives credit for Activity 540 – Drainage System Maintenance. A portion of the County's drainage system is inspected regularly throughout the year and maintenance is performed as needed. Credit is also provided for listing problem sites that are inspected more frequently, and for implementing an ongoing Capital Improvements Program. The County enforces a regulation prohibiting dumping in the drainage system, and annually publicizes the regulation or has appropriate signs posted.

Credit is available for the Erosion and Sediment Control (ESC) element under Activity 450 for regulating activities throughout the watershed to minimize erosion on construction sites that could result in sedimentation and water pollution. Chatham County currently receives credit for soil and erosion control regulations under Activity 450 – Stormwater Management. The FMPC propose protecting wetland and conservation areas along with promoting LID techniques to protect these natural floodplain functions.

Table B.3 – Natural Resource Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Natural Resource Protection Measures Considered by FMPC and Not Recommended			
-	Develop a natural area restoration plan	Developing a Natural Floodplain Functions plan instead, which addresses restoration among other issues and can earn CRS credit.	n/a
Natural Resource Protection Measures and Funding Recommended for Implementation			
11	Promote low-impact development projects where applicable to improve water quality and reduce runoff.	Developers implement the LID techniques, which reduce flood risk by managing stormwater on-site and improve water quality, helping the County reduce risk and meet NPDES targets.	Operating budget
12	Enact deed restrictions and other growth management tools to preserve wetland and natural resource areas and conserve their natural and ecological functions.	Preserving wetlands and natural resource areas will protect these important areas for future flood protection and continued water quality improvement.	Operating budget

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
13	Develop a Natural Floodplain Functions Plan to protect and or restore endangered species and habitat.	Developing this plan will identify mitigation actions to further protect natural floodplain resources and will provide credit in the Community Rating System toward lowering flood insurance premiums.	-

B.2.4 Emergency Services Measures

Emergency services measures protect people during and after a disaster. A good emergency management program addresses all hazards, and it involves all local government departments. This section reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an impending problem (threat recognition) and continues through post-disaster activities.

Threat Recognition

The first step in responding to a flood is to know when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

The National Weather Service (NWS) is the prime agency for detecting meteorological threats. Severe weather warnings are transmitted through NOAA's Weather Radio System. Local emergency managers can then provide more site-specific and timely recognition after the Weather Service issues a watch or a warning. A flood threat recognition system predicts the time and height of a flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On smaller rivers and streams, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The NWS may issue a "flash flood watch." This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

Warning

The next step in emergency response following threat recognition is to notify the public and staff of other agencies and critical facilities. More people can implement protection measures if warnings are early and include specific detail.

The NWS issues notices to the public using two levels of notification:

- Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.
- Warning: a flood, tornado, etc., has started or been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- CodeRED countywide mass telephone emergency communication system
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts

- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact
- Mobile public address systems
- Email notifications

Just as important as issuing a warning is telling people what to do in case of an emergency. A warning program should include a public information component.

StormReady

The National Weather Service (NWS) established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather related warnings for the public. To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises

Being designated a NWS StormReady community is a good measure of a community's emergency warning program for weather hazards. Chatham County is credited by NOAA as a StormReady community.

Response

The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency preparedness)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (public works)
- Holding children at school or releasing children from school (school superintendent)
- Opening evacuation shelters (the American Red Cross)
- Monitoring water levels (public works)
- Establishing security and other protection measures (police)

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to ensure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and of changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner possible.

Evacuation and Shelter

There are six key components to a successful evacuation:

- Adequate warning
- Adequate routes
- Proper timing to ensure the routes are clear
- Traffic control
- Knowledgeable travelers
- Care for special populations (e.g., disabled persons, prisoners, hospital patients, schoolchildren)

Those who cannot get out of harm's way need shelter. Typically, the American Red Cross will staff a shelter and ensure that there is adequate food, bedding, and wash facilities. Shelter management is a specialized skill. Managers must deal with problems like scared children, families that want to bring in their pets, and the potential for an overcrowded facility.

Local Implementation /CRS Credit

Flash flood warnings are issued by National Weather Service Offices, which have the local and county warning responsibility. Flood warnings are forecasts of coming floods, and are distributed to the public by the NOAA Weather Radio, commercial radio and television, and through local emergency agencies. The warning message tells the expected degree of flooding, the affected river, when and where flooding will begin, and the expected maximum river level at specific forecast points during flood crest. The County has a Flood Incident Management (FIM) plan, as part of the Emergency Operations Plan. The FIM plan includes flood threat recognition, emergency warning dissemination, flood response operations, and critical facilities planning. The FMPC recommended the installation of additional flood gauges, in partnership with University of Georgia, to improve threat detection and, as a result, warning capabilities.

Chatham County currently receives credit for Activity 610 – Flood Warning Program for maintaining a program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities. Community Rating System credits are based on the number and types of warning media that can reach the community's flood prone population. Depending on the location, communities can receive credit for the telephone calling system and more credits if there are additional measures, like telephone trees. Being designated as a StormReady community also provides additional credits.

Table B.4 – Emergency Services Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Emergency Services Measures Considered by FMPC and Not Recommended			
-	Develop post-disaster mitigation procedures that assign responsibilities for public information, code enforcement, planning, and other efforts that encourage loss reduction.	To avoid redundancy, these responsibilities are identified in the County's Emergency Operations Plan, and the other mitigation projects identified in this FMP can be used as a guide for flood loss reduction in post-disaster mitigation.	n/a
Emergency Services Measures and Funding Recommended for Implementation			
20	Partner with Georgia Tech to install additional tidal and riverine flood gauges at various locations throughout the County to help provide real-time flood data on the County website.	The County will have better data on flooding and be able to recognize flood threats and issue more timely, accurate warnings.	-

B.2.5 Structural Projects

Four general types of flood control projects are reviewed here: levees, reservoirs, diversions, and dredging. These projects have three advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings.
- Many projects can be built without disrupting citizens' homes and businesses.
- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, as shown below, structural measures also have shortcomings. The appropriateness of using flood control depends on individual project area circumstances.

- Advantages
  - They may provide the greatest amount of protection for land area used
  - Because of land limitations, they may be the only practical solution in some circumstances
  - They can incorporate other benefits into structural project design, such as water supply and recreational uses
  - Regional detention may be more cost-efficient and effective than requiring numerous small detention basins
- Disadvantages
  - They can disturb the land and disrupt the natural water flows, often destroying wildlife habitat
  - They require regular maintenance
  - They are built to a certain flood protection level that can be exceeded by larger floods
  - They can create a false sense of security
  - They promote more intensive land use and development in the floodplain

Levees and Floodwalls

Probably the best known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

Reservoirs and Detention

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, and then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could also help mitigate a drought).

Retention pond

Flood control reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the stormwater runoff impacts of new development.

Diversion

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During floods, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

Local Implementation /CRS Credit

Chatham County does not currently receive credit for Activity 530 – Flood Protection. Structural flood control projects that provide 100-year flood protection and that result in revisions to the Flood Insurance Rate Map are not credited by the CRS so as not to duplicate the larger premium reduction provided by removing properties from the mapped floodplain.

Table B.5 – Structural Projects Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Structural Project Measures Considered by FMPC and Not Recommended			
-	Dredge and increase size of all open channels to increase flow and carrying capacity	No funding to complete project; flow reduction strategies pursued instead	n/a
Structural Project Measures and Funding Recommended for Implementation			
5	Develop stormwater conveyance systems to alleviate flooding for existing and new development.	Improving stormwater conveyance systems in areas where drainage is currently inadequate will reduce stormwater flooding and prevent losses.	-
17	Improve recurring local funding for Public Works maintenance and flood management activities implemented through the Capital Improvements Program.	Identifying additional funding sources for a capital improvement program will enable better advanced planning of Improvements to the stormwater system and more assurance that funding will be available for the needed maintenance.	Operating budget

B.2.6 Public Information

Outreach Projects

Outreach projects are the first step in the process of orienting property owners to the hazards they face and to the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Awareness of the hazard is not enough; people need to be told what they can do about the hazard. Thus, projects should include information on safety, health and property protection measures. Research has shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

Community newsletters/direct mailings: The most effective types of outreach projects are mailed or distributed to everyone in the community. In the case of floods, they can be sent only to floodplain property owners.

News media: Local newspapers can be strong allies in efforts to inform the public. Local radio stations and cable TV channels can also help. These media offer interview formats and cable TV may be willing to broadcast videos on the hazards.

Libraries and Websites

The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government. Today, websites are commonly used as research tools. They provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed on the Internet.

In addition to online floodplain maps, websites can link to information for homeowners on how to retrofit for floods or a website about floods for children.

Technical Assistance

Hazard Information

Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Communities can easily provide map information from FEMA's FIRMs and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never flood.

Property Protection Assistance

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track. Building or public works department staffs can provide the following types of assistance:

- Visit properties and offer protection suggestions
- Recommend or identify qualified or licensed contractors
- Inspect homes for anchoring of roofing and the home to the foundation
- Explain when building permits are needed for home improvements.

Public Information Program

A Program for Public Information (PPI) is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended plan of activities. A PPI consists of the following parts, which are incorporated into this plan:

- The local flood hazard
- The property protection measures appropriate for the flood hazard

- Flood safety measures appropriate for the local situation
- The public information activities currently being implemented within the community, including those being carried out by non-government agencies
- Goals for the community's public information program
- The outreach projects that will be done each year to reach the goals
- The process that will be followed to monitor and evaluate the projects

Local Implementation /CRS Credit

Chatham County currently receives credit under Activity 330 – Outreach Projects as well as Activity 350 – Flood Protection Information. A community brochure is mailed to all properties in the SFHA and all properties in repetitive loss areas on an annual basis. An outreach brochure is also placed at public building locations. Credit is also provided for general outreach projects including publications in local newspapers and expos at fairs. Documents relating to floodplain management are available in the reference section of the Chatham County Regional Library. Credit is also provided for floodplain information displayed on the County's website.

Table B.6 – Public Information and Outreach Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Public Information and Outreach Measures Considered by FMPC and Not Recommended			
-	Provide grants information, planning tools, training, and technical assistance to increase the number of private sector mitigation projects.	This service is already provided under Activity 360 Flood Protection Assistance.	n/a
Public Information and Outreach Measures and Funding Recommended for Implementation			
1	Update County website incorporating new technology to create interactive data and mapping system that will provide online technical assistance to homeowners, real estate agents and insurance agents. Include access to elevation certificates, flood zones, general flood history, repetitive loss areas, and mitigated properties, etc.	Providing information on flood risk and mitigation options to the public can reduce vulnerability through better awareness and encourage private action to reduce risk.	Operating budget
9	Encourage the purchase of flood insurance and educate public on Increased Cost of Compliance (ICC) coverage through outreach materials, face-to-face meetings, and presentations to HOAs.	Educating the public on ICC coverage and encouraging the purchase of flood insurance will help protect property owners in the event of a major flood by ensuring that they are aware of the resources available to them to help cover the cost of necessary mitigation.	Operating budget
10	Display signs along roads and canals at entrances to high, moderate, and low flood risk areas.	Posting signage around high, moderate, and low flood risk areas will reduce vulnerability to flooding by increasing awareness and therefore encouraging residents and visitors to avoid high and moderate flood risk areas during or leading up to a flood event.	Operating budget

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
15	Implement an outreach campaign to educate residents on flood risks, maps, mitigation activities, stormwater, water quality, environmental protection, and the benefits of natural floodplains.	Educating the public on flooding and the hazard area will make people more aware of their risk. Expanding this outreach campaign to include mitigation activities and ecological functions will make people more likely to implement mitigation actions and understand the importance of mitigation actions taken by the County.	Operating budget
16	Develop web-based outreach efforts, including social media.	Social media is an increasingly essential way to communicate with the public. Developing web-based outreach efforts will give Chatham County a larger audience, especially with younger residents.	Operating Budget
18	Use Flood Protection Questionnaire results to identify target areas for outreach and flood protection.	The survey may reveal areas with stormwater flooding problems not yet known to the County.	Operating Budget
20	Partner with Georgia Tech to install additional tidal and riverine flood gauges at various locations throughout the County to help provide real-time flood data on the County website.	The County will have better data on flooding and be able to recognize flood threats and issue more timely, accurate warnings.	-

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